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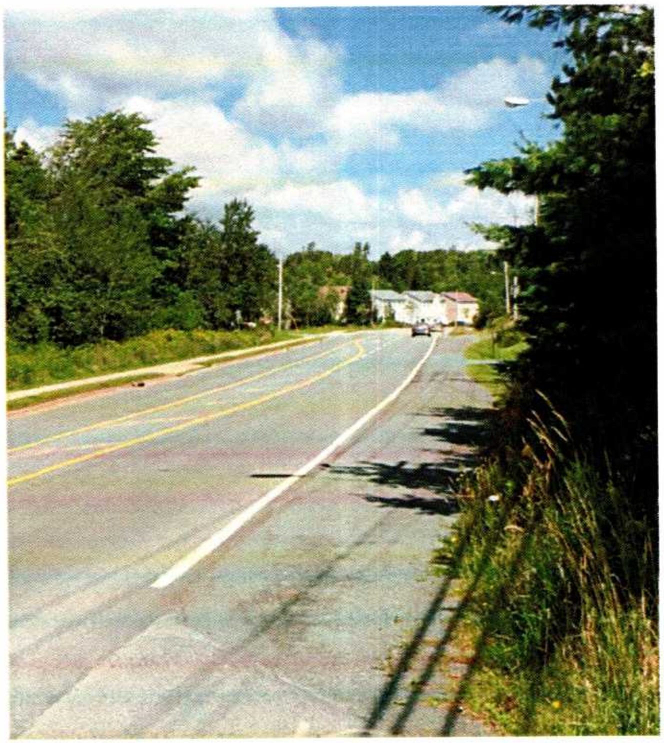

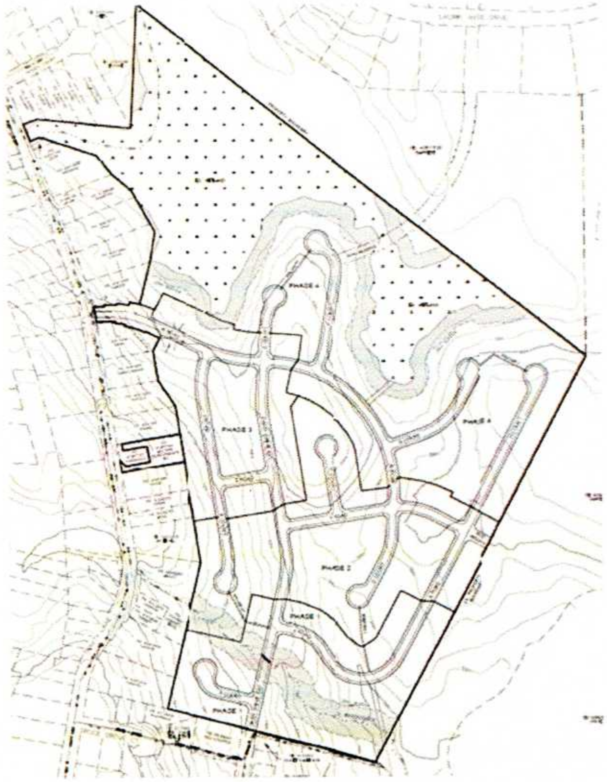

Traffic Impact Study:

Proposed Residential Development

Carriagewood Estates

Beaver Bank, NS

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Presented to:
Mo-Par Developments Inc.

October 2014

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DATE 2014 Oct. 2
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1.0 Introduction

Background

Plans are being prepared by Mo-Par Developments for the development of Carriagewood Estates, a residential subdivision in Beaver Bank, NS. The proposed development is located at PID#00468694, an undeveloped parcel located just north of the existing terminus of Daisy Drive (See Figure 1). It will consist of up to 270 residential units, accessed by an extension of Daisy Drive and a connection to Trinity Lane. Access to Beaver Bank Road will be from Mayflower Avenue (at the south of the development) and Trinity Lane (north of the development). It is anticipated that buildout of the development will be completed by 2024.

WSP Canada Inc. has been retained to complete a Traffic Impact Study satisfactory to the Halifax Regional Municipality (HRM).

A Traffic Impact Study Usually Considers Four Questions

A Traffic Impact Study usually consists of determining answers for the following questions:

1. **What are the existing traffic situations** on roads adjacent to the study site? 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 weekday peak hours? How will the traffic be distributed at the exits from the development and to Study Area roads and intersections?
3. **What traffic impacts will occur** on Study Area roads and intersections? How will level of service of roads and intersections be affected?
4. **What road or intersection improvements are required** to mitigate project impacts on Study Area traffic movements?

Study Objectives

1. Develop projected 2014 and 2024 background weekday AM and PM peak hourly volumes for Study Area roads that do not include trips generated by proposed site development.
2. Estimate the number of weekday AM and PM peak hour trips that will be generated by the proposed development.
3. Distribute and assign site generated trips to Study Area intersections.
4. Add site generated trips to projected 2024 background peak hourly volumes to provide projected volumes that include site generated trips.
5. Evaluate impacts of site generated traffic on the performance and level of service of study intersections.
6. Complete traffic signal warrant analyses, as necessary, for intersections on Beaver Bank Road that are accessed by the proposed development.
7. Complete left-turn and right-turn lane warrants, as necessary, for intersections on Beaver Bank Road that are accessed by the proposed development.
8. Recommend improvements that may be needed at study intersections to mitigate the impacts of site development.

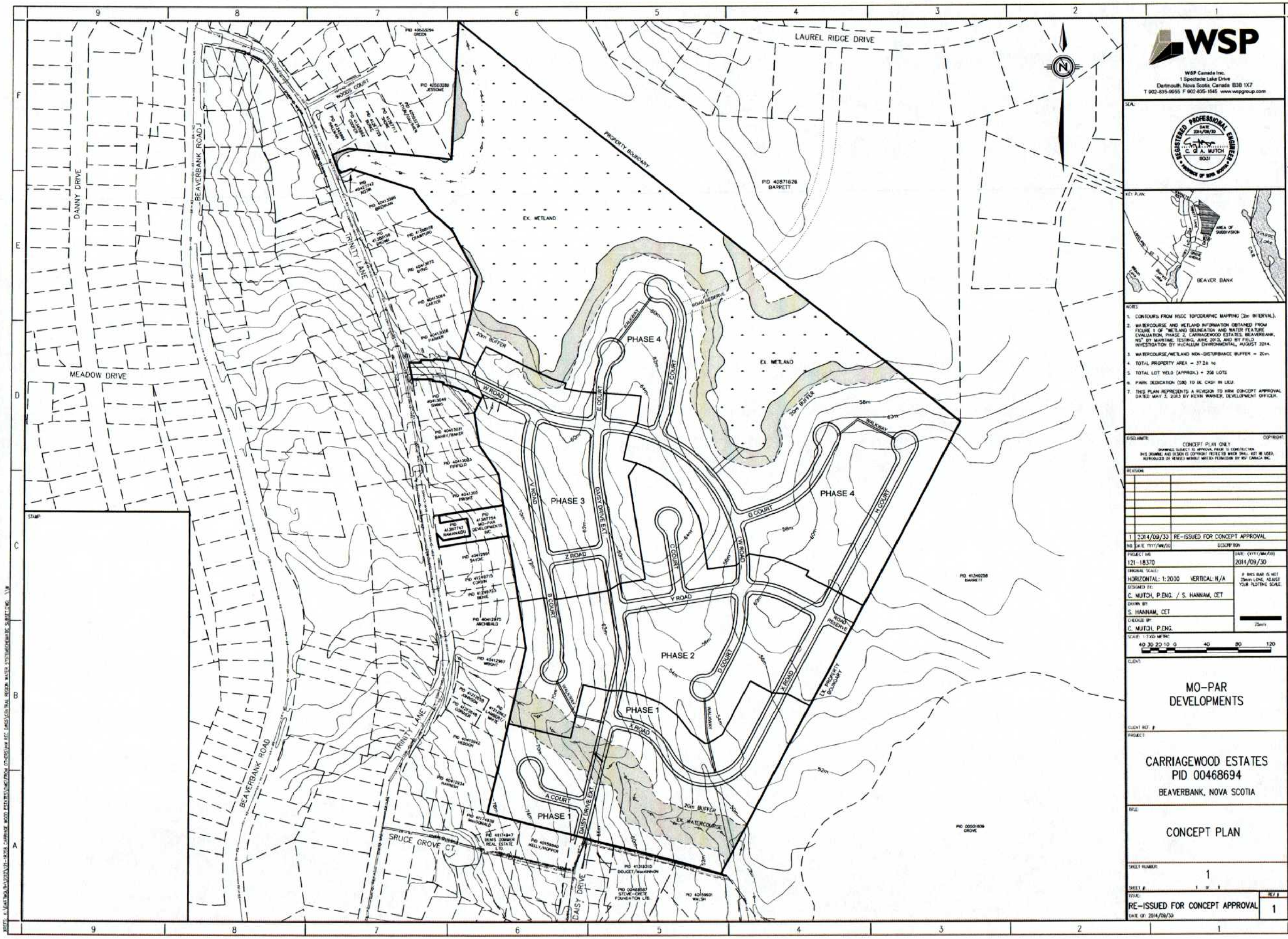


FIGURE 1 - SITE PLAN

2.0 *Study Area Descriptions*

Site Description

The proposed site is an approximately 37 hectare undeveloped parcel located just north of the existing terminus of Daisy Drive and east of Trinity Lane. Access to Beaver Bank Road will be from Mayflower Avenue (at the south of the development) and Trinity Lane (north of the development).

Road and Intersection Descriptions

Beaver Bank Road is a 2-lane collector road that runs approximately 21km between Lower Sackville and East Uniacke Road. In the vicinity of the Study Area, the posted speed limit is 70km/h. Just south of the intersection at Mayflower Avenue, there is a conditional school zone speed limit that reduces to 50km/h "when children are present". Annual average daily traffic volumes on Beaver Bank Road 1.7km north of Trinity Lane are approximately 5,100 vehicles per day (vpd).

Trinity Lane is a 2-lane local residential street that runs north-south approximately 1.3km between Mayflower Avenue and Beaver Bank Road. The majority of its length (approximately 1km) is unpaved. Though not posted, it has an assumed speed limit of 50km/h.

The Beaver Bank Road – Trinity Lane intersection (See Photo 1 and Photo 2) is unsignalized, with stop control on Trinity Lane and the opposing eastbound approach from Barrett Road (local residential street). All approaches are single lane.

Photo 1: Looking south (to the left) on Beaver Bank Road from the Trinity Lane Intersection

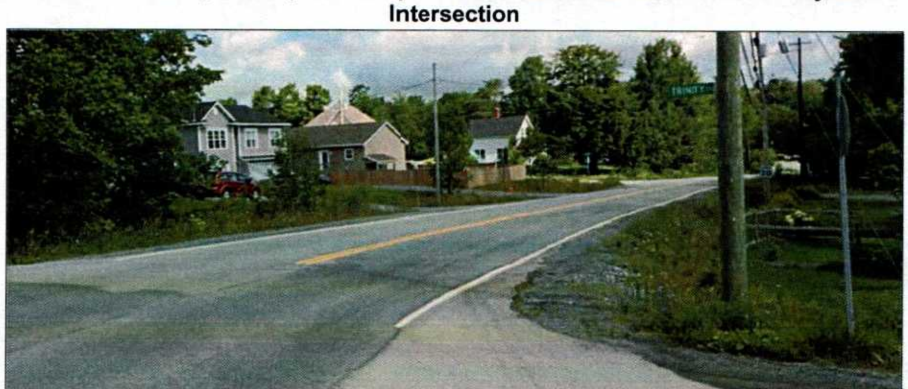


Photo 2: Looking north (to the right) on Beaver Bank Road from the Trinity Lane Intersection

Road and Intersection Descriptions (Continued)

Mayflower Avenue, Ernest Avenue, and ***Daisy Drive*** are 2-lane paved local residential streets located east of Beaver Bank Road near the south end of the proposed development. ***Mayflower Avenue*** extends from Beaver Bank Road approximately 400m to the east. ***Ernest Avenue / Daisy Lane*** run generally east-west approximately 600m between Trinity Lane and Pennington Drive. Each street has a posted speed limit of 50km/h.

The Beaver Bank Road – Mayflower Avenue intersection (See Photo 3 and Photo 4) is unsignalized, with stop control on the Mayflower Avenue approach. All approaches are single lane, however, there is a hatched area in the center of Beaver Bank Road that is used to develop the left turn lane at Danny Drive (approximately 150m to the north).

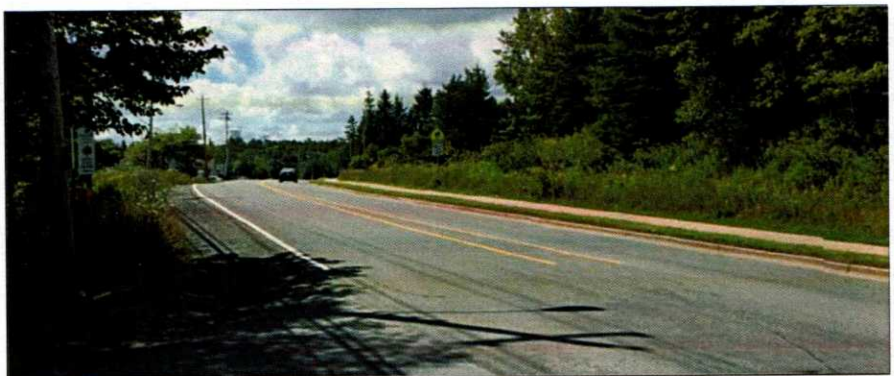


Photo 3: Looking south (to the left) on Beaver Bank Road from the Mayflower Avenue Intersection

Photo 4: Looking north (to the right) on Beaver Bank Road from the Mayflower Avenue Intersection

Public Transportation

Halifax Transit operates Route #400 (formerly Beaver Bank Community Transit) on Beaver Bank Road between Beaver Bank Villa and the Sackville Terminal, where it provides connection to additional routes including the Metrolink service. The route has stops at Trinity Lane and Mayflower Avenue located approximately 350m and 450m, respectively, from the proposed development.

Proposed Site Access

Vehicular access to the proposed development will be via an extension of Daisy Drive and a connection to Trinity Lane. Daisy Lane (See Photo 5), which accesses Beaver Bank Road via Ernest Avenue, Trinity Lane, and Mayflower Avenue, will be extended north from its existing limits by approximately 580m.

Photo 5: Looking south on Daisy Drive from its existing terminus and location of the south access point to the proposed development

The north site access at Trinity Drive will be via a new connection from the west side of the site, located approximately 800m north of of Mayflower Avenue (See Photo 6 and Photo 7). Stopping sight distances (SSD), measured from a driver eye height of 1.05 m to a 150 mm object, were observed on the Trinity Lane northbound and southbound approaches to the north access intersection. Observations indicated SSD greater than 190 meters on the northbound approach, which exceeds the minimum 92m required for an assumed operating speed of 60km/h on a -6% approach grade. On the southbound approach, observations indicated SSD of approximately 170m, which is greater than the minimum 78m required based on a 60km/h operating speed on a +5% approach grade.

Photo 6: Looking south (to the left) on Trinity Lane from the proposed north site access Intersection

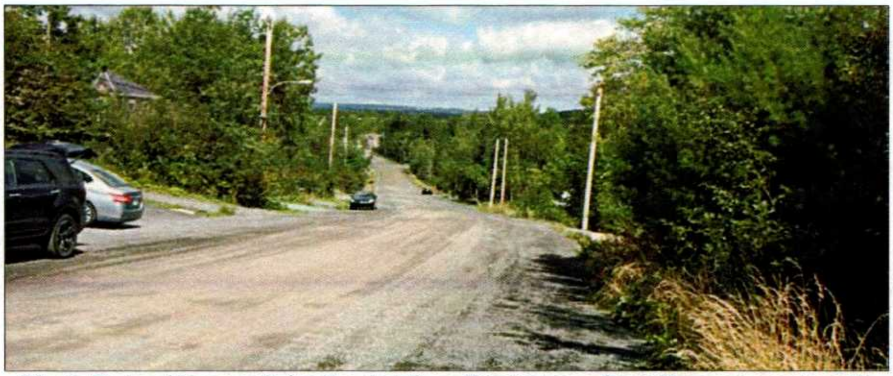


Photo 7: Looking north (to the right) on Trinity Lane from the proposed north site access Intersection

Traffic Volume Data

HRM Traffic & Right-of-Way Services (TROW) obtained a one week long machine traffic count on Beaver Bank Road between Douglas Drive and Kinsac Road (approximately 2km north of the proposed development) during August 2011. Counts indicate Beaver Bank Road two-way AM and PM peak hour volumes of about 230 and 280 vehicles per hour, respectively. The graphical representation of average weekday hourly volumes during a 24 hour day (Figure 2) illustrates the pronounced 'peaks' of AM and PM peak hour volumes typical of a road with commuter traffic.

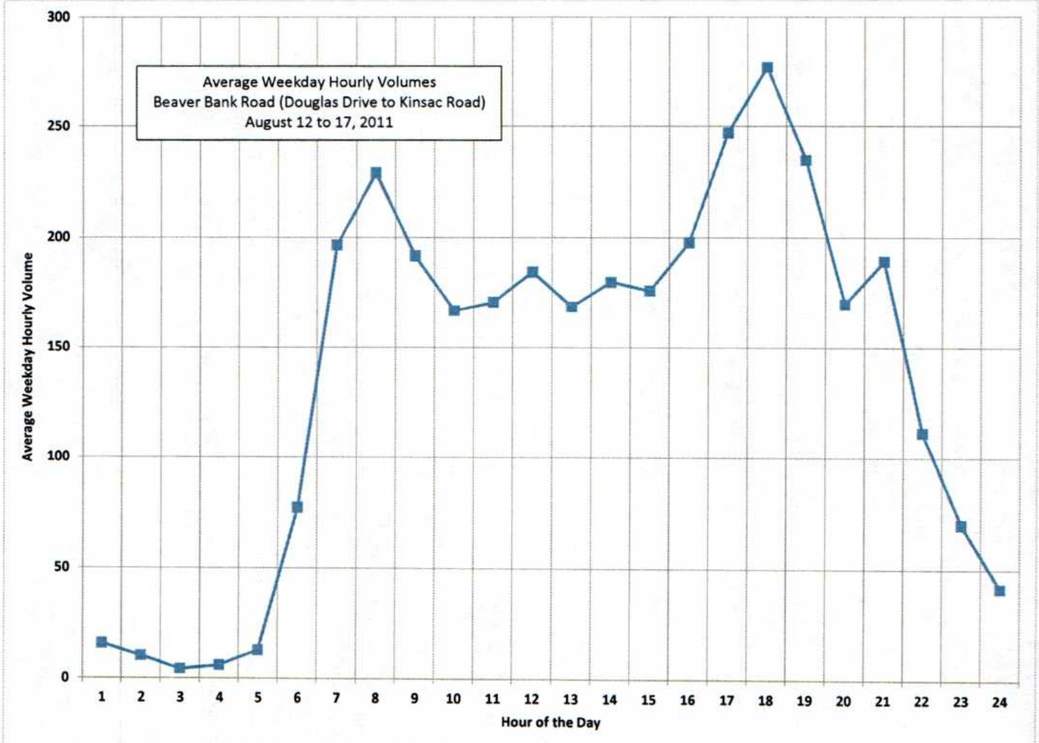


Figure 2: Average Weekday Hourly Volumes - August 2011: Beaver Bank Road (Douglas Drive to Kinsac Road)

Annual Volume Trends

Historical volume data obtained by HRM between 2007 and 2013 on Beaver Bank Road (approximately 1.7km north of Trinity Lane) do not indicate a consistent growth trend in volumes. Volumes are in the range of 5,000 to 5,500 vehicles per day. An annual growth rate of 1.0% typical of growth in the Halifax region has been used for the projecting future year traffic volumes for this study.

Manual Traffic Count

Manual traffic counts were obtained during AM, Noon, and PM peak periods on Tuesday, July 22 and Wednesday, July 23, 2014 at Beaver Bank Road intersections at Mayflower Avenue and Trinity Lane. Turning movement counts are tabulated in Tables A-1 and A-2, Appendix A, with peak hour volumes indicated by shaded areas.

Projected 2014 and 2024 Background Volumes

Projected 2014 and 2024 weekday AM and PM peak hour background volumes, calculated using an annual traffic volume growth rate of 1.0%, are illustrated diagrammatically in Figure A-1 (Boxes A to D), Appendix A.

3.0 Trip Generation, Distribution, and Assignment

Trip Generation for Proposed Commercial Development

The proposed residential development will include up to approximately 270 residential units on an approximately 37 hectare undeveloped parcel located just north of the existing terminus of Daisy Drive and east of Trinity Lane. It has been assumed that all residential units will be detached single family houses.

Estimation of Total Site Generated Trips

The number of trips that will be generated by the proposed development has been estimated using rates published in *Trip Generation, 9th Edition* (Washington, 2012). Trip generation estimates, which are summarized in Table 1, indicate that the proposed development is expected to generate 202 vehicles per hour (vph) (51 vph entering and 151 vph exiting) during the AM peak hour and 270 vph (170 vph entering and 100 vph exiting) during the PM peak hour.

Table 1 - Trip Generation Estimates for Proposed Residential Development

Land Use	Units	Trip Generation Rates[1]				Trips Generated[2]			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Single Family Residential (ITE Land Use Code 210)	270	0.19	0.56	0.63	0.37	51	151	170	100
Trip Generation Estimates for Proposed Development						51	151	170	100

Notes: 1. Trip generation rates are 'vehicles per hour per unit' for Single Family Residential (Land Use Code 210), published in *Trip Generation, 9th Edition*, Institute of Transportation Engineers, 2012.
2. Vehicles per hour for peak hours.

Trip Distribution and Assignment

Based on review of the local street network and development surrounding the site as well as local knowledge of the area, external trips generated by the proposed development have been distributed in the following manner:

- North – Beaver Bank Road 10%
- South – Beaver Bank Road 90%

Assigned site generated trips at Study Area intersections are shown diagrammatically in Figure A-2 (Boxes A and B), Appendix A.

Projected 2024 Volumes that Include Site Generated Trips

Site generated trips have been added to the projected 2024 background volumes (Figure A-1, Boxes C and D) to provide projected 2024 volumes that include site generated trips which are illustrated diagrammatically in Figure A-2 (Boxes C and D), Appendix A.

4.0 Intersection Performance Analysis

4.1 Traffic 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

Signal warrant analyses were completed for Beaver Bank Road intersections at Mayflower Avenue and Trinity Lane for projected 2024 background traffic with the addition of trips generated by the proposed development. Results are summarized below:

- Beaver Bank Road @ Mayflower Avenue (Table A-3):
  - *Not Warranted* ***(37 Warrant Points)***
- Beaver Bank Road @ Trinity Lane / Barrett Road (Table A-4):
  - *Not Warranted* ***(15 Warrant Points)***

4.2 Turn Lane Warrant Analysis

Left Turn Lane Warrant Analysis

Left turn movements on a two lane street may cause both operational and safety problems. Operational problems result as a vehicle stopped waiting for an opportunity to turn across 'heavy' opposing traffic causes a queue of stopped vehicles to form. Safety problems result from rear end collisions when a stopped left turning vehicle is struck by an advancing vehicle, or from head-on or right angle collisions when a left turning vehicle is struck by an opposing vehicle.

The Geometric Design Standards for Ontario Highways Manual contains nomographs for left turn lane analysis for two lane streets. The analysis method, which is normally used by WSP Atlantic to evaluate need for left turn lanes, uses a series of nomographs that consider speed, advancing volumes, left turns as a percentage of advancing volumes, and opposing volumes. A point, based on 'opposing' and 'advancing' volumes, plotted to the right of the 'warrant line' of the appropriate '% left turns' and 'approach speed' nomograph, indicates that a left turn lane is warranted for the conditions used in the analysis. Similarly, a point that is plotted to the left of the warrant line indicates that a left turn lane is not warranted.

Analysis of left turn lane warrants was completed (Figure A-3, Appendix A) for southbound left turns from Beaver Bank Road into Mayflower Avenue and Trinity Lane for projected 2024 volumes both without and with the addition of site generated trips. The analysis indicated that left turn lanes are not expected to be warranted based on weekday AM and PM peak hour traffic volumes.

Right Turn Lane Warrant Analysis

Operational problems may result at an intersection where a 'high' number of vehicles slow to make a right turn into a site. The *Ohio Department of Transportation State Highway Access Management Manual* contains nomographs for evaluating right turn lane warrants on two lane roads. The analysis is based on right turning and advancing volumes.

The right turn lane warrant evaluation included in Figure A-4, Appendix A, indicates that a right turn lane is warranted on the northbound approach to Mayflower Avenue during the PM peak hour based on projected 2024 volumes both without and with added site generated trips. It is also noted that a right turn lane is warranted based on 2014 PM peak hour volumes.

4.3 Intersection Level of Service Analysis

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.

Level of Service (LOS) Criteria

LOS criteria (Table 2) 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.

Table 2 - Level of Service (LOS) Criteria for Intersections

LOS	LOS Description	Two Way Stop Controlled (TWSC) Intersections Control Delay (Seconds per Vehicle)
A	Very low delay; most vehicles do not stop **(Excellent)**	Less than 10.0
B	Higher delay; most vehicles stop **(Very Good)**	Between 10.0 and 15.0
C	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	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop **(Satisfactory)**	Between 25.0 and 35.0
E	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	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

Intersection Level of Service Analysis

Synchro 8.0 software has been used for performance evaluation of Study Area intersections on Beaver Bank Road for 2024 AM and PM peak hour volumes without and with site development.

Level of service (LOS) analysis results are included in Appendix B and are summarized in Table 3 and Table 4.

Summary Level of Service Analysis

Beaver Bank Road @ Mayflower Avenue– Intersection performance is expected to be satisfactory both without and with the addition of site generated trips. All movements operate within HRM acceptable limits.

Beaver Bank Road @ Trinity Lane / Barrett Road– Intersection performance is expected to be satisfactory both without and with the addition of site generated trips. All movements operate within HRM acceptable limits.

Table 3 - LOS for Beaver Bank Road @ Trinity Lane / Barrett Road

LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement				Overall Intersection	
	EB-LTR	WB-LTR	NB-LTR	SB-LTR	Delay	LOS
Weekday AM Peak Hour - Projected 2024 Volumes without Site Development (Page B-1)						
Delay	11.4	12.8	0.3	0.2	0.6	A
LOS	B	B	A	A		
v/c	0.02	0.01	0.14	0.22		
Queue	0.4	0.3	0.1	0.1		
Weekday AM Peak Hour - Projected 2024 Volumes with Site Development (Page B-5)						
Delay	11.7	13	0.3	0.3	1.9	A
LOS	B	B	A	A		
v/c	0.02	0.13	0.15	0.23		
Queue	0.5	3.3	0.1	0.2		
Weekday PM Peak Hour - Projected 2024 Volumes without Site Development (Page B-3)						
Delay	14.1	13.6	0.3	0.0	0.7	A
LOS	B	B	A	A		
v/c	0.04	0.03	0.36	0.22		
Queue	0.9	0.6	0.2	0		
Weekday PM Peak Hour - Projected 2024 Volumes with Site Development (Page B-7)						
Delay	15.1	16.7	0.3	0.8	1.7	A
LOS	C	C	A	A		
v/c	0.04	0.14	0.38	0.24		
Queue	1.0	3.7	0.2	0.4		

Table 4 - LOS for Beaver Bank Road @ Mayflower Avenue

LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement			Overall Intersection	
	WB-LR	NB-TR	SB-LT	Delay	LOS
Weekday AM Peak Hour - Projected 2024 Volumes without Site Development (Page B-2)					
Delay	14.6	0.0	0.4	1.4	A
LOS	B	A	A		
v/c	0.15	0.08	0.37		
Queue	3.9	0.0	0.1		
Weekday AM Peak Hour - Projected 2024 Volumes with Site Development (Page B-6)					
Delay	21.2	0.0	0.1	3.9	A
LOS	C	A	A		
v/c	0.43	0.11	0.41		
Queue	16.2	0.0	0.1		
Weekday PM Peak Hour - Projected 2024 Volumes without Site Development (Page B-4)					
Delay	18.1	0.0	0.3	0.9	A
LOS	B	A	A		
v/c	0.14	0.39	0.30		
Queue	3.6	0.0	0.1		
Weekday PM Peak Hour - Projected 2024 Volumes with Site Development (Page B-8)					
Delay	28.8	0	0.2	2.6	A
LOS	D	A	A		
v/c	0.43	0.49	0.38		
Queue	15.4	0.0	0.2		

5.0 Summary, Recommendations, and Conclusions

Description of the Proposed Development

1. Plans are being prepared by Mo-Par Developments for the development of Carriagewood Estates, a residential subdivision in Beaver Bank, NS. The proposed development, located just north of the existing terminus of Daisy Drive, will consist of up to 270 single family residential units. It is anticipated that buildout of the development will be completed by 2024.

Proposed Site Access

2. Two site accesses will be provided to the proposed development including: (i) an extension of Daisy Drive and (ii) a connection to Trinity Lane. Access to Beaver Bank Road will be from Mayflower Avenue (at the south of the development) and Trinity Lane (north of the development).

Description of Study Area Roads

3. ***Beaver Bank Road*** is a 2-lane collector road that runs approximately 21km between Lower Sackville and East Uniacke Road.

   Trinity Lane is a 2-lane local residential street that runs north-south approximately 1.3km between Mayflower Avenue and Beaver Bank Road. The majority of its length (approximately 1km) is unpaved.

   Mayflower Avenue, Ernest Avenue, and ***Daisy Drive*** are 2-lane paved local residential streets located east of Beaver Bank Road near the south end of the proposed development. ***Mayflower Avenue*** extends from Beaver Bank Road to the east. ***Ernest Avenue / Daisy Lane*** run generally east-west between Trinity Lane and Pennington Drive.

Background Traffic Volumes

4. Projected 2014 and 2024 weekday AM and PM peak hour background volumes were calculated using an annual traffic volume growth rate of 1.0%.

Estimation of Site Generated Trips for the Proposed Development

5. The proposed residential development will include up to approximately 270 single family residential units. Trip generation estimates, estimated using rates published in *Trip Generation, 9th Edition* (Washington, 2012), indicate that the proposed development is expected to generate 202 vehicles per hour (vph) (51 vph entering and 151 vph exiting) during the AM peak hour and 270 vph (170 vph entering and 100 vph exiting) during the PM peak hour.

Trip Distribution and Assignment

6. External trips generated by the development have been assigned to study area streets and intersections based on review of the local street network and development surrounding the site as well as local knowledge of the area. Trips were distributed to the north (10%) and south (90%) on Beaver Bank Road.

Signal Warrant Analysis

7. Signal warrant analyses were completed for Beaver Bank Road intersections at Mayflower Avenue and Trinity Lane for projected

2024 background traffic with the addition of trips generated by the proposed development. Traffic signals are not expected to be warranted at the Mayflower Avenue (37 warrant points) or the Trinity Lane (15 warrant points) intersections.

Left Turn Lane Warrant

8. Analysis of left turn lane warrants was completed for southbound left turns from Beaver Bank Road into Mayflower Avenue and Trinity Lane for projected 2024 volumes both without and with the addition of site generated trips. The analysis indicated that left turn lanes are <u>not</u> expected to be warranted for all scenarios.

Right Turn Lane Warrant Analysis

9. Right turn lane warrants were completed for northbound right turns from Beaver Bank Road into Mayflower Avenue and Trinity Lane for projected 2024 volumes both without and with the addition of site generated trips. The warrant evaluation has indicated that a right turn lane is warranted on the northbound approach to Mayflower Avenue during the PM peak hour based on projected 2024 volumes both without and with added site generated trips. It was also noted that a right turn lane is warranted based on 2014 PM peak hour traffic volumes.

Summary - Level of Service Analysis

10. Intersection performance analysis was completed for Beaver Bank Road intersections at Mayflower Avenue and Trinity Lane. Results indicate that intersection performance is expected to be satisfactory based on 2024 AM and PM peak hour volumes both without and with site development.

Recommendations

11. The need for a right turn lane on the northbound approach to Mayflower Avenue (warranted based on projected 2024 PM peak hour volumes without and with development) should be reviewed periodically.

12. Consideration should be given to adding a paved surface to the existing gravel section of Trinity Lane.

Conclusions

13. With implementation of recommended upgrades, site generated trips are not expected to have a significant impact to traffic performance in the Study Area.

Appendix A

Intersection Turning Movement Counts

Traffic Volume Diagrams

Traffic Signal Warrants

Left Turn Lane Warrants

Right Turn Lane Warrants

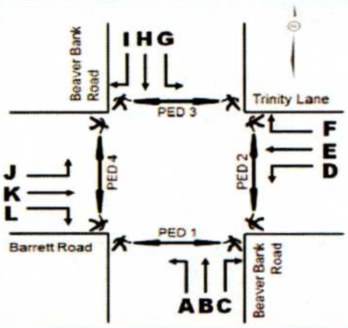
WSP

October 2014

Table A-1

Beaver Bank Road
@
Trinity Lane / Barrett Road

Beaver Bank, NS
Tuesday, July, 22, 2014



AM Peak Period Volume Data

Time		Beaver Bank Road Northbound Approach			Trinity Lane Westbound Approach			Beaver Bank Road Southbound Approach			Barrett Road Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
07:00	07:15	0	16	0	3	0	2	0	101	0	1	0	3	126
07:15	07:30	2	22	0	1	0	0	0	77	0	0	1	5	108
07:30	07:45	0	18	0	5	0	0	0	66	1	1	0	2	93
07:45	08:00	0	17	0	3	0	0	0	50	1	1	0	1	73
08:00	08:15	0	33	0	2	0	0	0	59	1	1	0	1	97
08:15	08:30	1	30	0	1	0	0	0	64	1	0	0	1	98
08:30	08:45	1	42	0	1	0	0	0	67	0	1	0	1	113
08:45	09:00	3	36	1	2	0	0	1	67	0	1	0	1	112
AM Peak Hour Data														
07:00	08:00	**2**	**73**	**0**	**12**	**0**	**2**	**0**	**294**	**2**	**3**	**1**	**11**	**400**
08:00	09:00	**5**	**141**	**1**	**6**	**0**	**0**	**1**	**257**	**2**	**3**	**0**	**4**	**420**
AM Peak Total		**5**	**141**	**1**	**6**	**0**	**0**	**1**	**257**	**2**	**3**	**0**	**4**	**381**
Pedestrians		PED:1		1	PED:2		1	PED:3		0	PED:4		4	-
Heavy Vehicles		**0**	**10**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	-
% Heavy			**7%**			**0%**			**4%**			**0%**		-

Noon Peak Period Volume Data

Time		Beaver Bank Road Northbound Approach			Trinity Lane Westbound Approach			Beaver Bank Road Southbound Approach			Barrett Road Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
11:00	11:15	0	36	0	3	0	0	0	22	0	0	0	2	63
11:15	11:30	3	30	3	2	0	1	0	50	1	1	0	2	93
11:30	11:45	1	28	1	5	0	1	0	50	0	2	0	2	90
11:45	12:00	0	38	2	0	0	0	1	47	1	0	0	3	92
12:00	12:15	0	32	0	1	0	1	0	40	1	0	0	0	75
12:15	12:30	1	41	0	2	0	0	0	50	1	2	0	6	103
12:30	12:45	4	54	1	1	0	0	0	45	0	1	0	1	107
12:45	13:00	1	54	3	1	0	1	2	43	0	2	0	1	108
Noon Peak Hour Data														
11:00	12:00	**4**	**132**	**6**	**10**	**0**	**2**	**1**	**169**	**2**	**3**	**0**	**9**	**338**
12:00	13:00	**6**	**181**	**4**	**5**	**0**	**2**	**2**	**178**	**2**	**5**	**0**	**8**	**393**
Noon Peak Hour		**6**	**181**	**4**	**5**	**0**	**2**	**2**	**178**	**2**	**5**	**0**	**8**	**393**
Pedestrians		PED:1		0	PED:2		0	PED:3		1	PED:4		0	-
Heavy Vehicles		**0**	**10**	**2**	**1**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	-
% Heavy			**6%**			**14%**			**7%**			**0%**		-

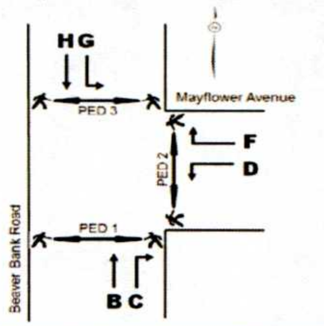
PM Peak Period Volume Data

Time		Beaver Bank Road Northbound Approach			Trinity Lane Westbound Approach			Beaver Bank Road Southbound Approach			Barrett Road Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
16:00	16:15	0	73	2	0	0	0	1	47	1	2	0	3	129
16:15	16:30	4	83	1	0	0	1	3	43	1	0	1	0	137
16:30	16:45	2	83	1	1	0	1	1	41	1	1	1	4	137
16:45	17:00	3	98	5	1	0	2	0	35	1	0	0	2	147
17:00	17:15	4	91	2	0	0	0	0	43	0	2	0	2	144
17:15	17:30	2	102	2	2	0	0	2	41	0	0	0	2	153
17:30	17:45	2	89	5	4	1	0	0	61	1	0	0	2	165
17:45	18:00	0	101	4	0	0	1	0	53	1	0	0	1	161
PM Peak Hour Data														
16:00	17:00	**9**	**337**	**9**	**2**	**0**	**4**	**5**	**166**	**4**	**3**	**2**	**9**	**550**
17:00	18:00	**8**	**383**	**13**	**6**	**1**	**1**	**2**	**198**	**2**	**2**	**0**	**7**	**623**
PM Peak Hour		**8**	**383**	**13**	**6**	**1**	**1**	**2**	**198**	**2**	**2**	**0**	**7**	**623**
Pedestrians		PED:1		0	PED:2		0	PED:3		0	PED:4		0	
Heavy Vehicles		**0**	**10**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	-
% Heavy			**2%**			**0%**			**4%**			**0%**		-

Table A-2

Beaver Bank Road
@
Mayflower Avenue

Beaver Bank, NS
Wednesday, July, 23, 2014



AM Peak Period Volume Data

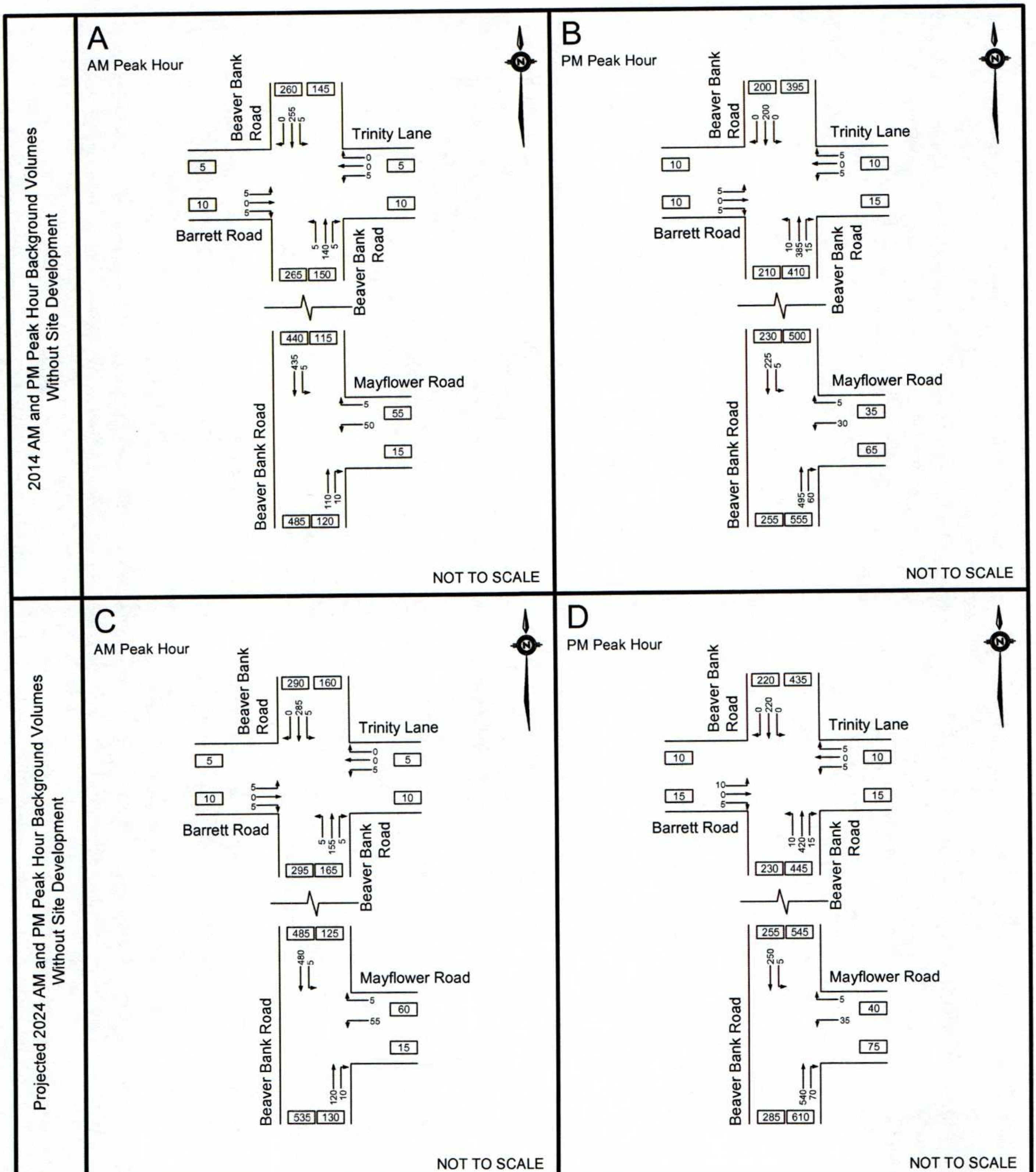
Time		Beaver Bank Road Northbound Approach		Mayflower Avenue Westbound Approach		Beaver Bank Road Southbound Approach		Total Vehicles
		B	C	D	F	G	L	
07:00	07:15	18	2	17	0	1	123	161
07:15	07:30	31	6	11	0	0	101	149
07:30	07:45	29	1	13	0	0	128	171
07:45	08:00	33	2	10	1	1	85	132
08:00	08:15	27	3	8	0	0	85	123
08:15	08:30	28	4	9	0	1	88	130
08:30	08:45	31	5	7	0	0	59	102
08:45	09:00	35	5	9	1	1	60	111
AM Peak Hour Data								
07:00	08:00	**111**	**11**	**51**	**1**	**2**	**437**	**613**
08:00	09:00	**121**	**17**	**33**	**1**	**2**	**292**	**466**
AM Peak Total		**111**	**11**	**51**	**1**	**2**	**437**	**613**
Pedestrians		PED:1	0	PED:2	0	PED:3	0	-
Heavy Vehicles		**10**	**0**	**0**	**0**	**0**	**13**	-
% Heavy		**8%**		**0%**		**3%**		-

Noon Peak Period Volume Data

Time		Beaver Bank Road Northbound Approach		Mayflower Avenue Westbound Approach		Beaver Bank Road Southbound Approach		Total Vehicles
		B	C	D	F	G	L	
11:00	11:15	37	1	3	1	0	58	100
11:15	11:30	38	11	6	0	0	62	117
11:30	11:45	39	10	4	2	0	57	112
11:45	12:00	53	4	11	0	0	58	126
12:00	12:15	61	3	7	0	1	69	141
12:15	12:30	52	2	4	2	0	54	114
12:30	12:45	39	3	2	1	0	60	105
12:45	13:00	58	1	3	0	1	43	106
Noon Peak Hour Data								
11:00	12:00	**167**	**26**	**24**	**3**	**0**	**235**	**455**
12:00	13:00	**210**	**9**	**16**	**3**	**2**	**226**	**466**
Noon Peak Hour		**191**	**28**	**28**	**2**	**1**	**246**	**496**
Pedestrians		PED:1	0	PED:2	0	PED:3	0	-
Heavy Vehicles		**12**	**4**	**0**	**2**	**0**	**14**	-
% Heavy		**7%**		**7%**		**6%**		-

PM Peak Period Volume Data

Time		Beaver Bank Road Northbound Approach		Mayflower Avenue Westbound Approach		Beaver Bank Road Southbound Approach		Total Vehicles
		B	C	D	F	G	L	
16:00	16:15	90	15	3	0	0	70	178
16:15	16:30	116	15	5	0	0	46	182
16:30	16:45	112	13	6	0	0	57	188
16:45	17:00	127	7	7	1	0	57	199
17:00	17:15	127	18	7	1	0	53	206
17:15	17:30	110	15	10	0	0	51	186
17:30	17:45	133	12	6	0	1	72	224
17:45	18:00	123	17	9	1	0	50	200
PM Peak Hour Data								
16:00	17:00	**445**	**50**	**21**	**1**	**0**	**230**	**747**
17:00	18:00	**493**	**62**	**32**	**2**	**1**	**226**	**816**
PM Peak Hour		**493**	**62**	**32**	**2**	**1**	**226**	**816**
Pedestrians		PED:1	0	PED:2	0	PED:3	0	-
Heavy Vehicles		**5**	**0**	**0**	**0**	**0**	**6**	-
% Heavy		**1%**		**0%**		**3%**		-

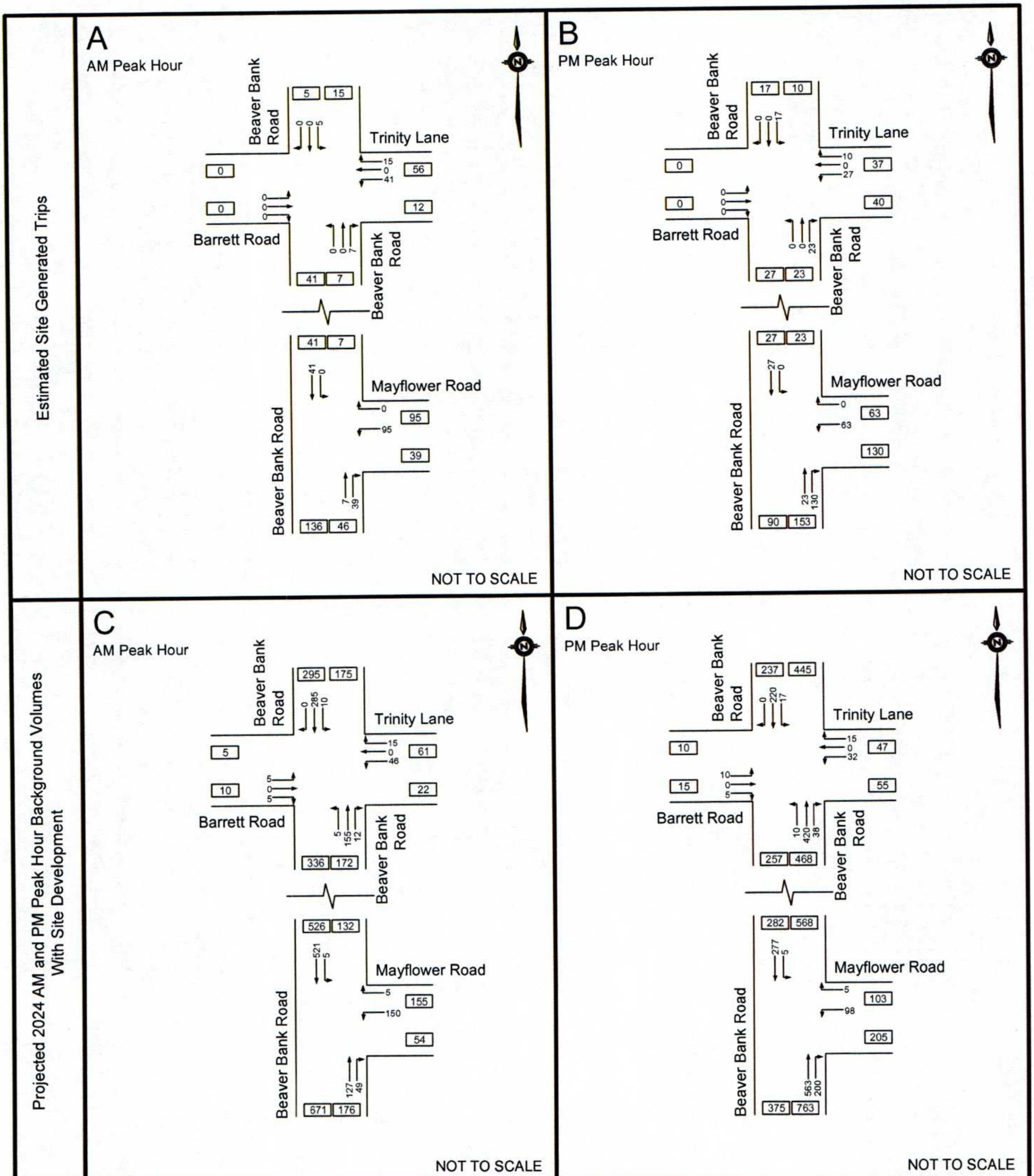


Traffic Impact Study - Proposed Residential Development
Carriagewood Estates
Beaver Bank, NS

Figure A-1

2014 and Projected 2024 Weekday AM and PM Peak Hour Traffic Volumes Without Site Development

September 2014



WSP	Traffic Impact Study - Proposed Residential Development Carriagewood Estates Beaver Bank, NS	Figure A-2
	Projected 2024 AM and PM Peak Hour Background Traffic Volumes With Added Site Generated Trips	September 2014

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table A-3 - Beaver Bank Road @ Mayflower Avenue - Projected 2024 Background Traffic Volumes with Site Development

Main Street (name)	Beaver Bank Road	Direction (EW or NS)	NS	Date:	August 2014
Side Street (name)	Mayflower Avenue	Direction (EW or NS)	EW	City:	Halifax NS

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Beaver Bank Road	NB				1			1	
Beaver Bank Road	SB				1		4,000	1	
Mayflower Avenue	WB			1					
	EB								

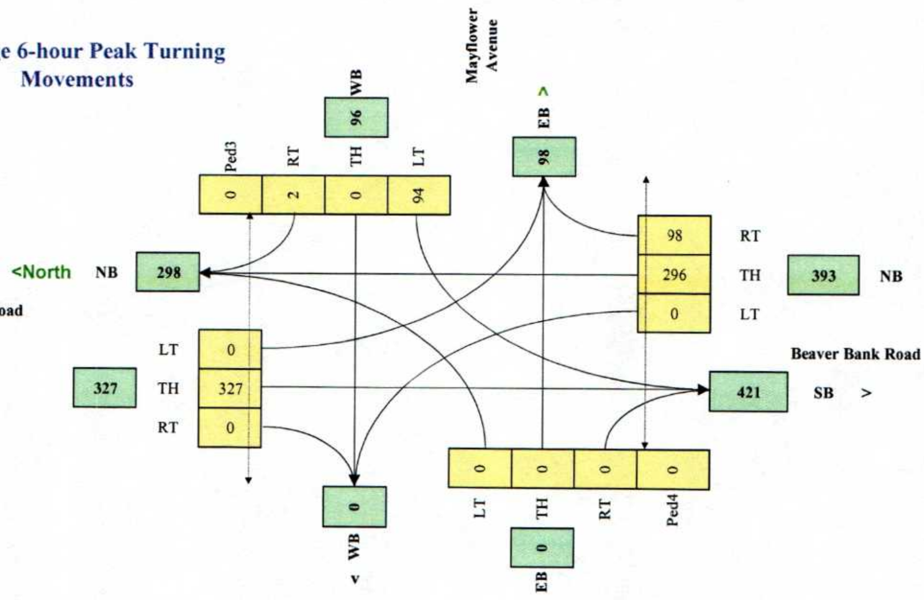
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Beaver Bank Road	NS	70	2.0%	n	0.0
Mayflower Avenue	EW	50	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00	0	0	0	0
8:00 - 9:00	0	0	0	0
11:30 - 12:30	0	0	0	0
12:30 - 13:30	0	0	0	0
15:30 - 16:30	0	0	0	0
16:30 - 17:30	0	0	0	0
Total (6-hour peak)	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**0**	**0**	**0**

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	300,000
Central Business District	(y/n)	n

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:00 - 8:00	0	130	50	0	520	0	150	0	0	0	0	0
8:00 - 9:00	0	140	50	0	350	0	105	0	0	0	0	0
11:30 - 12:30	0	190	70	0	275	0	65	0	5	0	0	0
12:30 - 13:30	0	240	50	0	265	0	60	0	5	0	0	0
15:30 - 16:30	0	515	185	0	280	0	95	0	0	0	0	0
16:30 - 17:30	0	560	180	0	270	0	90	0	0	0	0	0
Total (6-hour peak)	**0**	**1,775**	**585**	**0**	**1,960**	**0**	**565**	**0**	**10**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**296**	**98**	**0**	**327**	**0**	**94**	**0**	**2**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	37	37	0
		Veh	*Ped*
NOT Warranted			

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table A-4 - Beaver Bank Road @ Trinity Lane / Barrett Road

Projected 2024 Background Traffic Volumes with Site Development

Main Street (name)	Beaver Bank Road	**Direction (EW or NS)**	NS	**Date:**	August 2014
Side Street (name)	Trinity Lane	**Direction (EW or NS)**	EW	**City:**	Halifax NS

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Beaver Bank Road	NB			1				1	
Beaver Bank Road	SB			1			6,000	1	
Trinity Lane	WB			1					
	EB			1					

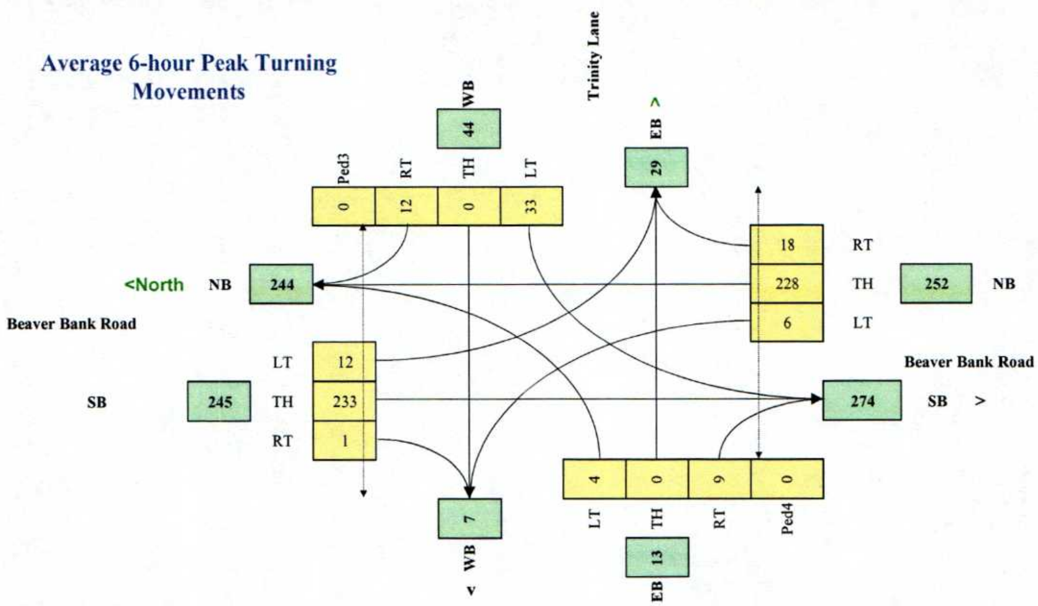
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Beaver Bank Road	NS	70	2.0%	n	0.0
Trinity Lane	EW	50	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00	0	0	0	0
8:00 - 9:00	0	0	0	0
11:30 - 12:30	0	0	0	0
12:30 - 13:30	0	0	0	0
15:30 - 16:30	0	0	0	0
16:30 - 17:30	0	0	0	0
Total (6-hour peak)	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**0**	**0**	**0**

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	300,000
Central Business District	(y/n)	n

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:00 - 8:00	0	80	5	5	325	0	55	0	15	5	0	10
8:00 - 9:00	5	155	5	5	285	0	40	0	10	5	0	5
11:30 - 12:30	5	145	15	5	185	0	20	0	10	5	0	10
12:30 - 13:30	5	200	10	10	195	0	20	0	10	5	0	10
15:30 - 16:30	10	370	35	25	185	5	25	0	15	5	0	10
16:30 - 17:30	10	420	35	20	220	0	35	0	10	0	0	10
Total (6-hour peak)	**35**	**1,370**	**105**	**70**	**1,395**	**5**	**195**	**0**	**70**	**25**	**0**	**55**
Average (6-hour peak)	**6**	**228**	**18**	**12**	**233**	**1**	**33**	**0**	**12**	**4**	**0**	**9**

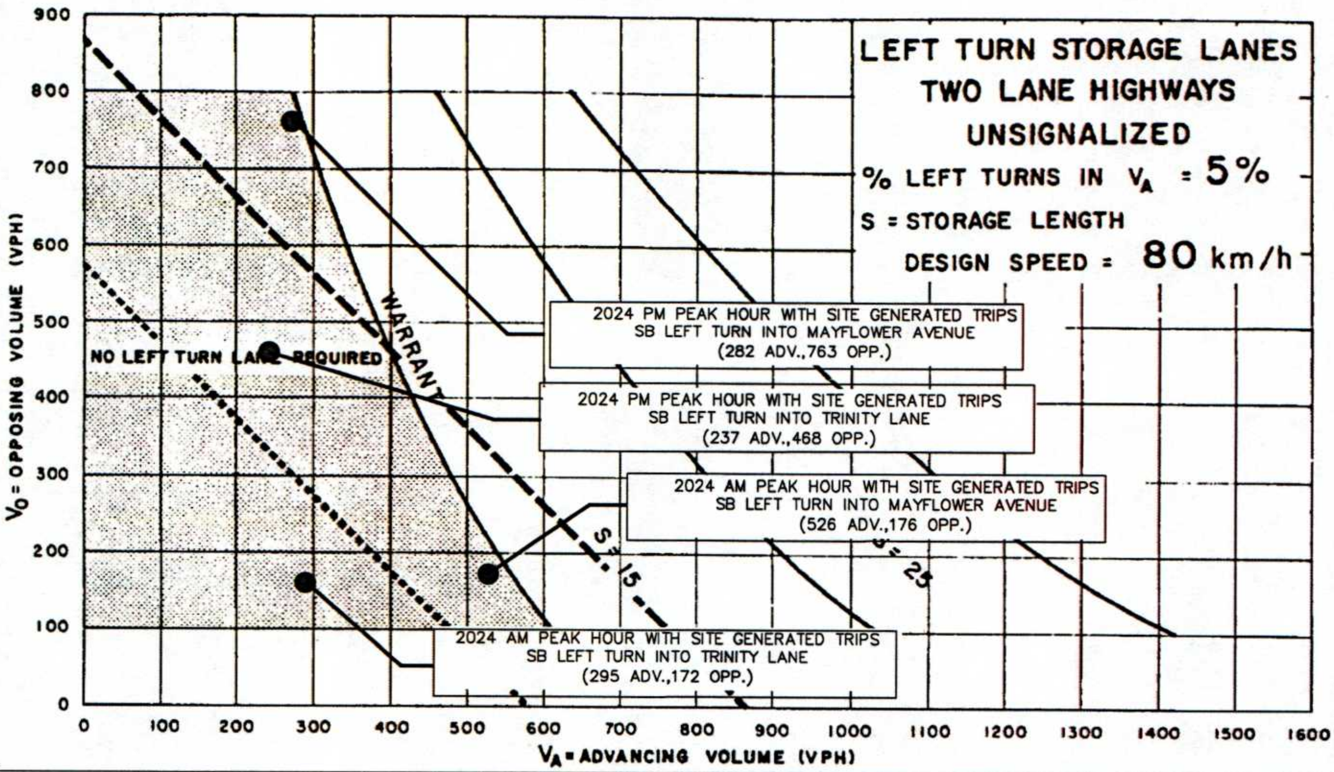
Average 6-hour Peak Turning Movements



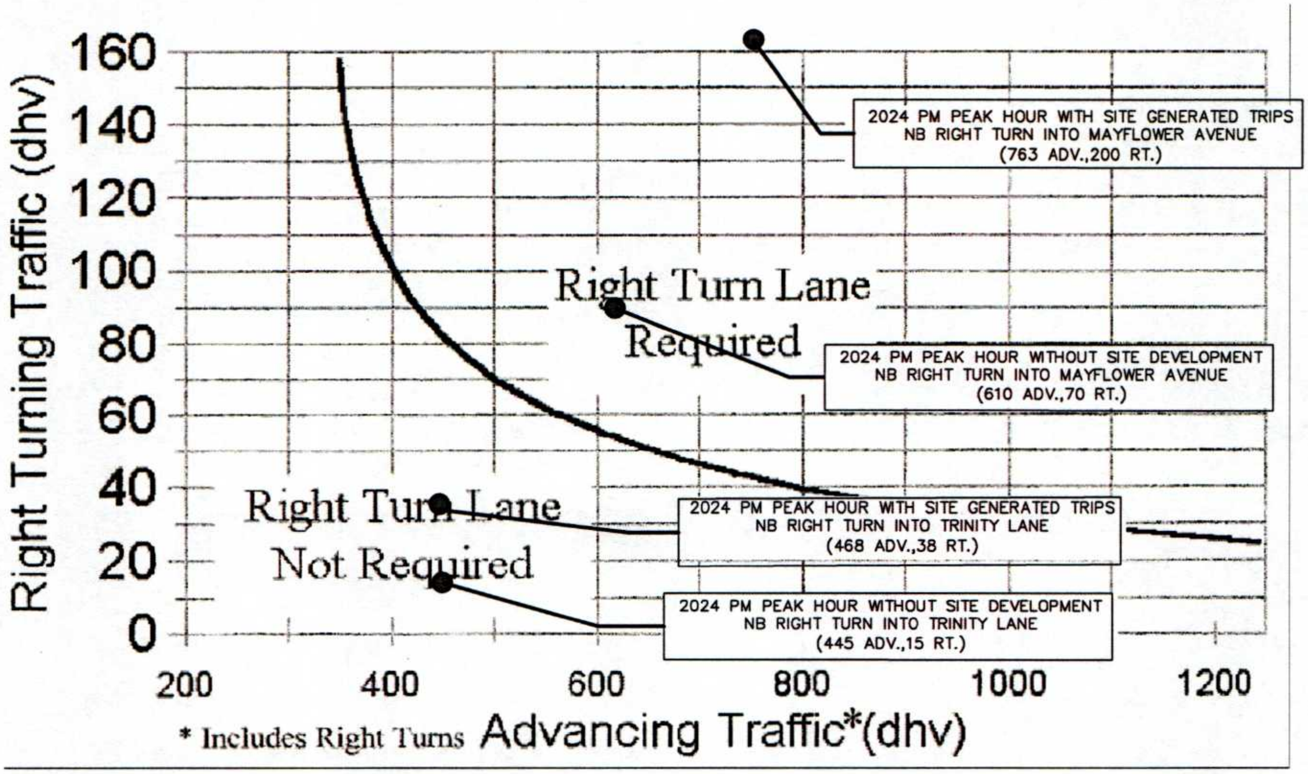
$$W = [C_{bt}(X_{v-v}) / K_1 + (F (X_{v-p}) L) / K_2] \times C_i$$

W =	15	15	0
		Veh	*Ped*

Not Warranted - Vs<75



WSP	Traffic Impact Study - Proposed Residential Development Carriagewood Estates Beaver Bank, NS	Figure A-3
	Left Turn Lane Warrants Beaver Bank Road into Trinity Lane / Mayflower Avenue	September 2014



WSP	Traffic Impact Study - Proposed Residential Development Carriagewood Estates Beaver Bank, NS	Figure A-4
	Right Turn Lane Warrants Beaver Bank Road into Trinity Lane / Mayflower Avenue	September 2014

Appendix B

Intersection Performance Analysis

WSP

October 2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	5	5	0	0	5	155	5	5	285	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	5	0	0	5	168	5	5	310	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	503	505	310	508	503	171	310			174		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	503	505	310	508	503	171	310			174		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	99	100	100	100			100		
cM capacity (veh/h)	476	465	730	469	467	873	1251			1403		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	5	179	315
Volume Left	5	5	5	5
Volume Right	5	0	5	0
cSH	576	469	1251	1403
Volume to Capacity	0.02	0.01	0.00	0.00
Queue Length 95th (m)	0.4	0.3	0.1	0.1
Control Delay (s)	11.4	12.8	0.3	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	11.4	12.8	0.3	0.2
Approach LOS	B	B		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	55	5	120	10	5	480
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	5	130	11	5	522
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	668	136			141	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	668	136			141	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	99			100	
cM capacity (veh/h)	421	913			1442	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	65	141	527
Volume Left	60	0	5
Volume Right	5	11	0
cSH	441	1700	1442
Volume to Capacity	0.15	0.08	0.00
Queue Length 95th (m)	3.9	0.0	0.1
Control Delay (s)	14.6	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	0	5	5	0	5	10	420	15	0	220	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	5	5	0	5	11	457	16	0	239	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	731	734	239	731	726	465	239			473		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	731	734	239	731	726	465	239			473		
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 %	97	100	99	98	100	99	99			100		
cM capacity (veh/h)	332	345	800	333	348	598	1328			1089		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	11	484	239
Volume Left	11	5	11	0
Volume Right	5	5	16	0
cSH	413	428	1328	1089
Volume to Capacity	0.04	0.03	0.01	0.00
Queue Length 95th (m)	0.9	0.6	0.2	0.0
Control Delay (s)	14.1	13.6	0.3	0.0
Lane LOS	B	B	A	
Approach Delay (s)	14.1	13.6	0.3	0.0
Approach LOS	B	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	35	5	540	70	5	250
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	5	587	76	5	272
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	908	625			663	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	908	625			663	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	99			99	
cM capacity (veh/h)	304	485			926	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	43	663	277
Volume Left	38	0	5
Volume Right	5	76	0
cSH	319	1700	926
Volume to Capacity	0.14	0.39	0.01
Queue Length 95th (m)	3.6	0.0	0.1
Control Delay (s)	18.1	0.0	0.2
Lane LOS	C		A
Approach Delay (s)	18.1	0.0	0.2
Approach LOS	C		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	5	46	0	15	5	155	12	10	285	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	50	0	16	5	168	13	11	310	5
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	536	527	312	526	523	175	315			182		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536	527	312	526	523	175	315			182		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	89	100	98	100			99		
cM capacity (veh/h)	442	451	728	455	453	868	1245			1394		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	66	187	326
Volume Left	5	50	5	11
Volume Right	5	16	13	5
cSH	550	515	1245	1394
Volume to Capacity	0.02	0.13	0.00	0.01
Queue Length 95th (m)	0.5	3.3	0.1	0.2
Control Delay (s)	11.7	13.0	0.3	0.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.7	13.0	0.3	0.3
Approach LOS	B	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	150	5	127	49	5	521
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	5	138	53	5	566
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	742	165			191	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	742	165			191	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	57	99			100	
cM capacity (veh/h)	382	880			1382	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	168	191	572
Volume Left	163	0	5
Volume Right	5	53	0
cSH	389	1700	1382
Volume to Capacity	0.43	0.11	0.00
Queue Length 95th (m)	16.2	0.0	0.1
Control Delay (s)	21.2	0.0	0.1
Lane LOS	C		A
Approach Delay (s)	21.2	0.0	0.1
Approach LOS	C		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	10	0	5	32	0	15	10	420	38	17	220	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	5	35	0	16	11	457	41	18	239	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	791	796	239	780	775	477	239			498		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	791	796	239	780	775	477	239			498		
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 %	96	100	99	89	100	97	99			98		
cM capacity (veh/h)	293	312	800	304	321	588	1328			1066		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	51	509	258
Volume Left	11	35	11	18
Volume Right	5	16	41	0
cSH	371	360	1328	1066
Volume to Capacity	0.04	0.14	0.01	0.02
Queue Length 95th (m)	1.0	3.7	0.2	0.4
Control Delay (s)	15.1	16.7	0.3	0.8
Lane LOS	C	C	A	A
Approach Delay (s)	15.1	16.7	0.3	0.8
Approach LOS	C	C		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	98	5	563	200	5	277
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	107	5	612	217	5	301
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	1033	721			829	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1033	721			829	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	58	99			99	
cM capacity (veh/h)	256	428			802	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	112	829	307
Volume Left	107	0	5
Volume Right	5	217	0
cSH	261	1700	802
Volume to Capacity	0.43	0.49	0.01
Queue Length 95th (m)	15.4	0.0	0.2
Control Delay (s)	28.8	0.0	0.2
Lane LOS	D		A
Approach Delay (s)	28.8	0.0	0.2
Approach LOS	D		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		