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Fall River, NS B2T 1R2

April 22, 2020

Marco Visentin, P.Eng.
ABLE Engineering & Land Surveying Services
5209 St. Margaret's Bay Road
Upper Tantallon, NS B3Z 1E3

RE: A Traffic Impact Assessment of the proposed Fall River South Development

Dear Mr. Visentin:

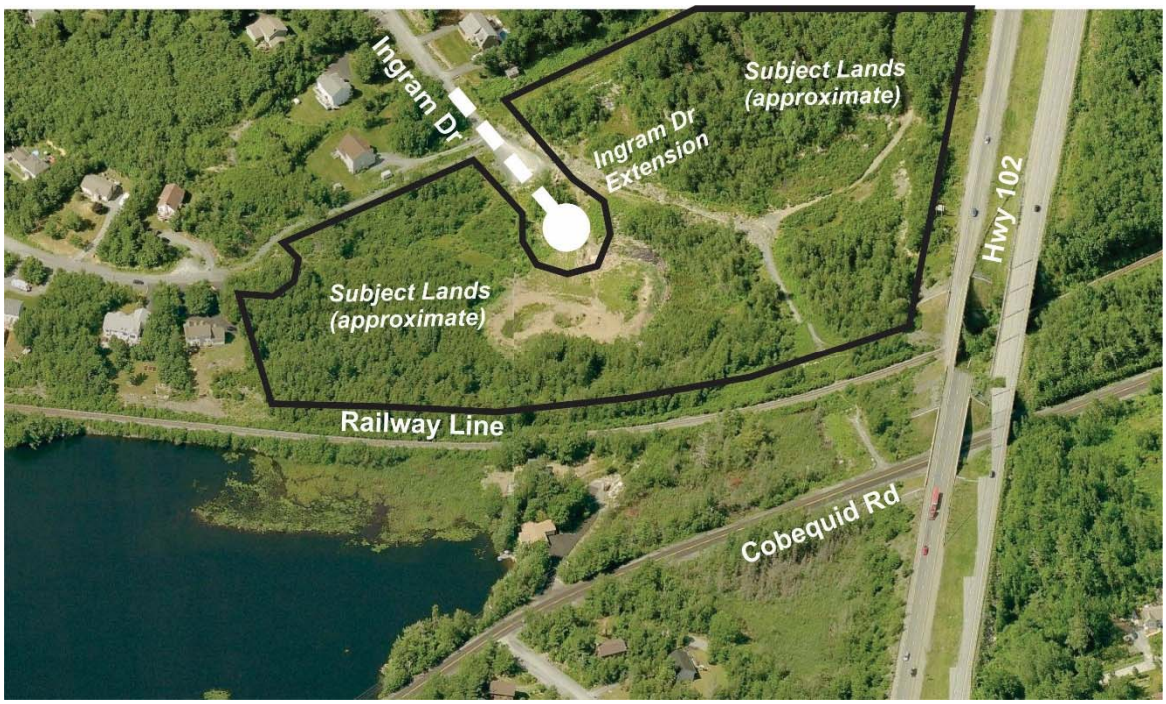
1.0 INTRODUCTION

In May 2018, the *GRIFFIN transportation group inc. (GRIFFIN)* completed a qualitative Stage 1 Traffic Impact Statement letter in support of the then proposed residential development at the south terminus of Ingram Drive (PID's #40844375, #40551277, #00472910, #00472902, and #40551558), in the community of Windsor Junction, Halifax Regional Municipality (HRM). Upon reviewing the planning application at that time, HRM's Traffic Management department requested that additional analysis be carried out to ensure the Cobequid Road / Windsor Junction Road intersection could adequately accommodate the expected increase in peak hour traffic volume associated with the proposed development. Since that time the proponent has made revisions to the proposed site plan layout and types of residential units. Therefore, GRIFFIN has recently been engaged to provide updated analysis and a new TIS letter for the latest development scenario at the Ingram Drive site.

In May 2018, the proposed development was envisioned to have seven buildings containing 142 medium density residential units. This included two low-rise buildings (120 total units), and five low-rise condominium/townhome buildings (22 total units). The most recent plan will also contain medium density residential units; however, they are all expected to be rental apartment units contained within three low-rise buildings (120 total units). The traffic impacts using the latest trip generation rates and updated traffic counts are discussed in detail in the Sections below.

The subject lands measure about 29 acres and are generally bounded by the terminus of Ingram Drive, an active railway line to the south and the Highway 102 right-of-way to the east. Access to the development will be provided via an extension of Ingram Drive towards the south by about 100m. The subject lands currently have a zoning designation of Residential Comprehensive Development District (RCDD) within the Land Use By-law Planning Districts 14 / 17 (i.e. Shubenacadie Lakes Land Use By-law Area) and is within the HRM Water Service Area. The site context is generally illustrated in *Figure 1.*

Figure 1: Study Area and Site Context



2.0 STUDY AREA AND SITE CONEXT

As shown in *Figure 1*, the subject lands are currently undeveloped. Ingram Drive will serve as the only access to/from the proposed development. This street is generally aligned in a north-south direction with a two-lane, two-way rural open ditch cross-section. It is under the jurisdiction of the HRM and appears to function as a minor collector road through the existing Fall River Village / Perry Lake Estates subdivision.

The major service area for future residents is assumed to be located to the west in Lower Sackville. Therefore, the main travel route in and out of this southern portion of the Fall River Village / Perry Lake Estates subdivision for the majority of current and future residents is comprised of the Ingram Drive/Winley Drive/Windsor Junction Road/Cobequid Road route.

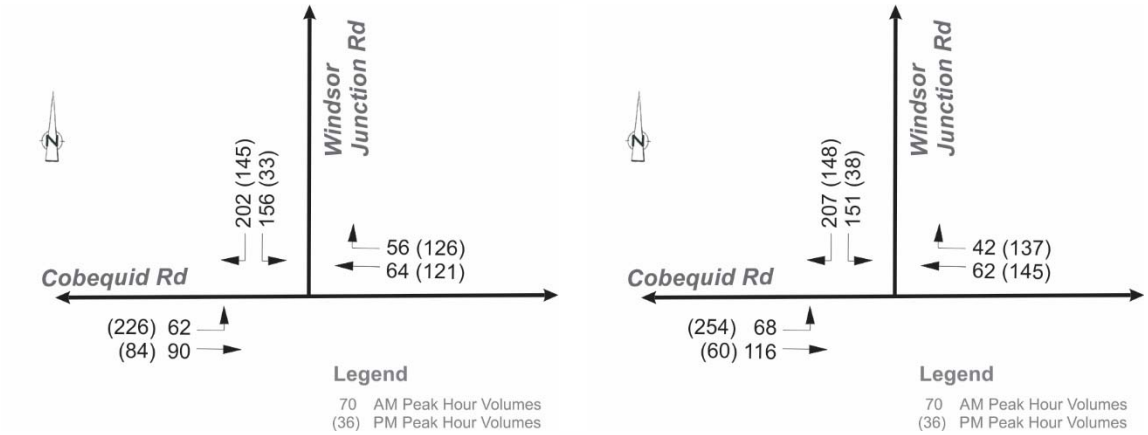
3.0 EXISTING TRAFFIC CONDITIONS

Since the proposed development will be comprised of new residential units and the surrounding road system experiences peak traffic demands during the typical weekday commuter peak times, it seemed reasonable to assume the highest overall study area volumes would occur during the weekday morning and afternoon peak periods. Therefore, these two peak times were selected for use in this assessment.

At the request of HRM representatives, GRIFFIN carried out a site visit and data collection effort at the Cobequid Road/ Windsor Junction Road intersection to establish current traffic conditions. This intersection was selected due to its close proximity to the development, the expectation that it will accommodate the majority of the new site-generated traffic and due to the fact that it currently experiences the highest vehicle demand relative to any of the other near-by intersections.

Current peak period traffic data was gathered on Tuesday February 25th, 2020 and used in the traffic operational analysis discussed later in this letter. Supplementary historical traffic data was also obtained from HRM's Traffic Management department for the Cobequid Road/ Windsor Junction Road intersection which was gathered in 2014. This supplementary data provided historical context and an indication of traffic growth over the last 5-6 years. A summary of both the 2014 and 2020 peak hour traffic volumes at the Cobequid Road / Windsor Junction Road intersection is provided in *Figure 2*.

Figure 2: Cobequid Road / Windsor Junction Road Intersection – Peak Hour Traffic Volumes



2014 TMC (HRM) ***2020 TMC (GRIFFIN)***

Considering the peak period volumes shown in *Figure 2* and the typical capacity provided by two-lane, two-way roadways it appears there is residual capacity available along the Ingram Drive, Winley Drive, Windsor Junction Road and Cobequid Road corridors that can accommodate some

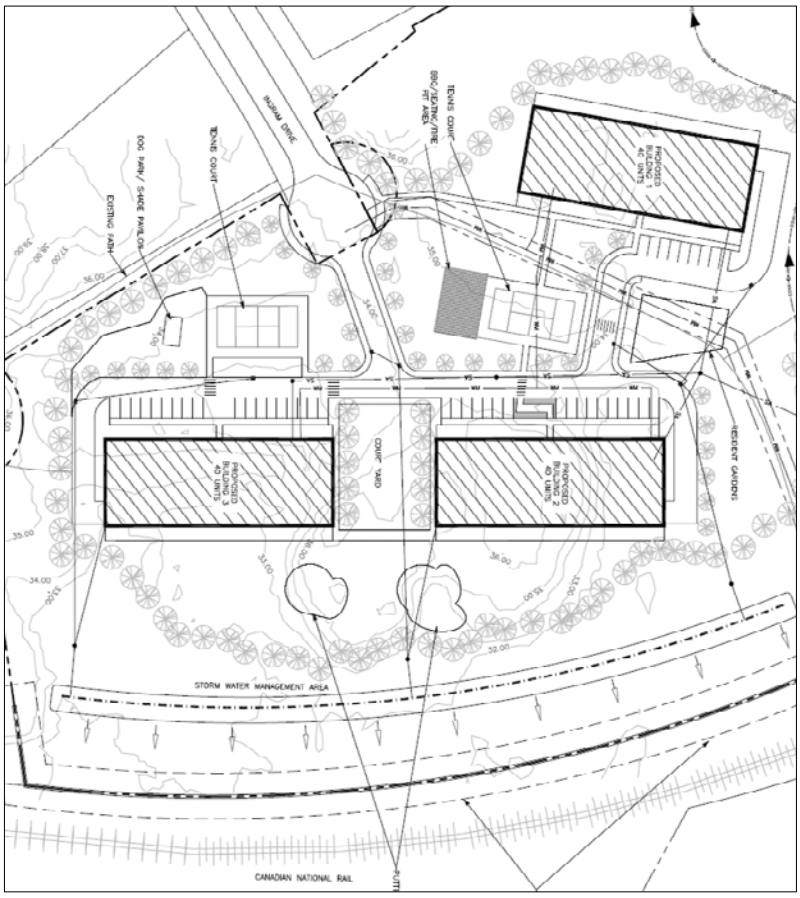
future traffic growth. An evaluation of the future traffic conditions is provided in the Sections below.

4.0 SITE TRIP GENERATION AND DISTRIBUTION

In order to assess the change in traffic volumes on the study area streets under future conditions, there was a need to estimate the number of new vehicles that would be entering and exiting the proposed development. This is referred to as the trip generation calculation process. Typically, traffic engineers use trip generation rates published by the Institute of Transportation Engineers (ITE) to forecast site-generated volumes for specific land use types, if deemed appropriate. As such, ITE's *Trip Generation, 10th Edition* document was used to identify the most appropriate land use type and trip rate for this study.

It is understood that the residential development will be comprised of medium-density rental apartment style units, contained within three separate low-rise buildings. Upon reviewing the 10th Edition Trip Generation document, it appeared appropriate to apply the trip generation rates for ITE's Land Use Code 220 – Multifamily Housing (Low-Rise) units. The building locations and site layout is contained in *Figure 3*. As shown, the three low-rise buildings will contain 40 apartment units each, yielding a total of 120 units.

Figure 3: Proposed Site Plan



A summary of the new weekday peak hour site-generated trips is provided in *Table 2*. The trip generation calculation results suggest the proposed medium-density residential development is expected to generate a total of 57 trips/hour (13 inbound and 44 outbound) during the weekday morning peak period and 69 trips/hour (44 inbound and 25 outbound) during the weekday afternoon peak period. This generally equates to an average of about one vehicle trip every minute during both the morning and afternoon peak hours. During all other times of the day the new site-generated vehicle trips will be considerably lower.

Table 2: Site Trip Generation for the Proposed Residential Development (vehicles/hour)

	Size	Trip Rate	New Vehicle Trips / Hour		
			In	Out	Total
AM Peak Hour					
Multifamily Housing (Low-rise) (LUC 220)	120 Units	0.47/unit[A]	13 (23%)	44 (77%)	57
AM Peak Total Trips			**13**	**44**	**57**
PM Peak Hour					
Multifamily Housing (Low-rise) (LUC 220)	120 Units	0.58/unit[A]	44 (63%)	25 (37%)	69
PM Peak Total Trips			**44**	**25**	**69**

A – ITE's regression formula used.

It should be noted that all of the site-generated trips are considered to be new vehicles added to the study area roadways and there have been no trip reduction factors applied. This follows the latest ITE guidelines for residential land use types.

The new site-generated trips were assigned to the study area road network following industry best practices for residential developments. The following distribution percentages were used in this study and assumes a worst-case scenario where the large majority of the new trips travel through the Cobequid Road / Windsor Junction Road intersection.

Table 3: New Residential Vehicle Trip Distribution

Direction	Via	Destination	AM & PM Peaks	
			Inbound	Outbound
North	Ingram Drive[A]	Fall River service area	25%	25%
East	Cobequid Road	Waverley / Hwy 102 / Hwy 118	25%	25%
West	Cobequid Road	Lower Sackville service area	50%	50%
South	*n/a*	*n/a*	-	-
Total			**100%**	**100%**

A – Ingram Drive vehicles traveling to/from the north were not assumed to travel through the Cobequid Road / Windsor Junction Road intersection.

5.0 FUTURE TRAFFIC CONDITIONS

5.1 Future Planning Horizon

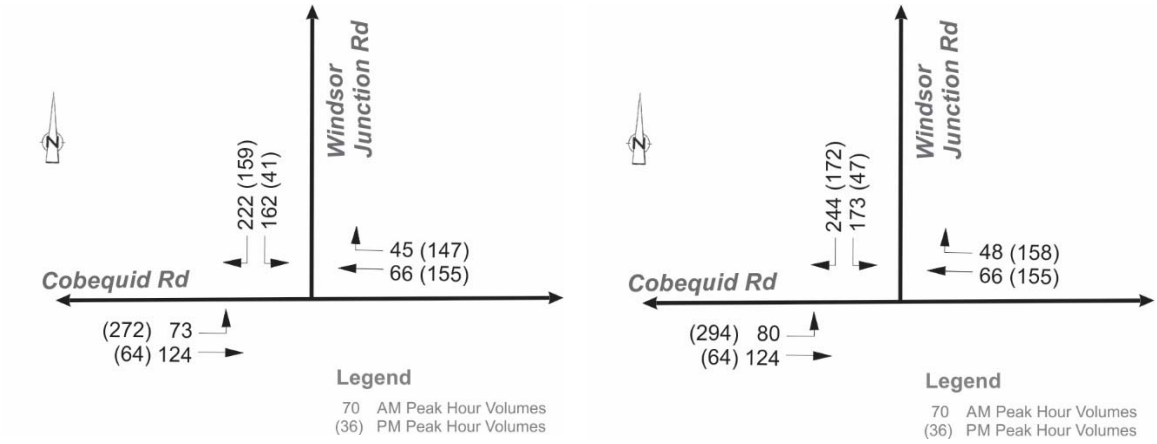
Following HRM guidelines, the future planning horizon year used in the analysis for this type of development will occur 5 years beyond the full build-out/occupancy of the site. It is expected that the planning, design and construction of the proposed development will likely occur within two years (2022). This would mean a reasonable future planning horizon for analysis purposes would occur by 2027.

5.2 Developing the Future 2027 Volumes

The future background traffic volume scenario assumes the proposed development would not be built. However, following HRM guidelines it is assumed that peak hour traffic volumes on the study area roads would continue to grow into the future. The background traffic volume growth was based on historical growth trends at the Cobequid Road / Windsor Junction Road intersection – which was determined to be 1% per year. As such, a 1% per year compounding traffic growth factor was applied to this analysis to account for increases in peak hour demand expected to occur between the existing 2020 traffic volumes and the future 2027 planning horizon.

The future total traffic volumes scenario assumes that the proposed development is built and fully occupied by the 2027 planning horizon. Therefore, the new site generated vehicle trips combined with the future 2027 background traffic volumes yield the expected total peak hour demand. The future Background and Total peak hour traffic volumes are contained in *Figure 4*.

Figure 4: Future 2027 Peak Hour Volumes at the Cobequid Road / Windsor Junction Road Intersection



Background 2027 ***Total 2027***

5.3 Intersection Capacity Assessment

A capacity analysis effort was carried out for the Cobequid Road / Windsor Junction Road intersection using both sets of future 2027 forecast traffic volumes contained in *Figure 4*. The analysis assumed that the existing intersection traffic control and lane configuration would remain in place out to the 2027 planning horizon. The analysis process used Trafficware's *Synchro 10* software tool. The results for each intersection approach are contained in *Table 4* and the detailed capacity reports are contained in *Appendix I*.

Table 4: Future 2027 Intersection – Summary of Analysis Results

1. Cobequid Road / Windsor Junction Road						
	AM Peak Hour			**PM Peak Hour**		
	Approach: Delay	**V/C**	**Queue[A]**	**Critical Move: Delay**	**V/C**	**Queue[A]**
Background 2027	WB Th-Rt: n/a[B]	-	-	WB Th-Rt: n/a[B]	-	-
(existing lanes)	EB Th-Lt: 7.7s	0.06	<10m	EB Th-Lt: 9.0s	0.25	10m
	SB Lt-Rt: 17.5s	0.60	30m	SB Lt-Rt: 19.4s	0.47	20m
Total 2027	WB Th-Rt: n/a[B]	-	-	WB Th-Rt: n/a[B]	-	-
(existing lanes)	EB Th-Lt: 7.7s	0.06	<10m	EB Th-Lt: 9.1s	0.27	10m
	SB Lt-Rt: 19.7s	0.66	35m	SB Lt-Rt: 23.5s	0.56	25m

A – Queue represents the calculated vehicle queue length in metres occurring 95% of the time (95th percentile).

B – No performance measures calculated as this is a first order priority movement at the intersection.

Based on the results contained in *Table 4*, the subject intersection is expected to operate with acceptable performance measures. Under a full build-out scenario, peak hour delay times will be 23.5 seconds/vehicle or less, volume-to-capacity ratios will be 0.66 or less and queues of 35m or less. This suggests that this intersection will have residual capacity to accommodate traffic growth beyond the 2027 planning horizon.

As noted earlier in this letter, the Cobequid Road / Windsor Junction Road intersection is the most significant intersection in close proximity to the proposed development. Therefore, these results also suggest that the other nearby intersections – such as the Windsor Junction Road / Winley Drive and Ingram Drive / Winley Drive intersections – will also continue to have sufficient residual capacity under peak period conditions.

6.0 FINDINGS & CONCLUSIONS

The following conclusions were gleaned from the traffic impact assessment of the proposed residential development:

- The proposed residential development will be comprised of 120 medium-density residential units contained within 3 buildings. It is understood that the residential units are intended to be rental apartments. Using appropriate trip rates for these types of residential units referenced from ITE's 10th Edition trip generation document, the proposed development is expected to generate 57 trips/hour (13 inbound and 44 outbound) during the weekday morning peak period and 69 trips/hour (44 inbound and 25 outbound) during the weekday afternoon peak period.
- At the request of HRM, the Cobequid Road / Windsor Junction Road was evaluated given its close proximity to the proposed development and the likelihood that the majority of new traffic will travel through this area. It was determined that under a future full build-out scenario, the critical stop-controlled movements at this intersection would operate with delays times of less than 24 seconds/vehicle, volume-to-capacity ratios of 0.66 or less and vehicle queue lengths of 35m or less. These results are within acceptable HRM guidelines for peak hour conditions and suggest there are no operational concerns expected by the 2027 planning horizon.

In summary, the traffic generated by the proposed residential development is expected to have an acceptable level of impact on the traffic operating conditions along Ingram Drive, Winley Drive, Windsor Junction Road and the Windsor Junction Road/Cobequid Road intersection. Based on this assessment the following steps are recommended:

- That the design of the Ingram Drive extension, cul-de-sac, and the vehicle access to the proposed new parking areas contained within the proposed development follow Transportation Association of Canada (TAC) and HRM design guidelines contained in the most recent edition of their Municipal Design Guidelines document. As part of the design process all new signage and pavement markings should be designed and installed in accordance with the most recent version of the *Manual of Uniform Traffic Control Devices for Canada* (MUTCDC).
- That HRM By-law requirements, including requirements for corner clearance and sight triangles are met to ensure both approaching and departing driver sightlines are maintained throughout the planning, design and construction phases of this project. This would include all driveway connections with public roads/streets, property accesses, and active transportation crossings.

7.0 CLOSING

The findings flowing from this traffic impact assessment indicate the new site-generated trips associated with a proposed 120-unit medium density residential development on Ingram Drive are expected to have an acceptable level of impact on the study area streets and intersections. I would be happy to provide you with additional information or clarification regarding these matters and can be reached anytime by phone at (902) 266-9436 or by email at jcopeland@griffininc.ca.

Sincerely,

Original Signed

James J. Copeland, P.Eng.
Managing Principal – Traffic & Road Safety Engineer
GRIFFIN transportation group inc.

Enclosed – Appendix A

APPENDIX A

Intersection Analysis Synchro Reports

Intersection	
Int Delay, s/veh	10.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	73	124	66	45	162	222
Future Vol, veh/h	73	124	66	45	162	222
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	79	135	72	49	176	241

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	126	0	-	0	400	107
Stage 1	-	-	-	-	102	-
Stage 2	-	-	-	-	298	-
Critical Hdwy	4.15	-	-	-	7.05	6.55
Critical Hdwy Stg 1	-	-	-	-	6.05	-
Critical Hdwy Stg 2	-	-	-	-	6.05	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1442	-	-	-	561	931
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	710	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1436	-	-	-	523	923
Mov Cap-2 Maneuver	-	-	-	-	523	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	17.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1436	-	-	-	698
HCM Lane V/C Ratio	0.055	-	-	-	0.598
HCM Control Delay (s)	7.7	0	-	-	17.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	4

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	272	64	155	147	41	159
Future Vol, veh/h	272	64	155	147	41	159
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	296	70	168	160	45	173

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	333	0	-	0	920	258
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	667	-
Critical Hdwy	4.15	-	-	-	7.05	6.55
Critical Hdwy Stg 1	-	-	-	-	6.05	-
Critical Hdwy Stg 2	-	-	-	-	6.05	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1210	-	-	-	255	757
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	452	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1205	-	-	-	188	751
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	556	-
Stage 2	-	-	-	-	450	-

Approach	EB	WB	SB
HCM Control Delay, s	7.3	0	19.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1205	-	-	-	465
HCM Lane V/C Ratio	0.245	-	-	-	0.468
HCM Control Delay (s)	9	0	-	-	19.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	1	-	-	-	2.4

Intersection	
Int Delay, s/veh	12

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	80	124	66	48	173	244
Future Vol, veh/h	80	124	66	48	173	244
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	87	135	72	52	188	265

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	129	0	-	0	417	108
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	314	-
Critical Hdwy	4.15	-	-	-	7.05	6.55
Critical Hdwy Stg 1	-	-	-	-	6.05	-
Critical Hdwy Stg 2	-	-	-	-	6.05	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1438	-	-	-	547	929
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	697	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1432	-	-	-	507	921
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	19.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1432	-	-	-	688
HCM Lane V/C Ratio	0.061	-	-	-	0.659
HCM Control Delay (s)	7.7	0	-	-	19.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	5

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	294	64	155	158	47	172
Future Vol, veh/h	294	64	155	158	47	172
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	320	70	168	172	51	187

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	345	0	-	0	974	264
Stage 1	-	-	-	-	259	-
Stage 2	-	-	-	-	715	-
Critical Hdwy	4.15	-	-	-	7.05	6.55
Critical Hdwy Stg 1	-	-	-	-	6.05	-
Critical Hdwy Stg 2	-	-	-	-	6.05	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1197	-	-	-	234	751
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	425	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1192	-	-	-	167	745
Mov Cap-2 Maneuver	-	-	-	-	167	-
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	423	-

Approach	EB	WB	SB
HCM Control Delay, s	7.5	0	23.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1192	-	-	-	427
HCM Lane V/C Ratio	0.268	-	-	-	0.557
HCM Control Delay (s)	9.1	0	-	-	23.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	1.1	-	-	-	3.3