



I 656 Prospect Road Traffic Impact Study

August 2018

Prepared for
Hatchet Lake Plaza Ltd

JRL consulting

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Prepared by

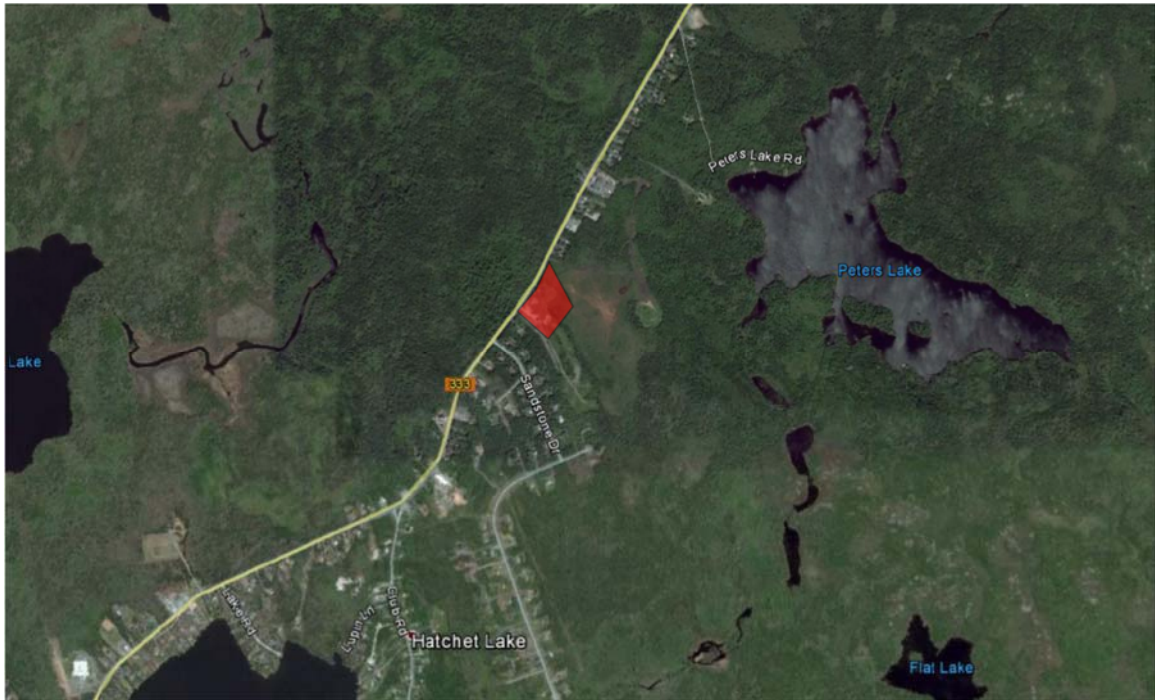
Jeff R. LeBlanc, P.Eng., PMP

1 Introduction

1.1 Background

Hatchet Lake Plaza Ltd has submitted an application to HRM to develop lands at 1656 Prospect Road with a Gasoline Station/Convenience Store/Fast Food Restaurant. Exhibit 1.1 shows the site in red in the context of the surrounding area in Hatchet Lake, Nova Scotia.

Exhibit 1.1 – 1656 Prospect Road in Hatchet Lake, Nova Scotia



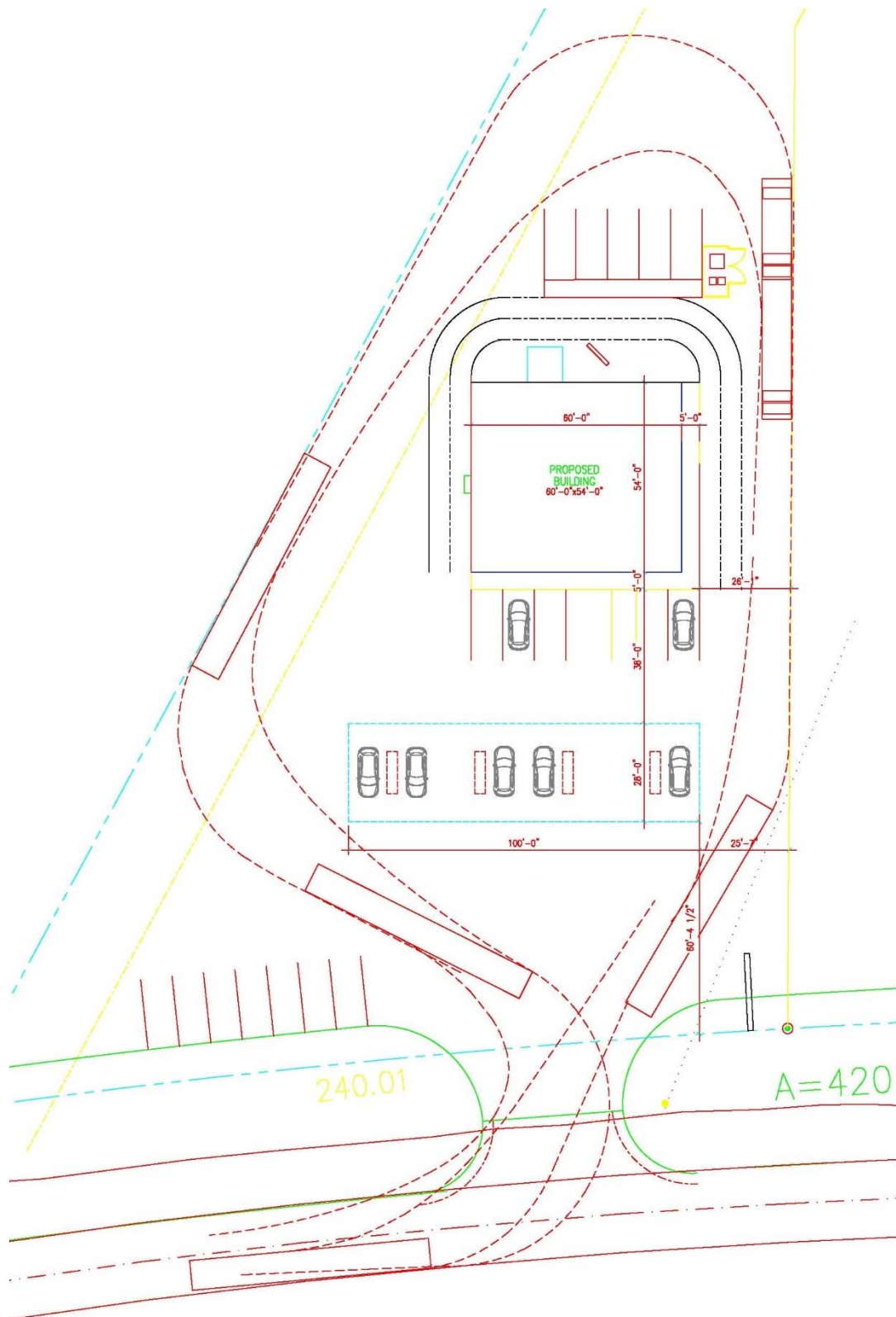
Source: Google Earth

The site plan provided for the proposed development shows a Gasoline Station with 8 fueling positions along with a 2,500 sqft Convenience Store and a 1,900 sqft Fast Food restaurant with drive through. There will be a single driveway with separate left and right turn exit lanes for this development which is shown on the left side of the site plan.

Development in this area is controlled by Halifax Regional Municipality (HRM) but the existing roads are maintained by Nova Scotia Transportation and Infrastructure Renewal (NSTIR) and they generally review potential traffic impacts for proposed developments like this one.

Refer to Exhibit 1.2 for the proposed site plan provided by Hatchet Lake Plaza Ltd that includes truck turning paths.

Exhibit 1.2 – 1656 Prospect Road Proposed Site Plan



JRL consulting completed a Traffic Impact Statement in November 2016 that was included in the application to HRM. Our report was reviewed by TIR and the following comment related to traffic was provided in a letter dated February 24, 2017:

"The traffic impact statement indicates that the proposed development will generate 187 and 332 vehicle trips in the morning and afternoon peak periods, respectively. If a coffee shop with drive-thru use is being considered, ITE Land Use Code 820 (Fast Food Restaurant with Drive Thru) may underestimate traffic generation. TIR policy requires a more detailed traffic impact study consistent with provincial requirements. The first step in this process would be a meeting with TIR staff to discuss scope and other requirements for this study. Traffic control requirement and turn lane warrants will need to be assessed."

JRL consulting met with representatives of TIR at a Scope Development Meeting (SDM) on Monday April 24, 2017. We submitted a Terms of Reference that outlined those discussions and decisions that were agreed upon per the requirements of the *Guide for the Preparation of Traffic Impact Studies*.

A report was completed in May 2017 and it was presented to HRM and TIR. The developer has indicated that the Retail Plaza is no longer part of the development plans nor is the coffee shop which will now be a Fast Food Restaurant with Drive Through that may be a Subway.

We are pleased to submit this updated report that addresses TIR comments above and also includes our findings and recommendations.

2 Existing Traffic Conditions

2.1 Description

The principal route affected by this proposed development is Prospect Road (NS Highway 333). Exhibit 2.1 summarizes HRM's Characteristics of Street Classes.

Exhibit 2.1 - HRM Characteristics of Street Classes

Characteristic	Arterial Street	Major Collector	Minor Collector	Local Industrial	Local Street
1. Traffic Service Function	First Consideration	Traffic movement primary consideration, land access secondary consideration, some parking	Traffic movement of equal importance with land access, parking permitted	Traffic movement secondary consideration with land access primary consideration, parking permitted	Traffic movement secondary consideration with land access primary consideration, parking permitted
2. Land Access Function	Limited Access with no parking				
3. Range of design traffic average daily volume	More than 20,000	12,000 to 20,000 or more	Up to 12,000	Less than 3,000	Less than 3,000
4. Characteristics of traffic flow	Uninterrupted flow except at signals; w/ pedestrian overpass	Uninterrupted flow except at signals and crosswalks	Interrupted flow	Interrupted flow	Interrupted flow
5. Average running speed in off-peak conditions	50-70 km/hr	40-60 km/hr	30-50 km/hr	15-30 km/hr	15-30 km/hr
6. Vehicle types	All types	All types but trucks may be limited	All types with truck limitation	All types	Passenger and service vehicles, transit buses; large vehicles restricted
7. Connects to	Expressways, arterials, major collectors, minor collectors	Expressways, arterials, major collectors, minor collectors, some locals	Arterials, major collectors, minor collectors, locals	Some major collectors, minor collectors, locals	Some major collectors, minor collectors, locals

Prospect Road is a major route (Nova Scotia Highway 333) that extends from Halifax at Route 3 to St Margarets Bay and provides access to dozens of communities including Peggy's Cove. It's a two lane facility throughout with some auxiliary turning lanes and it provides access to residential and commercial properties. The posted speed limit varies and is listed at 70km/hr in the study area near the proposed development. Prospect Road is constructed with a gravel shoulder and ditches and there are no pedestrian sidewalks. It is controlled and maintained by Nova Scotia Transportation and Infrastructure Renewal.

Refer to Exhibit 2.2 for photos of the Study Area around 1656 Prospect Road in Hatchet Lake, Nova Scotia.

Exhibit 2.2 – Study Area Photos



1656 Prospect Road looking south

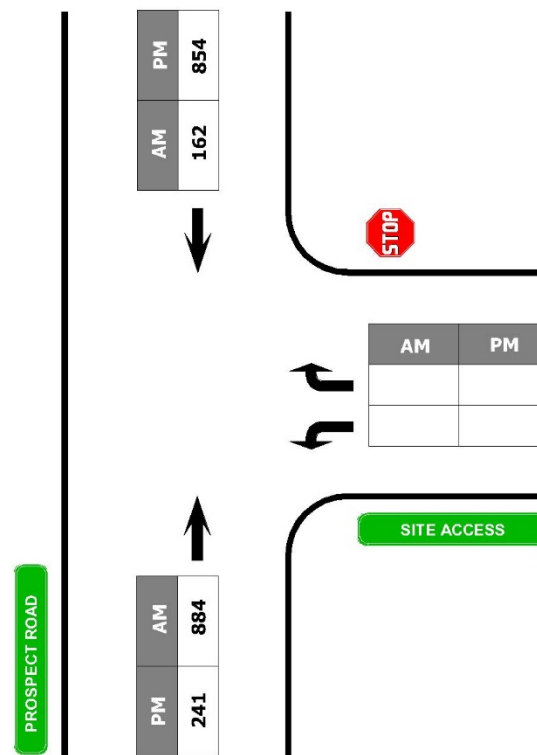


1656 Prospect Road looking north

2.2 Existing Traffic Volumes

TIR had no recent traffic counts near the proposed development at 1656 Prospect Road so JRL consulting completed new AM and PM Peak Hour manual traffic counts on Thursday April 27, 2017 as summarized in Exhibit 2.3.

Exhibit 2.3 – Existing Traffic Volumes and Distribution at 1656 Prospect Road



2.3 Existing Trip Distribution

During the AM peak hour period, 82% of the traffic on Prospect Road travels northbound towards Halifax. This trend is reversed during the PM peak hour as drivers return home from work with 78% of the traffic on Prospect Road travelling in a southbound direction.

2.4 Background Changes in Traffic Conditions

We applied an annual background traffic volume growth rate of 1% to establish baseline background traffic volumes at all intersections for analysis in 2023 which was defined as the horizon year.

2.5 Transit and Pedestrians

There is no Metro Transit bus service on Prospect Road south of Exhibition Park. We did not observe any pedestrian traffic on Prospect Road during our site review completed on April 18, 2015. There are no sidewalks in the area but Prospect Road does have a graveled shoulder.

3 Site Generated Traffic

3.1 Trip Generation

We completed new trip generation estimates using equations provided in Institute for Transportation Engineer's Trip Generation Manual Ninth Edition. The site plan provided for the proposed development shows a Gasoline Station with 8 fueling positions along with a 2,500 sqft Convenience Store and a Fast Food restaurant with drive through at 1,900 sqft.

We used the following ITE Land Use Codes to assess site generated trips for this proposed development:

- ITE Land Use 945 Gasoline/Service Station with Convenience Market

"Includes gasoline/service stations with convenience markets where the primary business is the fueling of motor vehicles. These service stations may also have ancillary facilities for servicing and repairing motor vehicles." The unit of measurement for average vehicle trip ends vehicle fueling positions.

- ITE Land Use 934 Fast Food Restaurant with Drive-Through Window

"Includes fast-food restaurants with drive-through windows. This type of restaurant is characterized by a large carryout clientele; long hours of services (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours)." The unit of measurement for average vehicle trip ends is 1000 square feet of gross floor area.

Exhibit 3.1 – Estimated Site Generated Traffic Volumes at 1656 Prospect Road

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Gasoline Station with Convenience Market ITE Land Use 945	8 Pumps	81	50%	50%	108	50%	50%
			41	41		54	54
Fast Food Restaurant with Drive Thru ITE Land Use 934	1,900 sqft	86	51%	49%	62	52%	48%
			44	42		32	30
TOTAL		168	85	83	170	86	84

3.2 Pass By Trips

We expect that this proposed development will attract a significant portion of its trips from the existing traffic passing by the site. These pass-by trips do not add new traffic to the surrounding transportation network; however, they are included in the traffic volumes entering and exiting the site. Essentially, pass-by trips are intermediate stops of a trip that already exists on the transportation network. They are not diverted from another roadway. The proposed retail portion of the development is relatively small and as a result will primarily serve the local area and not attract regional traffic

We reviewed ITE's Trip Generation Manual, 9th Edition for their recommended practice regarding pass-by trips and it states that *"Pass-by trips are drawn from the passing traffic stream, but are always included in site driveway movements. In traffic analyses, the summation of driveway volumes must equal the total external site generation (i.e., the sum of primary, pass-by and diverted linked trips). Pass-by trips are not included in (and thus subtracted from) the through volumes passing a given site access point on an adjacent road."*

ITE provides data plots and equations that estimate the average pass-by trip percentage for the land use codes used for this development were reviewed to estimate the average pass-by-trip percentage.

The average pass-by trip percentages for a Gasoline Station with Convenience Market with 6 pumps is 62% during the AM peak hour and 56% during the PM peak hour.

The average pass-by trip percentages for a 1,500 sqft Fast Food Restaurant with Drive Thru is 49% during the AM peak hour and 50% during the PM peak hour

To determine a more reasonable estimate of net new traffic we reduced all peak hour traffic volumes by the pass-by percentages described above.

Exhibit 3.2 – Estimated Net Future Traffic Volumes with Pass-By Trip Adjustments

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
TOTAL		75	38	37	79	40	39

As per the ITE recommended practice, we included all estimated trips in the site movements (enter and exit) and reduced the through traffic volumes accordingly to account for the pass-by trip percentage.

3.3 Trip Distribution and Assignment

We distributed and assigned the site-generated trips to the transportation network by analyzing the existing traffic distribution on Prospect Road during the AM and PM peak hours as observed during our manual traffic counts.

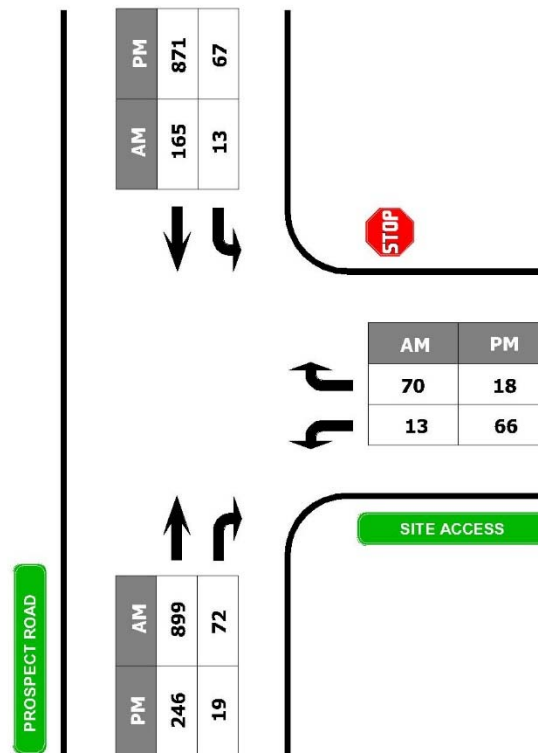
During the AM peak hour period, 82% of the traffic on Prospect Road travels northbound towards Halifax. This trend is reversed during the PM peak hour as drivers return home from work with 78% of the traffic on Prospect Road travelling in a southbound direction.

Detailed spreadsheets showing how the site-generated traffic was distributed at the new site access point at 1656 Prospect Road (including pass-by trip adjustments) have been included in the Appendix.

3.4 Total Traffic

The estimated distributed site-generated traffic was added to the calculated 2023 background traffic volumes (with an annual growth factor of 1%) to obtain the total traffic volumes proposed Prospect Road/Site Access intersection. Please refer Exhibit 3.3 for a summary of total traffic volumes in 2023 and the Appendix for a detailed breakdown of the calculation of total traffic at this intersection for this analysis period.

Exhibit 3.3 – 1656 Prospect Road Estimated Total Traffic 2023



4 Evaluation of Impacts

4.1 Turning Lane Assessment

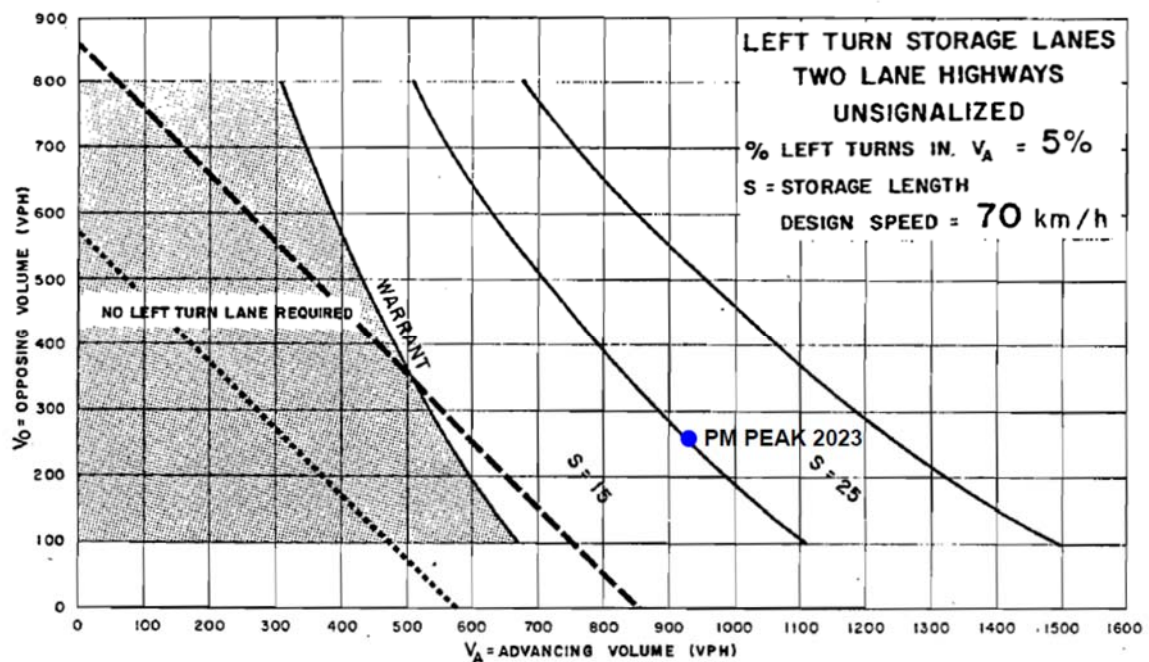
Left turn warrants and storage lane lengths for unsignalized intersections are based on turning, advancing and opposing design hour volumes.

The significant amount of northbound and southbound traffic on Prospect Road tends to result in the need for auxiliary turning lanes with new developments.

We completed a southbound Left Turn Warrant on Prospect Road at the proposed Hatchet Lake Plaza driveway based on estimated traffic volumes from the proposed development at full build out in 2023 following procedures defined by the Ministry of Transportation for the Province of Ontario. We used graphs for a design speed of 70 km/hr to match the posted speed on Prospect Road.

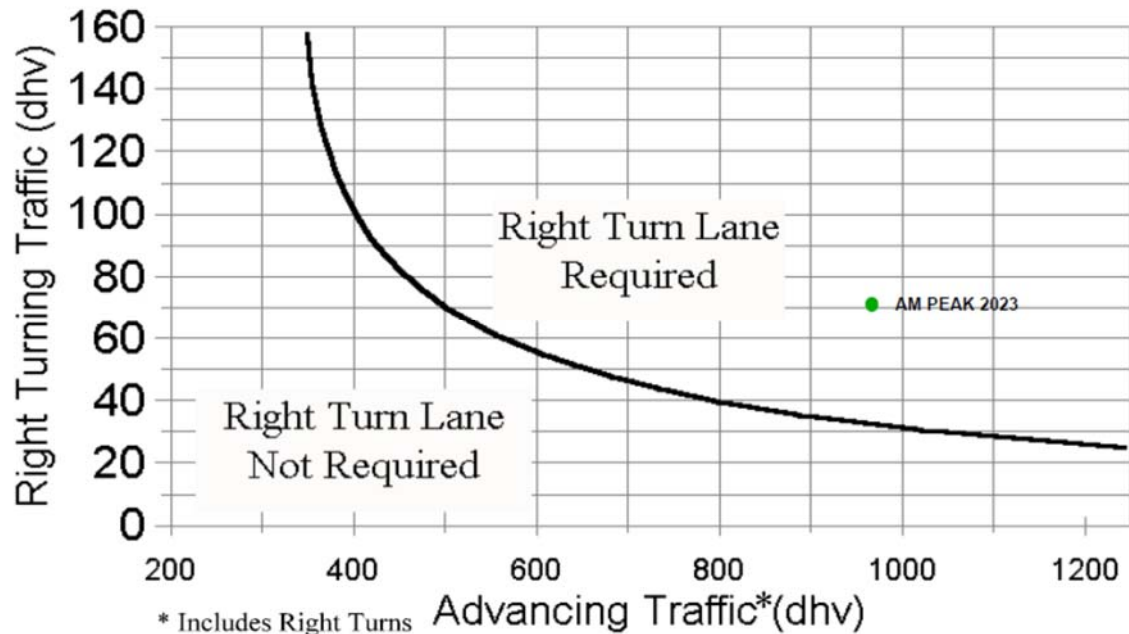
We focused on the PM peak hour as the southbound volumes (through and left) are larger. We calculated the percentage of left turns in the advancing southbound volume at 7.4% so we used the 5% graph and this shows that a left turn lane is warranted with a storage length of 25 meters based on the PM peak hour volumes. Refer to Exhibit 4.1.

Exhibit 4.1 – Southbound Left Turn Lane Warrant at 1656 Prospect Road



We completed a northbound Right Turn Warrant at 1656 Prospect Road based on estimated AM peak hour traffic volumes from the proposed development at full build out in 2023 using graphs prepared by the Ohio Department of Transportation. A right turn lane is warranted as shown in Exhibit 4.2

Exhibit 4.2 – Eastbound Right Turn Warrants at Wallace Hill Road/Hammonds Plains Road



We calculated a storage length of 12.5 meters for this northbound right turn auxiliary lane based on 121 right-turning vehicles following Transportation Association of Canada procedures which estimate the number of vehicles that are likely to accumulate in 2 minutes. This storage length is in addition to deceleration length and exclusive of taper. For the purpose of this assessment we rounded off the storage length to 15 meters.

4.2 Traffic Signal Warrant

We completed a Traffic Signal Warrant Analysis at this intersection following Transportation Association of Canada's Canadian *Traffic Signal Warrant Procedure* (2005) with estimated 2023 total traffic volumes. This warrant produced a total of **36** points indicating that signals are not warranted as it does not reach the threshold of 100 priority points. We used 10 pedestrians per hour per HRM guidelines in rural areas although we expect actual pedestrians to be less than this. The pedestrian portion of the signal warrant accounted for 8 of the 36 points.

In preparing these signal warrants, we allocated estimated site generated traffic by looking at observed traffic during our local counts to determine the ratio of the observed peak hour counts compared with the other hour in the 2-hour period used in signal warrants. For the noon hour peak period between 11am and 1pm we reviewed 24-hour traffic counts from TIR completed in 2017 to compare that period with the PM peak period between 4pm and 6pm to estimate noon hour volumes including site generated traffic. Noon hour traffic volumes in this area are between 52% and 60% of PM peak hour volumes.

We have included both warrants in the Appendix.

4.3 Level of Service Analysis

As described in the Highway Capacity Manual "the concept of levels of service used qualitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers. The descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst."

As stated in the Highway Capacity Manual, "analysis of signalized intersections focuses on the capacity and level of service of intersection approaches and the intersection as a whole. Capacity is evaluated in terms of the ratio of demand flow rate (volume) to capacity (v/c ratio) while the level of service is evaluated on the basis of average control delay per vehicle (in seconds per vehicle)." Exhibit 4.3 defines Level of Service for signalized intersections.

The Highway Capacity Manual also states that "the level of service is determined by the computed or measured control delay and is defined for each minor movement. Level of Service is not defined for the intersection as a whole." LOS criteria for unsignalized intersections are summarized in Exhibit 4.4.

Exhibit 4.3 - Level of Service Criteria for Signalized Intersections

Level of Service	Description	Control, Delay Per Vehicle (Seconds)
A	Very low delay; most vehicles do not stop (Excellent)	≤ 10
B	Higher delay; more vehicles stop (Very Good)	≥ 10 and ≤ 20
C	Higher number of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	≥ 20 and ≤ 35
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; Many vehicles stop (Satisfactory)	≥ 35 and ≤ 55
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	≥ 55 and ≤ 80
F	This level is considered to be unacceptable for most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	≥ 80

Exhibit 4.4 - Level of Service Criteria for Unsignalized Intersections

Level of Service	Delay Range (Seconds)
A	≤ 10
B	≥ 10 and ≤ 15
C	≥ 15 and ≤ 25
D	≥ 25 and ≤ 35
E	≥ 35 and ≤ 50
F	≥ 50

Traffic volumes are at their highest during the AM and PM peak periods so the impact of the trips generated by the proposed development during these hours will provide a worst case assessment of their impacts on the existing transportation network.

NSTIR's Guide for the Preparation of Traffic Impact Studies states that:

"for signalized and unsignalized intersections and overall LOS rating of "A" to "D" (based on delay), and a volume/capacity (v/c) ratio less than 0.90 for any individual movement, are normally considered acceptable. Where existing or horizon year levels of service are "E" or "F", or v/c ratios exceed 0.90, without the proposed development, LOS and v/c ratios equal to or better than existing levels may be acceptable as long as the average stopped delay per vehicle per movement is not increased after the development."

Level of Service (LOS), Volume-to-Capacity ratios (v/c) and 95% Queue Length in meters (95%) results from all key movements are summarized in Exhibits 4.5

Exhibit 4.5 – 1656 Prospect Road LOS Results 2023 Total Traffic

	WB-L	WB-R	NB-T	NB-R	SB-L	SB-T	Total
AM PEAK HOUR – 2023 TOTAL TRAFFIC							
Delay	17.8	21.5			10.3		1.5
LOS	C	C			B		
v/c	0.049	0.264			0.021		
95% Queue	0.2	1.0			0.1		
PM PEAK HOUR – 2023 TOTAL TRAFFIC							
Delay	26.0	9.8			8.0		1.9
LOS	D	A			A		
v/c	0.301	0.026			0.058		
95% Queue	1.2	0.1			0.2		

All movements operated with acceptable LOS during the AM and PM peak hour periods.

4.4 Stopping Site Distance

As per the Transportation of Canada Geometric Design Guide for Canadian Roads, adequate stopping site distance *"is essential for safe operation that the vehicle operator be able to see far enough ahead to stop if necessary. Conditions that would force a vehicle operator to stop are for example, an object on the roadway, a culvert washout or other fault in the roadway.*

Adequate stopping site distance is required throughout the length of the roadway. Minimum stopping site distance is the sum of two distances namely:

- *Brake reaction distance*

The distance travelled during the brake reaction time, that is the time that elapses from the instant an object, for which the driver decides to stop, comes into view to the instant the driver takes remedial action (contacts brake pedal).

- *Braking distance*

The distance travelled from the time that braking begins to the time the vehicle comes to a stop."

For a design speed of 70 km/h, the minimum stopping site distance is 110 m.

We completed a site review and didn't identify any red flags or concerns providing adequate stopping site distance on Prospect Road at the proposed development as visibility is good at the site.

We engaged SDMM to complete a formal survey that was completed on May 18, 2018 at the proposed development. Their comments are outlined below and also included in the Appendix:

"The existing driveway to the property is located near a local crest in highway 333 which provides excellent sight lines in both east and west directions from the proposed development. Based on the proposed site plan the Eastern driveway will be located 10m east of the existing driveway and the Western driveway will be located 42m west of the existing driveway.

Visibility is excellent on Highway 333 at the existing driveway with slight westbound approach grade of 0.5% and eastbound approach grade of 2.0% on Highway 333 and the stopping site distance is more than adequate to the East and West with posted speed limit of 70km/hr. We completed a survey on May 18, 2018 on Highway 333 at the existing driveway and we measured the westbound approach Stopping Site Distance at 223m while the eastbound approach has an excess of 320m both of which far exceed the minimum SSD of 110m (As per TAC manual table 1.2.5.3). With an upward slope of 2% on the eastbound approach, this would decrease the SSD slightly to 108m."

5 Conclusions and Recommendations

This Traffic Impact Study has provided a detailed overview of the proposed development at 1656 Prospect Road of a Gasoline Station with 8 fueling positions along with 2,500 sqft Convenience Store and a 1,900 sqft Fast Food Restaurant with Drive Through.

We estimate that the proposed development will add a total of 75 new trips to the existing transportation network during the AM peak hour period and a total of 79 new trips during the PM peak hour period.

New site generated traffic will most likely follow existing trip distribution patterns with the majority of traffic heading in a general northbound direction on Prospect Road towards Halifax during the AM peak hour period and in a general southbound direction during the PM peak hour period.

The proposed development can be introduced safely and efficiently into the existing transportation network and we offer the following additional comments:

- A southbound left turn auxiliary lane on Prospect Road is warranted at the proposed entrance to the development with a storage length of 25m.
- A northbound right turn auxiliary lane on Prospect Road is warranted at the proposed entrance to the development with a storage length of 15m.
- Separate left and right turn lanes exiting the site from a single driveway is recommended to ensure efficient exit from the site northbound and southbound.
- Traffic signals are not warranted at the proposed entrance to the development.
- Stopping site distance at the proposed site driveway intersection with Prospect Road is adequate based on a visual inspection and detailed survey.
- The types of local land uses proposed for this development will in fact attract a large portion of its customers from the existing traffic stream which lessens the impact of site generated traffic.
- Currently, local residents must travel outside of the study area for retail trips, gas and coffee so this proposed development has the potential to actually reduce trips on other areas of Prospect Road since residents can meet their retail needs locally.

APPENDIX

TRIP GENERATION

TRAFFIC COUNTS AND DISTRIBUTION

SIGNAL WARRANTS

SYNCHRO 8 REPORTS

STOPPING SITE DISTANCE SURVEY

1656 PROSPECT ROAD TRAFFIC IMPACT STATEMENT 2018 UPDATE

TRIP GENERATION RATES

Source - ITE Trip Generation Manual 9th Edition

Land Use 945

Gasoline/Service Station with Convenience Market and Car Wash

AM PEAK	10.16	Average Rate per vehicle fueling positions
PM PEAK	13.51	Average Rate per vehicle fueling positions
AM PEAK PASS BY	62%	
AM PEAK PASS BY	56%	

Land Use 934

Fast-Food Restaurant with Drive Thru Window

AM PEAK	45.41	Average Rate per 1000 Sqft Gross Floor Area
PM PEAK	32.65	Average Rate per 1000 Sqft Gross Floor Area
AM PEAK PASS BY	49%	
AM PEAK PASS BY	50%	

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL TRIPS	ENTER	EXIT	TOTAL	ENTER	EXIT
Gasoline/Service Station with Convenience Market	8	81	50%	50%	108	50%	50%
			41	41		54	54
Fast-Food Restaurant with Drive Thru Window	1.9	86	51%	49%	62	52%	48%
			44	42		32	30
TOTAL		168	85	83	170	86	84

Gasoline/Service Station with Convenience Market	8	50	50%	50%	61	50%	50%
			25	25		30	30
Fast-Food Restaurant with Drive Thru Window	1.9	42	51%	49%	31	52%	48%
			22	21		16	15
TOTAL		93	47	46	92	46	45

Gasoline/Service Station with Convenience Market	6	31	50%	50%	48	50%	50%
			15	15		24	24
Fast-Food Restaurant with Drive Thru Window	1.5	44	51%	49%	31	52%	48%
			22	22		16	15
TOTAL		75	38	37	79	40	39

1656 PROSPECT ROAD TRAFFIC IMPACT STUDY 2018 UPDATE

TOTAL TRAFFIC ANALYSIS

AM PEAK		PROSPECT ROAD						SITE ACCESS					
ENTER	85	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
EXIT	83	L	T	R	L	T	R	L	T	R	L	T	R
PASS BY TRIPS													
ENTER	47												
EXIT	46												
2017													
07:00:00 AM	08:00:00 AM		884			162							
2018													
07:00:00 AM	08:00:00 AM		893			164							
2023													
07:00:00 AM	08:00:00 AM		938			172							
DISTRIBUTION													
07:00:00 AM	08:00:00 AM			85%	15%						15%		85%
SITE GENERATED TRAFFIC													
07:00:00 AM	08:00:00 AM			72	13						13		70
PASS BY TRIPS													
07:00:00 AM	08:00:00 AM		40			7							
TOTAL TRAFFIC 2023													
07:00:00 AM	08:00:00 AM		899	72	13	165					13		70

PM PEAK		PROSPECT ROAD						SITE ACCESS					
ENTER	86	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
EXIT	84	L	T	R	L	T	R	L	T	R	L	T	R
PASS BY TRIPS													
ENTER	46												
EXIT	45												
2017													
04:15:00 PM	05:15:00 PM		241			854							
2018													
04:15:00 PM	05:15:00 PM		243			863							
2023													
04:15:00 PM	05:15:00 PM		256			907							
DISTRIBUTION													
04:15:00 PM	05:15:00 PM			22%	78%						78%		22%
SITE GENERATED TRAFFIC													
04:15:00 PM	05:15:00 PM			19	67						66		18
PASS BY TRIPS													
04:15:00 PM	05:15:00 PM		10			36							
TOTAL TRAFFIC 2023													
04:15:00 PM	05:15:00 PM		246	19	67	871					66		18

1656 PROSPECT ROAD TRAFFIC IMPACT STUDY 2018 UPDATE

TOTAL TRAFFIC ANALYSIS FOR SIGNAL WARRANT

AM PEAK		PROSPECT ROAD						SITE ACCESS					
ENTER	85	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
EXIT	83	L	T	R	L	T	R	L	T	R	L	T	R
TOTAL TRAFFIC 2023													
07:00:00 AM	08:00:00 AM		899	72	13	165					13		70
08:00:00 AM	09:00:00 AM		600	48	9	110					9		47

NOON		PROSPECT ROAD						SITE ACCESS					
ENTER	85	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
EXIT	83	L	T	R	L	T	R	L	T	R	L	T	R
TOTAL TRAFFIC 2023													
11:00:00 AM	12:00:00 PM		128	10	35	455					34		10
12:00:00 PM	01:00:00 PM		141	11	38	499					38		11

PM PEAK		PROSPECT ROAD						SITE ACCESS					
ENTER	86	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
EXIT	84	L	T	R	L	T	R	L	T	R	L	T	R
TOTAL TRAFFIC 2023													
04:00:00 PM	05:00:00 PM		246	19	67	871					66		18
05:00:00 PM	06:00:00 PM		234	18	64	831					63		18

HRM Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	PROSPECT	Direction (EW or NS)	NS
Side Street (name)	GAS STATION	Direction (EW or NS)	EW
Quadrant / Int #		2023 TOTAL TRAFFIC ESTIMATES	
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	HRM
City:	HALIFAX
Analysis Date:	
Count Date:	2017 Apr 27, Thu
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
PROSPECT	NB			1			1		1
PROSPECT	SB	1		1		1		125	2
GAS STATION	WB	1					1		
GAS STATION	EB								

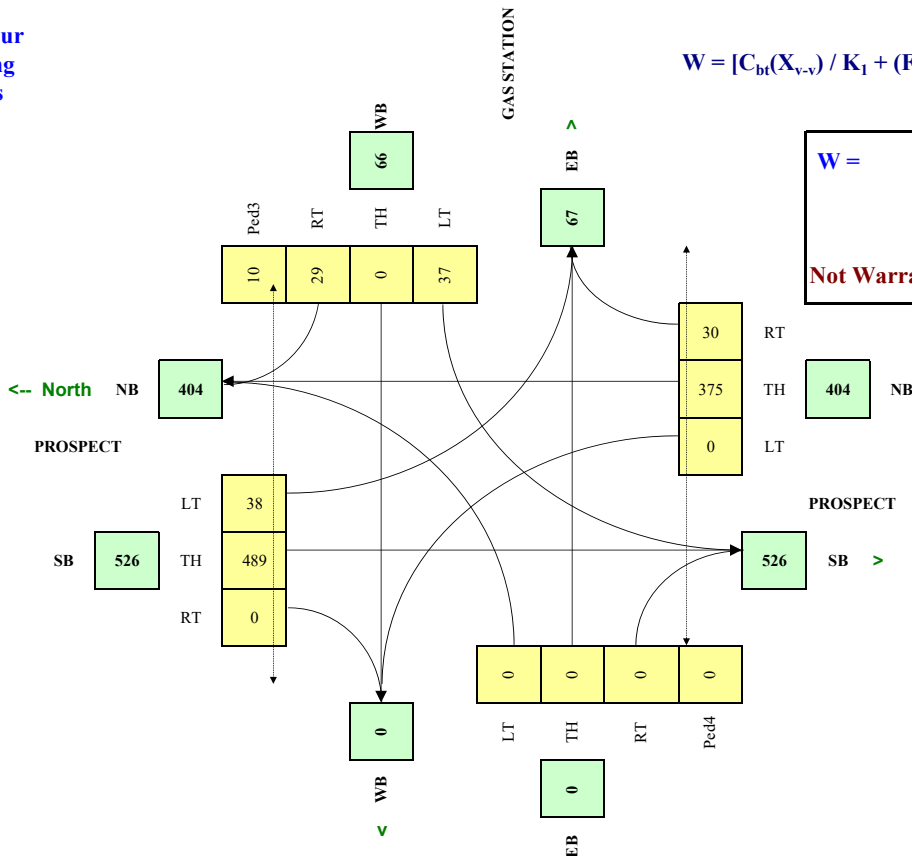
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	400,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
PROSPECT	NS	70	2.0%	n	
GAS STATION	EW		2.0%	n	

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7: - 8:		899	72	13	165		13		70					10	10	
8: - 9:		600	48	9	110		9		47					10	10	
11: - 12:		128	10	35	455		34		10					10	10	
12: - 13:		141	11	38	499		38		11					10	10	
16: - 17:		246	19	67	871		66		18					10	10	
17: - 18:		234	18	64	831		63		18					10	10	
Total (6-hour peak)	0	2,248	178	226	2,931	0	223	0	174	0	0	0	0	60	60	0
Average (6-hour peak)	0	375	30	38	489	0	37	0	29	0	0	0	0	10	10	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 =	36	28	8
		Veh	Ped
Not Warranted - Vs<75			

RESET SHEET

AM PEAK 2023 TOTAL TRAFFIC

3: Prospect Road & Site Access

2018-04-15

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR		NET	NER	SWL SWT
Vol, veh/h	13	70		899	72	13 165
Conflicting Peds, #/hr	0	0		0	0	0 0
Sign Control	Stop	Stop		Free	Free	Free Free
RT Channelized	-	None		-	None	- None
Storage Length	0	0		-	150	250 -
Veh in Median Storage, #	1	-		0	-	- 0
Grade, %	0	-		0	-	- 0
Peak Hour Factor	90	90		90	90	90 90
Heavy Vehicles, %	2	2		2	2	2 2
Mvmt Flow	14	78		999	80	14 183
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1211	999		0	0	999 0
Stage 1	999	-		-	-	- -
Stage 2	212	-		-	-	- -
Critical Hdwy	6.42	6.22		-	-	4.12 -
Critical Hdwy Stg 1	5.42	-		-	-	- -
Critical Hdwy Stg 2	5.42	-		-	-	- -
Follow-up Hdwy	3.518	3.318		-	-	2.218 -
Pot Cap-1 Maneuver	201	295		-	-	693 -
Stage 1	356	-		-	-	- -
Stage 2	823	-		-	-	- -
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	197	295		-	-	693 -
Mov Cap-2 Maneuver	295	-		-	-	- -
Stage 1	356	-		-	-	- -
Stage 2	806	-		-	-	- -
Approach	WB			NE	SW	
HCM Control Delay, s	20.9			0	0.8	
HCM LOS	C					
Minor Lane/Major Mvmt	NET	NER	WBLn1	WBLn2	SWL	SWT
Capacity (veh/h)	-	-	295	295	693	-
HCM Lane V/C Ratio	-	-	0.049	0.264	0.021	-
HCM Control Delay (s)	-	-	17.8	21.5	10.3	-
HCM Lane LOS	-	-	C	C	B	-
HCM 95th %tile Q(veh)	-	-	0.2	1	0.1	-

PM PEAK 2023 TOTAL TRAFFIC

3: Prospect Road & Site Access

2018-04-15

Intersection

Int Delay, s/veh 1.9

Movement	WBL	WBR	NET	NER	SWL	SWT
Vol, veh/h	66	18	246	19	67	871
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	150	250	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	20	273	21	74	968

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1390	273	0
Stage 1	273	-	-
Stage 2	1117	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	157	766	1290
Stage 1	773	-	-
Stage 2	313	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	148	766	1290
Mov Cap-2 Maneuver	244	-	-
Stage 1	773	-	-
Stage 2	295	-	-

Approach	WB	NE	SW
HCM Control Delay, s	22.5	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	WBLn1	WBLn2	SWL	SWT
Capacity (veh/h)	-	-	244	766	1290	-
HCM Lane V/C Ratio	-	-	0.301	0.026	0.058	-
HCM Control Delay (s)	-	-	26	9.8	8	-
HCM Lane LOS	-	-	D	A	A	-
HCM 95th %tile Q(veh)	-	-	1.2	0.1	0.2	-



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May 23, 2018

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Re: 1656 Prospect Road Wilson's Gas Bar Development – Stopping Sight Distance Report

SDMM visited the site May 18, 2018 to measure the stopping sight distance along Hwy 333 for a proposed Wilson's Fuel gas bar and commercial development (Gallagher Technical Services Limited site plan date December 2017). The existing driveway to the property is located near a local crest in highway 333 which provides excellent sight lines in both east and west directions from the proposed development. Based on the proposed site plan the Eastern driveway will be located 10m East of the existing driveway and the Western driveway will be located 42m west of the existing driveway.

Visibility is excellent on Highway 333 at the existing driveway with slight westbound approach grade of 0.5% and eastbound approach grade of 2.0% on Highway 333 and the stopping site distance is more than adequate to the East and West with posted speed limit of 70km/hr. We completed a survey on May 18, 2018 on Highway 333 at the existing driveway and we measured the westbound approach Stopping Site Distance at 223m while the eastbound approach has an excess of 320m both of which far exceed the minimum SSD of 110m (As per TAC manual table 1.2.5.3). With an upward slope of 2% on the eastbound approach, this would decrease the SSD slightly to 108m.

For any additional discussion of the above please contact the undersigned.

Regards,

Servant, Dunbrack, McKenzie & MacDonald Ltd.

Original Signed

Ray Landry, M.A.Sc., P.Eng.
Project Engineer

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