James J. Copeland, P.Eng.
GRIFFIN transportation group inc.
30 Bonny View Drive
Fall River, NS B2T 1R2

May 17, 2021

Mr. Hekmat Jarrar
Canadian Standard EST Inc.
834 Hammonds Plains Road
Bedford, NS B4B 1B1

RE: Response to Traffic Engineering Comments from HRM

1.0 INTRODUCTION

The GRIFFIN transportation group inc. (GRIFFIN) recently completed a qualitative Stage 1 Traffic Impact Statement (TIS) letter, dated March 2nd, 2021, for a proposed 19-unit residential development located on the lands that comprise civic #5-#7 Kingswood Drive, in the community of Hammonds Plains. Vehicle access to the proposed development will be provided via an extension of Kenwood Avenue, east of Woodlyn Drive.

In completing the qualitative TIS, GRIFFIN followed HRM TIS guidelines and industry best practices. It was concluded that the proposed 19-unit residential development – marketed toward senior adult active living – would add about 1 new vehicle trip every 4-5 minutes to the study area streets and intersections during peak travel times. This level of increase is considered to be very small. Given the fact that there is a considerable amount of residual capacity along Kenwood Avenue, Woodlyn Drive and Crestfield Drive, it was concluded the proposed development would have a negligible traffic impact.

HRM has reviewed the planning application documents submitted by *Canadian Standard EST Inc.* for the 19-unit development, and subsequently provided a set of comments. At the request of *Canadian Standard EST Inc.*, GRIFFIN has prepared this letter to provide responses to the HRM's traffic engineering comments.

2.0 IMPACTS TO CIVIC #19 KENWOOD AVENUE

Civic #19 Kenwood Avenue contains a detached residential home with a driveway connection at the Kenwood Avenue / Woodlyn Drive intersection. Currently, Kenwood Avenue terminates at Woodlyn Drive. As discussed in the March 2nd, 2021 TIS letter, it is proposed that the new access serving the 19-unit development would form a new east leg to the Kenwood Avenue / Woodlyn Drive intersection - essentially extending Kenwood Avenue along the existing road reserve that forms the north boundary of the civic #19 property.

Once the proposed development is complete, the civic #19 driveway is expected to connect to the Kenwood Avenue extension at a 90-degree angle. As identified in GRIFFIN's March 2nd TIS letter the geometric design process should follow HRM and TAC design guidelines.

As noted earlier, there is a considerable amount of residual capacity along Kenwood Avenue. As such, the proposed changes to the civic #19 driveway will result in a similar level of traffic operational performance that is currently experienced at the other individual driveways along Kenwood Avenue.

3.0 TRAFFIC SIGNAL WARRANT ANALYSIS

3.1 - Traffic Volumes at Hammonds Plains Road & Crestfield Drive

HRM has requested that a traffic signal warrant be carried out at the Hammonds Plains Road / Crestfield Drive intersection. In order to complete the traffic signal warrant calculation process, GRIFFIN first established a set of baseline traffic volumes for the intersection. HRM was contacted to obtain any recent historical traffic data they have gathered through their on-going data collection program. GRIFFIN also supplemented the historical volumes with their own data collection efforts. The following data sets were reviewed by GRIFFIN:

Table 1: Traffic Data Sources

Date	Type / Location	Source
May 2014	TMC at Crestfield Dr	HRM
June 2015	ATR count east of Lucasville Rd	HRM
July 2017	6-hour count east of Crestfield Dr	HRM
April 2018	ATR count east of Crestfield Dr	Harbourside Engineering
May 2021	TMC at Crestfield	GRIFFIN

The May 2021 data gathered at the Hammonds Plains Road / Crestfield Drive intersection was the most recent. However, given the Provincial State of Emergency that was in place at the time of the traffic counts, GRIFFIN reviewed the other data sets to establish reasonable adjustment factors that would be applied to the May 2021 counts. This resulted in an adjusted set of Baseline traffic

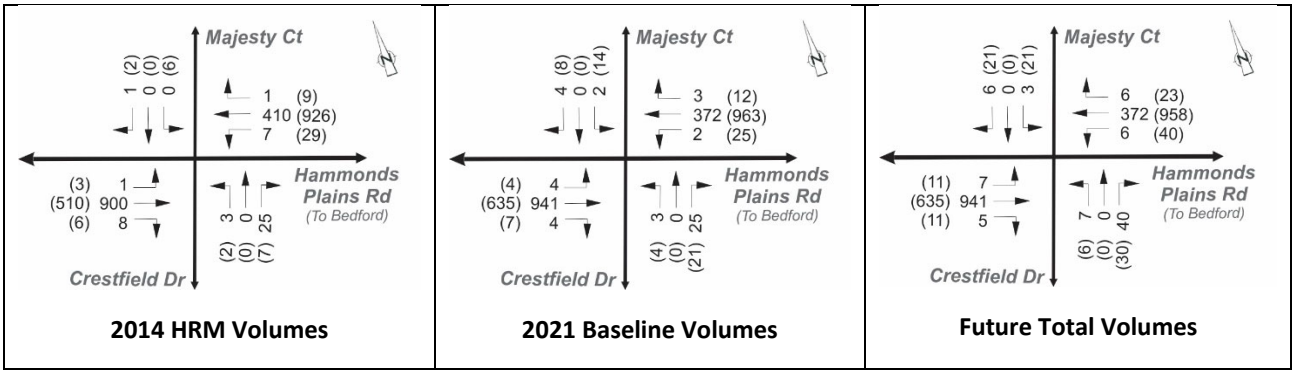
volumes at the Hammonds Plains Road / Crestfield Drive intersection that represent current conditions without any impacts associated with the current State of Emergency.

At the request of HRM, GRIFFIN also added traffic associated with all of the known planned developments in the vicinity of the Hammonds Plains Road / Crestfield Drive intersection. They include:

- The 19-unit senior adult active living development at civic #5-#7 Kingswood Drive.
- A 36-unit residential apartment development in the southwest quadrant of the Hammonds Plains Road / Crestfield Drive intersection.
- A 9,900 ft^2 retail store located in the northwest quadrant of the Hammonds Plains Road / Crestfield Drive intersection.

This resulted in multiple sets of intersection volumes that were applied to the signal warrant calculations. The first set utilized the 2014 peak hour volumes HRM had gathered and this provided some historical context to the need for signalization. The second set included GRIFFIN's baseline estimate of current conditions. The third set included the additional traffic associated with the three developments noted above. The AM and PM peak hour volumes at the subject intersection are contained in *Figure 1*.

Figure 1: Peak Hour Volumes at the Hammonds Plains Road / Crestfield Drive Intersection



12 AM peak hour volumes

(34) PM peak hour volumes

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3.2 - Traffic Signal Warrant Results

GRIFFIN determined the need for traffic signal control at the Hammonds Plains Road / Crestfield Drive intersection by using the most recent version of the Transportation Association of Canada (TAC) signal warrant procedure. This methodology is widely used by road agencies across Canada and is a recognized procedure by the HRM. The TAC calculation process uses a set of average intersection volumes measured over the six highest hours of a typical day. The results of this calculation process are a number of priority points to indicate whether a traffic signal is warranted. When the minor street peak hour traffic volume exceeds 75 vehicles/hour and the number of priority points exceeds 100, the traffic signal warrant is met.

GRIFFIN applied the three sets of intersection volumes in *Figure 1* to the warrant procedure. The results are contained in *Table 2*.

Table 2: TAC Traffic Signal Warrant Priority Points

Traffic Scenario	TAC Priority Points	Warrant Met?
2014 HRM Volumes	27 points	NO
2021 Baseline Volumes	38 points	NO
Future Total Volumes	55 points	NO

Based on the results contained in the Table above, the traffic signal warrant is not met. It was concluded that there is still residual capacity at this intersection to accommodate future traffic growth.

4.0 ROAD SAFETY COMMENTARY

4.1 - Overview

HRM has requested that a review of the collision history be carried out at the subject intersection as well as supplementary comments on the "…*anticipated future safety conditions*…". It should be noted that GRIFFIN has not carried out a formal In-service Road Safety assessment nor a Road Safety Audit (RSA). These types of comprehensive studies provide a full understanding of the depth and breadth of any historical or on-going road safety issues at an intersection, and under this context, a study of this nature is not the responsibility of *Canadian Standard EST Inc.* Historical road safety risks and concerns are considered to be pre-existing issues and would require the HRM to commission a full road safety performance study to understand and address these concerns.

However, GRIFFIN has carried out a focused assessment to meet the specific risk-related requests of HRM as it relates to this particular project. This included a review of the available collision

history information at the subject intersection, a comparison of the expected number of collisions, and a commentary to understand how the completion of the proposed development at civic #5-#7 Kingswood Drive would impact the collision frequency trends.

4.2 - Collision History

In the first step, GRIFFIN reviewed HRM's vehicle collision records contained in the HRM database. The time period of the available collision records spans from January 1st, 2018 to May 1st, 2021. Industry best practices strongly suggest that safety reviews only include collision records occurring within the last 3-5 years as longer-term data (i.e. more than 5 years) has shown to be influenced by changing vehicle technology, changing road conditions and so forth.

There was only one reported collision at or near the Hammonds Plains Road / Crestfield Drive intersection during the 40-month time frame. This collision occurred in July 2019 and had a rear-end configuration between at least two vehicles. Records show that this collision was categorized as having a low severity (i.e. property damage only). The resulting historical intersection collision frequency over a 40-month time period is 0.3 collisions/year.

In the second step, GRIFFIN reviewed the Transportation Research Board's (TRB) *Highway Safety Manual* (HSM) document to provide some context for the above noted collision frequency. The HSM document contains collision prediction models for intersections based on empirical data gathered across North America. GRIFFIN used these models to compare the actual collision frequency versus the expected collision frequency. The results are contained in *Table 3*.

Table 3: Safety Performance Comparison

	Hammons Plains Rd / Crestfield Dr Intersection
Historical Collision Frequency	0.30 collisions/year
Expected Collision Frequency[A]	2.22 collisions/year

A – CMF adjustments applied to account for lighting, skew angle and auxiliary lane.

The comparison of results for the subject intersection indicates that the actual historical safety performance since January 2018 has been better than the expected safety performance.

To conclude, GRIFFIN's March 2nd, 2021 Stage 1 TIS letter stated that the expected traffic volume increase associated with the proposed 19-unit senior adult active living residential development would have a negligible impact on the traffic operations at the study area streets and intersections. Correlating this earlier finding with the intersection safety performance results presented above, GRIFFIN expects the change in intersection safety performance associated with the proposed 19-unit development to also be negligible.

It should be noted that collision history is only one indicator of risk at this intersection. If HRM would like to gain a more comprehensive understanding of the road safety risk environment it is suggested that they commission a formal In-service safety study.

5.0 CLOSING

I trust the additional technical information contained in this letter adequately addresses HRM's traffic engineering comments associated with GRIFFIN's March 2nd, 2021 Stage 1 TIS letter. If you require additional clarification on this matter, I can be reached 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: TAC Traffic Signal Warrant Results

HRM - Traffic Signal Warrant Analysis

Main Street (name)	Hammonds Plains Rd	Direction (EW or NS)	EW
Side Street (name)	Crestfield - Majesty	Direction (EW or NS)	NS
Quadrant / Int #	1	Comments	2014 Volumes (Recorded by HRM)
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	HRM
City:	Halifax Regional Municipality
Analysis Date:	2021 May 14, Fri
Count Date:	2014 May 23, Fri
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
Hammonds Plains Rd	WB	1				1		290	1
Hammonds Plains Rd	EB	1				1		2,000	1
Crestfield - Majesty	NB				1				
Crestfield - Majesty	SB				1				
Are the Crestfield - Majesty NB right turns significantly impeded by through movements? (y/n)							n		
Are the Crestfield - Majesty SB right turns significantly impeded by through movements? (y/n)							n		

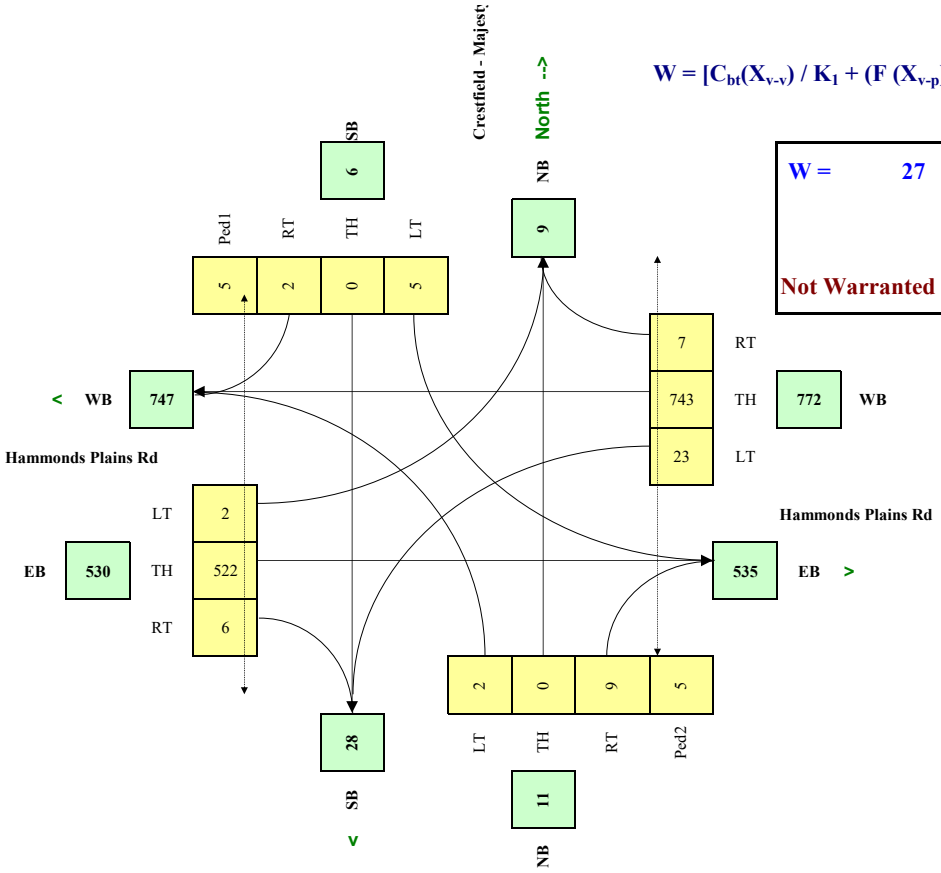
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	380,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hammonds Plains Rd	EW	70	10.0%	y	0.0
Crestfield - Majesty	NS		2.0%	n	

Set Peak Hours

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
7:00 - 8:00	3	0	25	0	0	1	7	410	1	1	900	8	5	5	5	5
8:00 - 9:00	2	0	6	5	0	2	24	754	7	2	415	5	5	5	5	5
11:00 - 12:00	2	0	5	5	0	2	23	724	7	2	399	5	5	5	5	5
12:00 - 13:00	2	0	5	5	0	2	23	719	7	2	396	5	5	5	5	5
16:00 - 17:00	2	0	7	6	0	2	29	925	9	3	509	6	5	5	5	5
17:00 - 18:00	2	0	7	6	0	2	29	926	9	3	510	6	5	5	5	5
Total (6-hour peak)	**13**	**0**	**55**	**27**	**0**	**11**	**135**	**4,458**	**40**	**13**	**3,129**	**35**	**30**	**30**	**30**	**30**
Average (6-hour peak)	**2**	**0**	**9**	**5**	**0**	**2**	**23**	**743**	**7**	**2**	**522**	**6**	**5**	**5**	**5**	**5**

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 =	27	14	13
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

HRM - Traffic Signal Warrant Analysis

Main Street (name)	Hammonds Plains Rd	Direction (EW or NS)	EW
Side Street (name)	Crestfield - Majesty	Direction (EW or NS)	NS
Quadrant / Int #	1	Comments	2021 Baseline Traffic Scenario (2021 adjusted vols)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	HRM
City:	Halifax Regional Municipality
Analysis Date:	2021 May 14, Fri
Count Date:	2021 May 13, 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
Hammonds Plains Rd	WB	1				1		290	1
Hammonds Plains Rd	EB	1				1		2,000	1
Crestfield - Majesty	NB				1				
Crestfield - Majesty	SB				1				
Are the Crestfield - Majesty NB right turns significantly impeded by through movements? (y/n)							n		
Are the Crestfield - Majesty SB right turns significantly impeded by through movements? (y/n)							n		

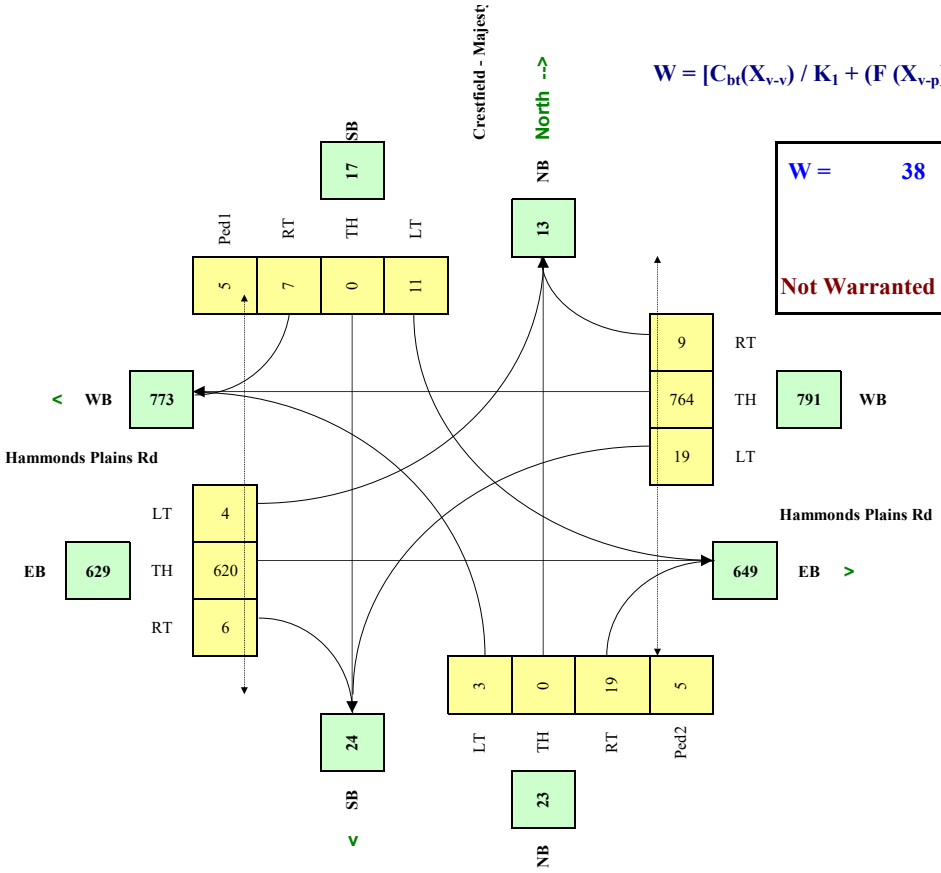
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	380,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hammonds Plains Rd	EW	70	10.0%	y	0.0
Crestfield - Majesty	NS		2.0%	n	

Set Peak Hours

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
7:00 - 8:00	3	0	25	2	0	4	2	372	3	4	941	4	5	5	5	5
8:00 - 9:00	3	0	17	11	0	7	20	784	10	3	517	6	5	5	5	5
11:00 - 12:00	3	0	16	11	0	6	20	753	9	3	497	5	5	5	5	5
12:00 - 13:00	3	0	16	11	0	6	19	747	9	3	493	5	5	5	5	5
16:00 - 17:00	4	0	21	14	0	8	25	962	12	4	634	7	5	5	5	5
17:00 - 18:00	4	0	21	14	0	8	25	963	12	4	635	7	5	5	5	5
Total (6-hour peak)	**20**	**0**	**116**	**63**	**0**	**39**	**111**	**4,581**	**55**	**21**	**3,717**	**34**	**30**	**30**	**30**	**30**
Average (6-hour peak)	**3**	**0**	**19**	**11**	**0**	**7**	**19**	**764**	**9**	**4**	**620**	**6**	**5**	**5**	**5**	**5**

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 =	38	24	14
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

HRM - Traffic Signal Warrant Analysis

Main Street (name)	Hammonds Plains Rd	Direction (EW or NS)	EW
Side Street (name)	Crestfield - Majesty	Direction (EW or NS)	NS
Quadrant / Int #	1	Comments	Total Traffic Scenario 2021 adjusted vols w/: - Seniors Dev. - 36 apartments - Majesty Retail
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	HRM
City:	Halifax Regional Municipality
Analysis Date:	2021 May 14, Fri
Count Date:	2021 May 13, 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
Hammonds Plains Rd	WB	1				1		290	1
Hammonds Plains Rd	EB	1				1		2,000	1
Crestfield - Majesty	NB				1				
Crestfield - Majesty	SB				1				
Are the Crestfield - Majesty NB right turns significantly impeded by through movements? (y/n)							n		
Are the Crestfield - Majesty SB right turns significantly impeded by through movements? (y/n)							n		

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	380,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hammonds Plains Rd	EW	70	10.0%	y	0.0
Crestfield - Majesty	NS		2.0%	n	

Set Peak Hours

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
7:00 - 8:00	7	0	40	3	0	6	6	372	6	7	941	5	5	5	5	5
8:00 - 9:00	5	0	24	17	0	17	33	780	19	9	517	9	5	5	5	5
11:00 - 12:00	5	0	23	16	0	16	31	749	18	9	497	9	5	5	5	5
12:00 - 13:00	5	0	23	16	0	16	31	743	18	9	493	9	5	5	5	5
16:00 - 17:00	6	0	30	21	0	21	40	957	23	11	634	11	5	5	5	5
17:00 - 18:00	6	0	30	21	0	21	40	958	23	11	635	11	5	5	5	5
Total (6-hour peak)	**34**	**0**	**170**	**94**	**0**	**97**	**181**	**4,559**	**107**	**56**	**3,717**	**54**	**30**	**30**	**30**	**30**
Average (6-hour peak)	**6**	**0**	**28**	**16**	**0**	**16**	**30**	**760**	**18**	**9**	**620**	**9**	**5**	**5**	**5**	**5**

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 =	55	40	15
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET