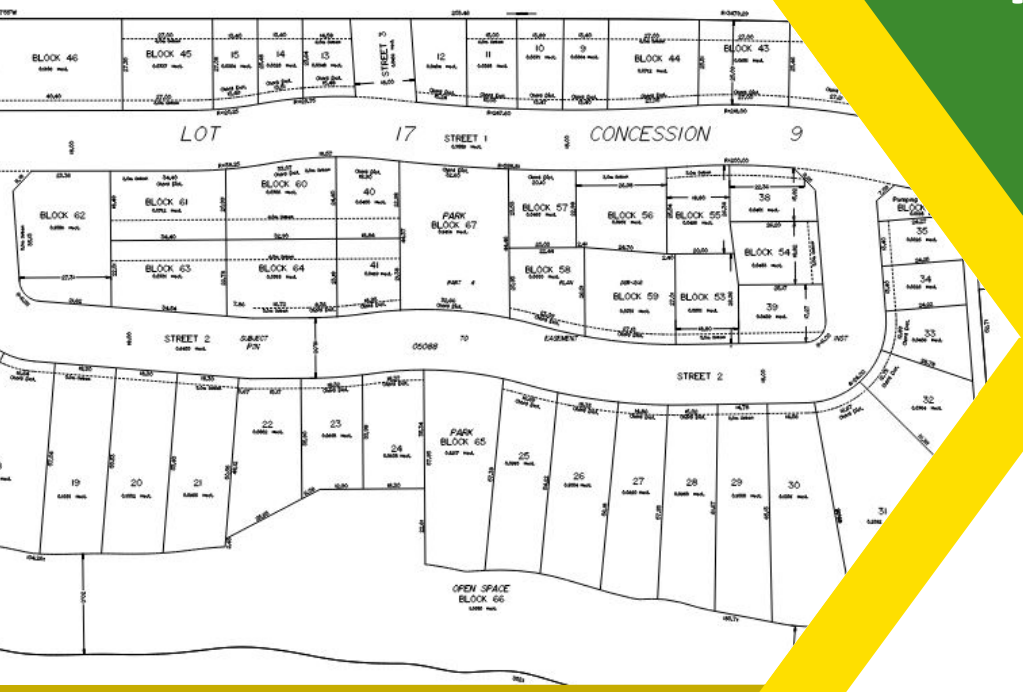
Westview Projects

Hilan Village



Transportation Impact Assessment

C|G|H
TRANSPORTATION

Hilan Village

Transportation Impact Assessment

Prepared for:

Westview Projects
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March 2024

PN: 2023-165

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1 Introduction

This Transportation Impact Assessment has been prepared to support the proposed development of Hilan Village in the Ward of Almonte. The subject site is located at the northwest corner of Carss Street and the Ottawa Valley Rail Trail and is currently designated as a Development (D2) Zone. The site is proposed to include a total of 127 residential units, 39 of these units will be single family detached units, 48 units will be single-family attached units, and the remaining 40 units will be mid-rise condo units.

The proposed development will have one full-movement accesses located on Carss Street approximately 150 metres west of Mitcheson Street. Additionally, two future road blocks are proposed, one to the east and one to the future adjacent development to the north.

The subject site is anticipated to be built-out in two phases, with Phase 1 having a build-out year of 2025, and Phase 2 having a build-out year of 2028. Given the minimal number of proposed units, only the future analysis horizon of 2028 will be considered. The analysis will therefore include 2022 existing, 2028 future background, and 2028 future total conditions. The scope of this TIA has been confirmed with staff from both Lanark County and the Municipality of Mississippi Mills in the forms of a Terms of Reference (TOR) document which can be seen in Appendix A.

Additionally, following the Transportation Impact Assessment submission dated April 2022, comments from both Town and Municiplaity staff have been received. These comments as well as prepared responses to these comments have also been included in Appendix A.

Figure 1 illustrates the Study Area Context. Figure 2 illustrates the draft plan of subdivision.

Figure 1: Area Context Plan

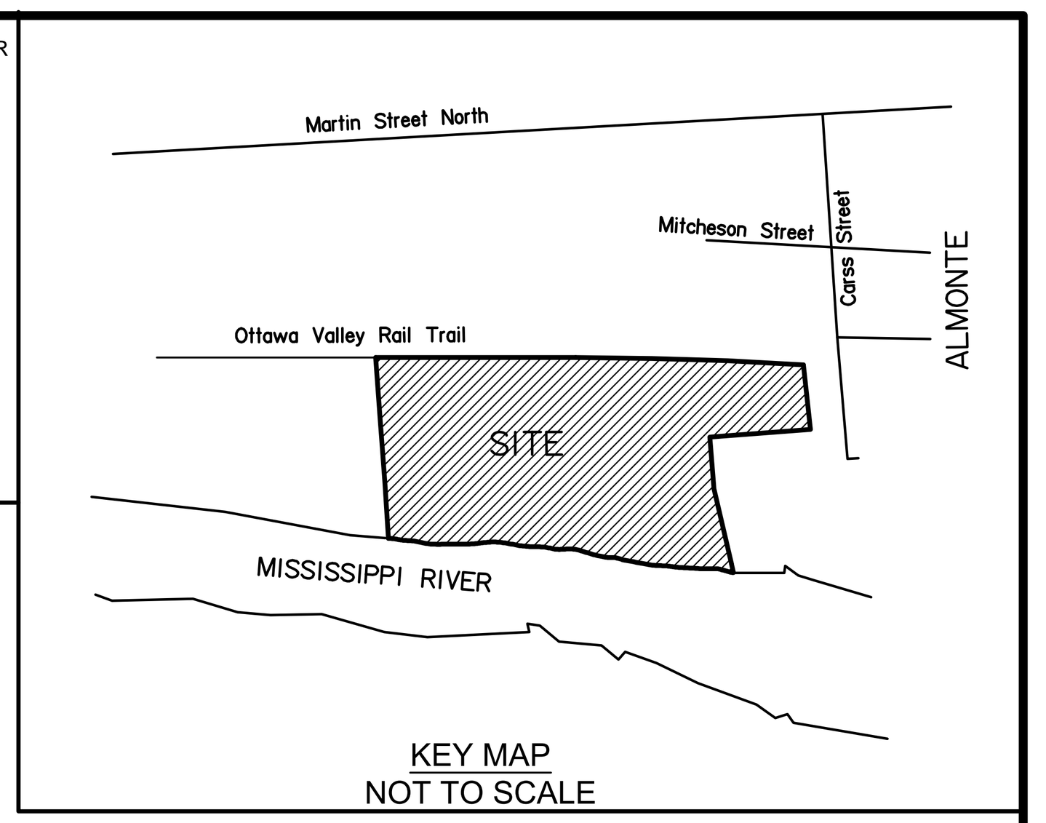
Figure 2: Draft Plan of Subdivision

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

____________________.

THIS DRAFT PLAN IS APPROVED BY THE COUNTY OF LANARK UNDER SECTION 51 OF THE PLANNING ACT.
THIS ____ DAY OF ____________, 20__.

KURT GREAVES
CHIEF ADMINISTRATIVE OFFICER
COUNTY OF LANARK



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF PART OF LOT 17 CONCESSION 9

Geographic Township of Ramsay
Municipality of Mississippi Mills
COUNTY OF LANARK

Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 500

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

Date

E. H. Herweyer
ONTARIO LAND SURVEYOR

Plan Revised August 24, 2022
Plan Revised September 21, 2023

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

Date

L. Aggarwal
2849358 Ontario Inc.
I have authority to bind the corporation

TABLE TO ILLUSTRATE PROPOSED LAND USE

PROPOSED USE	LOT \ BLOCK	NUMBER OF UNITS	AREA (sqm)
SINGLE DETACHED	1 - 41	41	27,011
MULTI-UNITS RESIDENTIAL BUILDINGS	42-64		16,454
RESERVE	71, 72, 73		16
OTHER	68	Lot Line Adjustment	1,942
OPEN SPACE	66		10,585
PARKS	65, 67		2,631
WALKWAYS	70		127
OTHER/ PUMPING STATION	69		198
STREETS			14,756
		TOTAL	73720

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) (purpose for which lots are to be used)
(e) see plan
(f) see plan
(g) see plan
(h) Municipality of Mississippi Mills
(i) see soils report
(j) see plan
(k) (municipal services available or to be available)
(l) see plan

Ontario Land Surveyors

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Job No. 21770-21 Westview PtLt 17 C9 RA DPS D10 | ig

1.1 Existing Conditions

1.1.1 Area Road Network

Carss Street

Carss Street is a Municipality of Mississippi Mills minor collector road between Union Street North and Martin Street North, and a Municipality of Mississippi Mills local road west of Union Street North. Carss Street has a two-lane cross-section. No posted speed limit is present however the Municipality of Mississippi Mills Transportation Master Plan indicates a speed limit of 80 km/h can be assumed for both rural local and rural collector roadways, and a speed limit of 50 km/h can be assumed for both urban local and urban collector roadways. Given Carss Street is a narrow roadway with multiple residential driveways, and is a short roadway segment with a dead-end, a speed limit of 50 km/h has been assumed. Between Martin Street North and the Ottawa Valley Rail Trail, Carss Street is paved, and west of the Ottawa Valley Rail Trial, Carss Street is a gravel road. Grass and gravel shoulders are present on either side of the road with no curbs or gutter provided. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 24.0 metre right of way for collector roadways and a 20.0 metre right-of-way for local roadways. It is however noted that a measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application of 20.0 metres is shown on Carss Street west of Union Street North, and measured right-of-way of 16.0 metres is shown on Carss Street east of Union Street North.

Martin Street North

Martin Street North is a County of Lanark collector road with a two-lane cross-section and a posted speed limit of 60 km/h. Paved shoulders are present north of Carss Street, and gravel shoulders are present south of Carss Street with no curbs or gutters provided. A measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application of 20.0 metres is noted.

Union Street North

Union Street North is a Municipality of Mississippi Mills minor collector road with a two-lane cross-section. No posted speed limit is present however the Municipality of Mississippi Mills Transportation Master Plan indicates a speed limit of 80 km/h can be assumed for rural collector roadways, and a speed limit of 50 km/h can be assumed for urban collector roadways. Given Union Street is a narrow roadway with multiple residential driveways, has a sidewalk on one side of the road, and is a short roadway segment that ends at Mains Street East, a speed limit of 50 km/h has been assumed. Curbs are presented on both sides of the road south of Brookdale Street. A sidewalk is provided on the east side of the road. The Municipality of Mississippi Mills Transportation Master Plan reserves a minimum 24.0 metre right of way for collector roadways. The measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application varies significantly.

1.1.2 Existing Intersections

Carss Street / Martin Street North

The intersection of Carss Street and Martin Street North is an unsignalized three-legged intersection with stop control on the eastbound approach. The northbound approach consists of a shared left-turn / through lane and the southbound approach consists of a shared through / right-turn lane. The eastbound approach has a shared left-turn / right-turn lane. Pedestrian crosswalks are not provided. No turning restrictions were noted at this intersection.

Carss Street / Union Street North

The intersection of Carss Street and Union Street North in an unsignalized three-legged intersection with stop control on the northbound approach. The northbound approach consists of a shared left-turn / right-turn lane. The eastbound approach has a shared through / right-turn lane, and the westbound approach has a shared left-turn / through lane. Pedestrian crosswalks are not provided. No turning restrictions were noted at this intersection.

Carss Street / Ottawa Valley Rail Trail

The Ottawa Valley Rail Trail crosses Carss Street ten metres west of Union Street North. The eastbound through and westbound through vehicle movements on Carss Street are free and are not subject to any type of control. Stop control is provided on the northbound/southbound approach for active transportation.

1.1.3 Existing Driveways

Existing driveways along Carss Street within close proximity to the proposed development's access are residential in nature and are not expected to generate significant traffic volumes.

1.1.4 Cycling and Pedestrian Facilities

Pedestrian facilities provided within the Study Area are limited to a sidewalk on the east side of Union Street North and to grass, gravel, or paved shoulders. Cycling facilities provided within the Study Area are limited to paved shoulders on Martin Street North north of Carss Street and will need to share the road with vehicles to facilitate cycling trips in all other areas of the Study Area.

The Ottawa Valley Rail Trail is located east of the proposed development and intersects with Carss Street. This trail is approximately 300 kilometres long and provides cycling and pedestrian connections between Smiths Falls and Mattawa and passes through Lanark County. At Carss Street, stop-control signage is noted on the trail on both sides of Carss Street and serves to alert trail users of vehicles on Carss Street. Both Figure 3 and Figure 4 below show the stop-control signage on the trail.

Figure 3: Ottawa Valley Rail Trail - Looking North at Carss Street

Figure 4: Ottawa Valley Rail Trail - Looking South at Carss Street

1.1.5 Existing Transit

There is no existing transit service along the boundary road that would serve the proposed development. Transport Thom bus services provides one trip daily to and from Ottawa. The closest bus stop is located at the intersection of Queen Street and Clyde Street, approximately one kilometre south of the proposed development via the surrounding road network.

1.1.6 Existing Peak Hour Travel Demand

Existing turning movement counts for the weekday AM and PM Peak were provided by Traffic Specialists. Table 1 summarizes the count locations, data sources, and identified peak hour periods.

Table 1: Turning Movement Count Data Dates

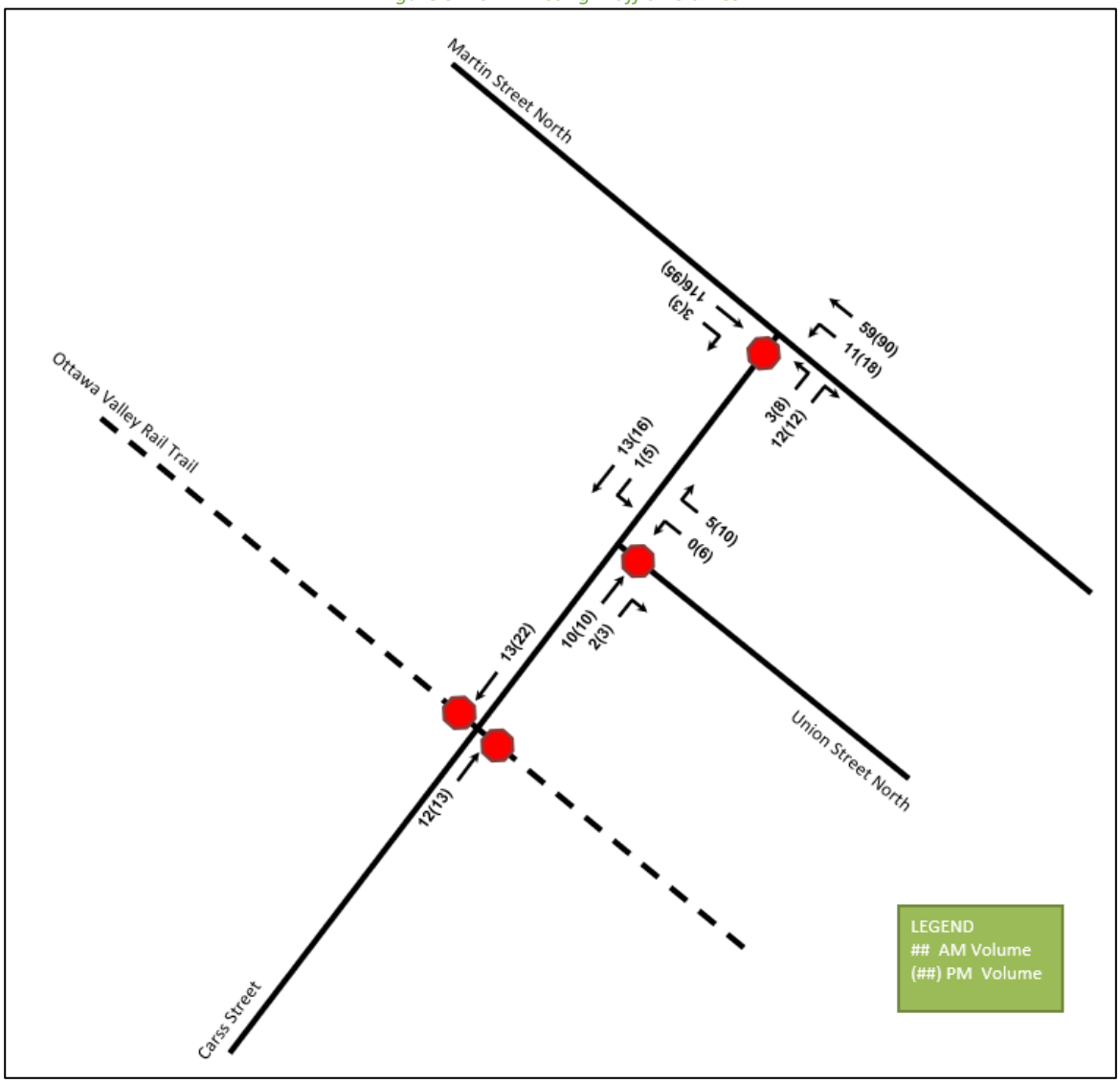
Location	Count Date	AM Peak Hour (PM Peak Hour)	Data Source
Carss Street at Martin Street North	Thursday, January 20, 2022	7:30 – 8:30 (16:00 – 17:00)	Traffic Specialists
Carss Street at Union Street North	Wednesday, February 16, 2022	8:45 – 9:45 (15:15 – 16:15)	
Carss and Ottawa Valley Rail Trail	Wednesday, February 16, 2022	8:45 – 9:45 (15:15 – 16:15)	

As all intersections traffic data were collected in 2022, no growth rate is required to be applied to the turning movement counts as they already represent a consistent 2022 horizon. Despite these counts occurring during a time period of minimal COVID-19 restrictions, adjustments are required to account for any impact to these volumes. Using 2016 and 2019 ADT volumes provided by Lanark County staff, a COVID increase factor of 1.5 has been calculated. To calculate this increase factor, the provided ADT volumes have been grown to a 2022 horizon using a compound annual growth rate of 1.5% which was provided by Lanark County staff. The calculations of this adjustment factor can be seen in Appendix B

Additionally, the existing volumes were evaluated for unjustified volume balances greater than 10% and adjusted accordingly to decrease the imbalances to below 10%. Volumes were balances to the higher observed volume.

Figure 5 illustrates the 2022 existing horizon traffic volumes. Detailed turning movement count data and ADT counts can be found in Appendix C. Based on the existing turning movement counts provided by Traffic Specialists, pedestrian and cycling volumes are noted to be minimal at the Study Area intersections.

Figure 5: 2022 Existing Traffic Volumes



Additionally, volume counts were performed for the Ottawa Valley Rail Trail crossing on Carss Street. All trail users were counted (pedestrians, cyclists, snowmobiles ATVs etc.) and Table 2 below summarizes the collected data.

Table 2: Ottawa Valley Rail Trail Crossing Volume Counts

Time Period	Ottawa Valley Rail Trail Crossing Carss Street
7:00-8:00	4
8:00-9:00	0
9:00-10:00	2
15:00-16:00	0
16:00-17:00	1
17:00-18:00	1
Total	**8**

As shown above, the volumes on the Ottawa Valley Rail Trail are minimal. Further information can be found in Appendix C.

2 Future Background Conditions

2.1 Planned Conditions

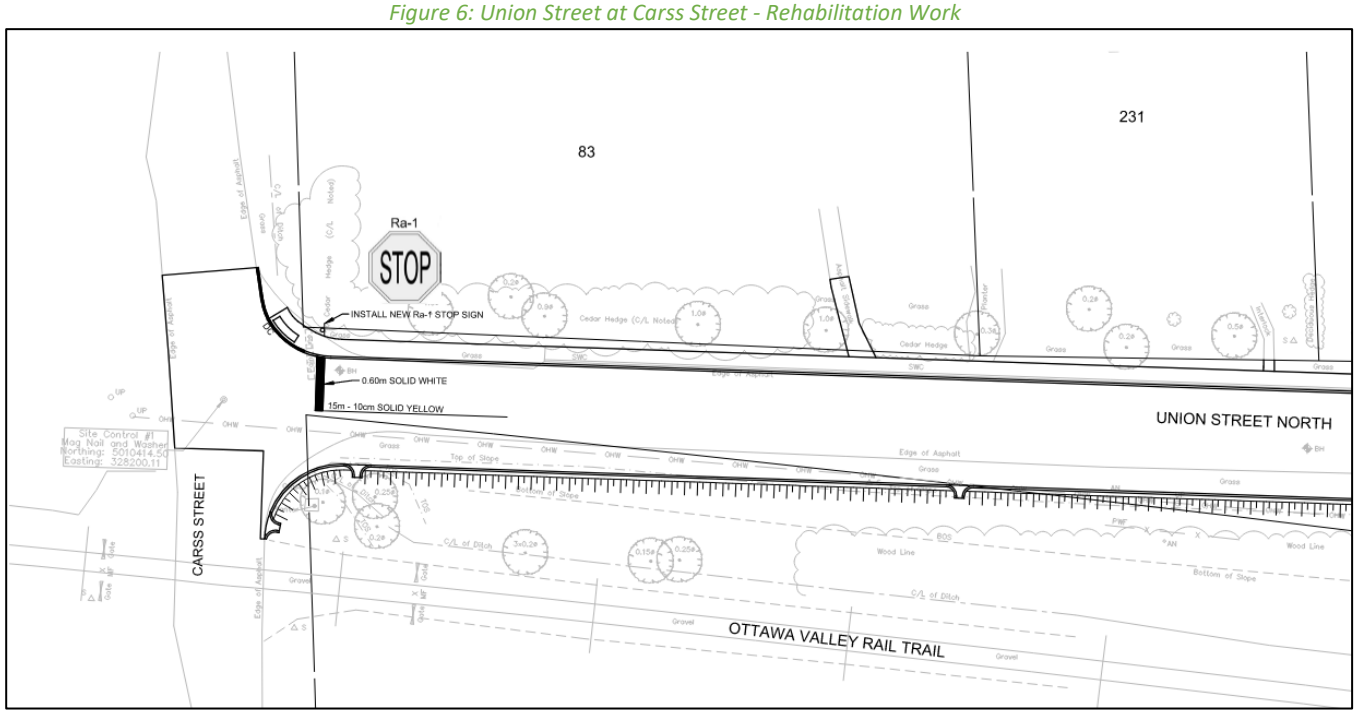
2.1.1 Changes to the Area Transportation Network

The Municipality of Mississippi Mills Active Transportation Plan indicates Martin Street North as a future primary cycling urban route and shows a future proposed sidewalk on Carss Street between Union Street North and Martin Street North. As no specific timing information has been indicated for these improvements, they have been assumed to occur beyond the future analysis horizon.

It is noted that an additional access to the site could be provided should the Lansdowne Street extension, performed by others, from Martin Street North to the edge of the subject development's property occur. Future connection to Lansdowne Street has been protected within the plan and is shown as the block titled "Street 3". Details on this roadway extension are unclear and the timing of this potential improvement is unknown. As such, the extension of Lansdowne Street is considered to be beyond the scope of this project and therefore has not been considered in the future horizon analysis and the subject development will not rely on this roadway connection. It is however recognized that if this connection were to proceed, trips generated by the subject development would be redistributed within the future roadway network, and fewer trips would be expected along Carss Street.

Additionally, future rehabilitation work on Union Street between Carss Street and Main Street has been identified. The Mississippi Mills website indicates construction will begin in 2025 and a completion date has not been identified. Minor upgrades to the intersection of Union Street and Carss Street have been noted as shown in Figure 6, however the intersection geometry is not anticipated to change.

Figure 6: Union Street at Carss Street - Rehabilitation Work



No other changes to the area transportation network are anticipated.

2.1.2 Other Study Area Developments

At the time of this report, no other development applications were available for the adjacent properties.

2.1.3 Background Growth

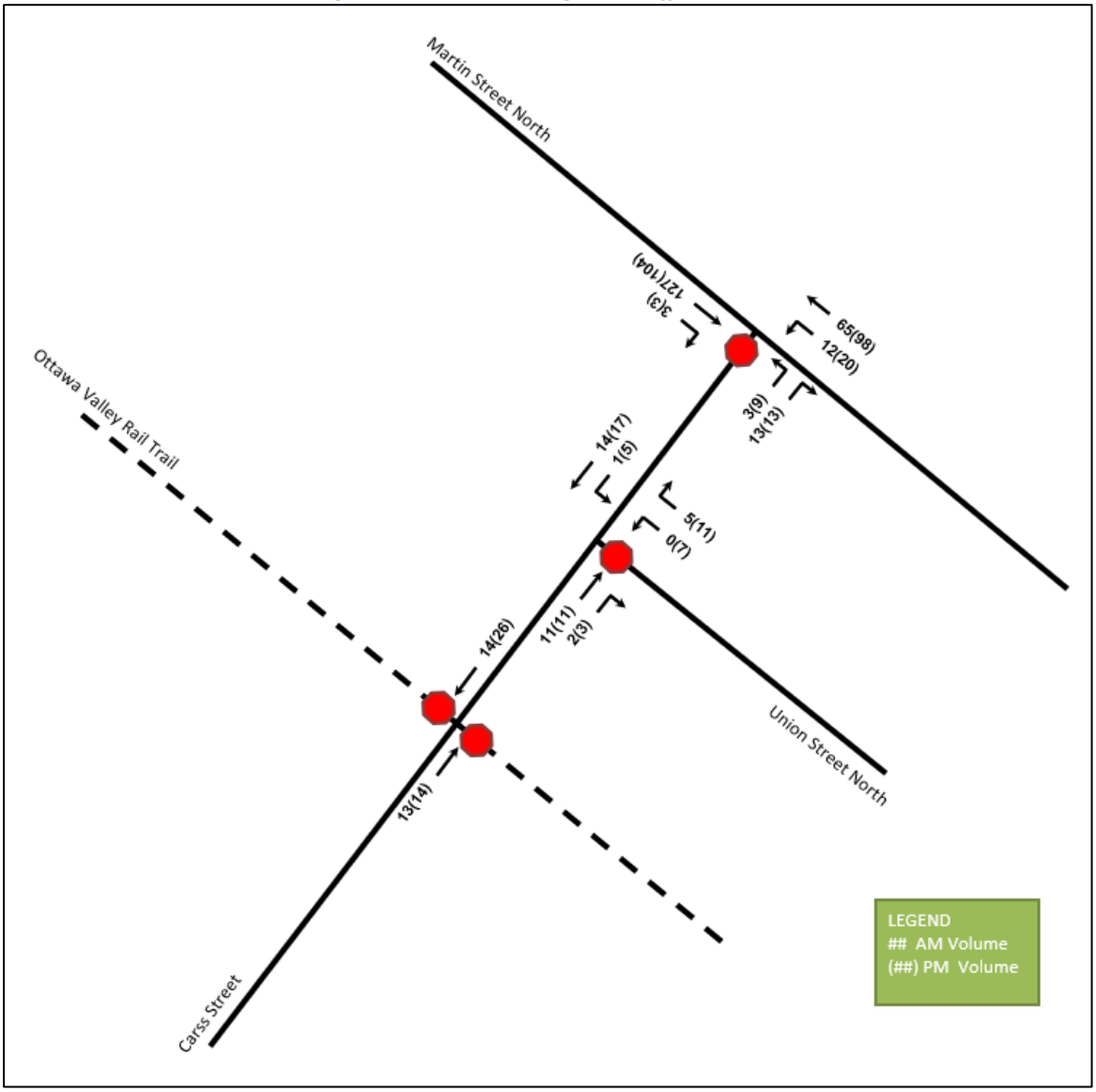
A 1.5 % compound annual growth rate was indicated by Lanark County staff to be applied to the existing 2022 traffic counts in order to generate 2028 future background traffic volumes. This growth rate has been applied to all Study Area intersection movements.

2.1.4 Future Background Traffic Volumes

Combining the background growth rate discussed in Section 2.1.3 above, and the 2022 existing traffic volumes, the future background traffic volumes were projected.

Figure 7 illustrates the 2028 future background traffic volumes. All intersection lane configurations have been carried forward from the 2022 existing conditions as there are no anticipated changes for the 2028 horizon.

Figure 7: 2028 Future Background Traffic Volumes



3 Demand Forecasting

3.1 Site Trip Generation

The proposed development will include 39 single family detached units, 48 single-family attached units, and 40 mid-rise multifamily housing units. The *ITE Trip Generation Manual 11th Edition* has been reviewed to determine the appropriate trip generation rate equations for the proposed land uses. and are summarized in Table 3.

Table 3: ITE Trip Generation Rate

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Single Family Detached	LUC 210	T = 0.91(X) + 0.12	T = 0.94(X) + 0.27
Single Family Attached	LUC 215	T = 0.52(X) - 5.70	T = 0.6(X) - 3.93
Multifamily Housing (Mid-Rise)	LUC 221	T = 0.44(X) - 11.61	T = 0.39(X) + 0.34
Notes: *T = Average Vehicle Trip Ends, X = Number of Dwelling Units*			

Using the above vehicle trip rate equations, the total vehicle trip generation during the weekday AM Peak and weekday PM Peak are summarized in Table 4. Given that the proposed development consists of only residential uses and this analysis is for full occupancy of the subject development, all trips are considered primary, and no synergy or pass-by effects have been considered.

Table 4: Vehicle Site Trip Generation

Land Use	Units	AM Peak (veh/hr)			PM Peak (veh/hr)		
		In	Out	Total	In	Out	Total
Single Family Detached	39	8	24	32	26	15	41
Single Family Attached	48	5	14	19	15	10	25
Multifamily Housing (Mid-Rise)	40	1	5	6	10	6	16
Total		**14**	**43**	**57**	**51**	**31**	**82**

As shown in Table 4, the resulting number of potential new two-way vehicle trips for the proposed development is approximately 57 veh/h during the weekday AM Peak and 82 veh/hr during the weekday PM Peak.

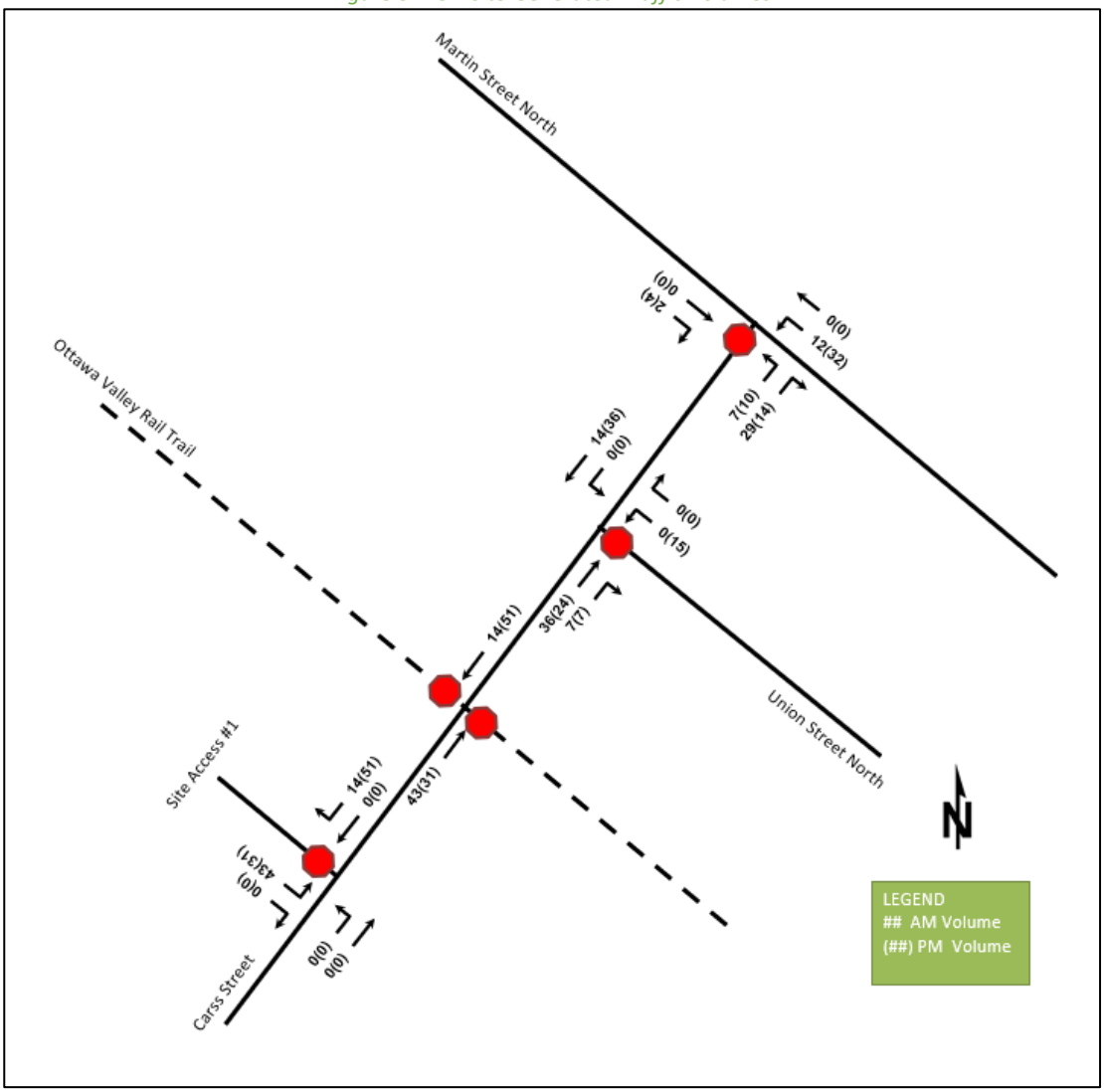
This will result in 0.95 vehicles travelling to and from the site each minute during the AM peak hour, and 1.37 vehicles travelling to and from the site each minute during the PM peak hour.

Additionally, it is noted that trips generated by residential land uses are typically spread out over a two to three hour period, however a peak hour within that time that represents the highest number of trips generated is typically evaluated. This is the case for the trip generation presented above. It is noted that this is likely a conservative estimate of trip generation during the peak hour as hybrid work conditions adopted following the COVID-19 pandemic have not been considered. As such, the trips generated by the subject development may be more evenly spread over the peak period, and therefore the trip generation presented and analyzed can be considered conservative.

3.2 Vehicle Traffic Distribution and Assignment

Traffic distribution was based on the existing volume splits at Study Area intersections and our knowledge of the surrounding area. Based on this, new site-generated trips were assigned to Study Area intersections, which is illustrated in Figure 8. See Section 5.2 for further information regarding the proposed access configuration.

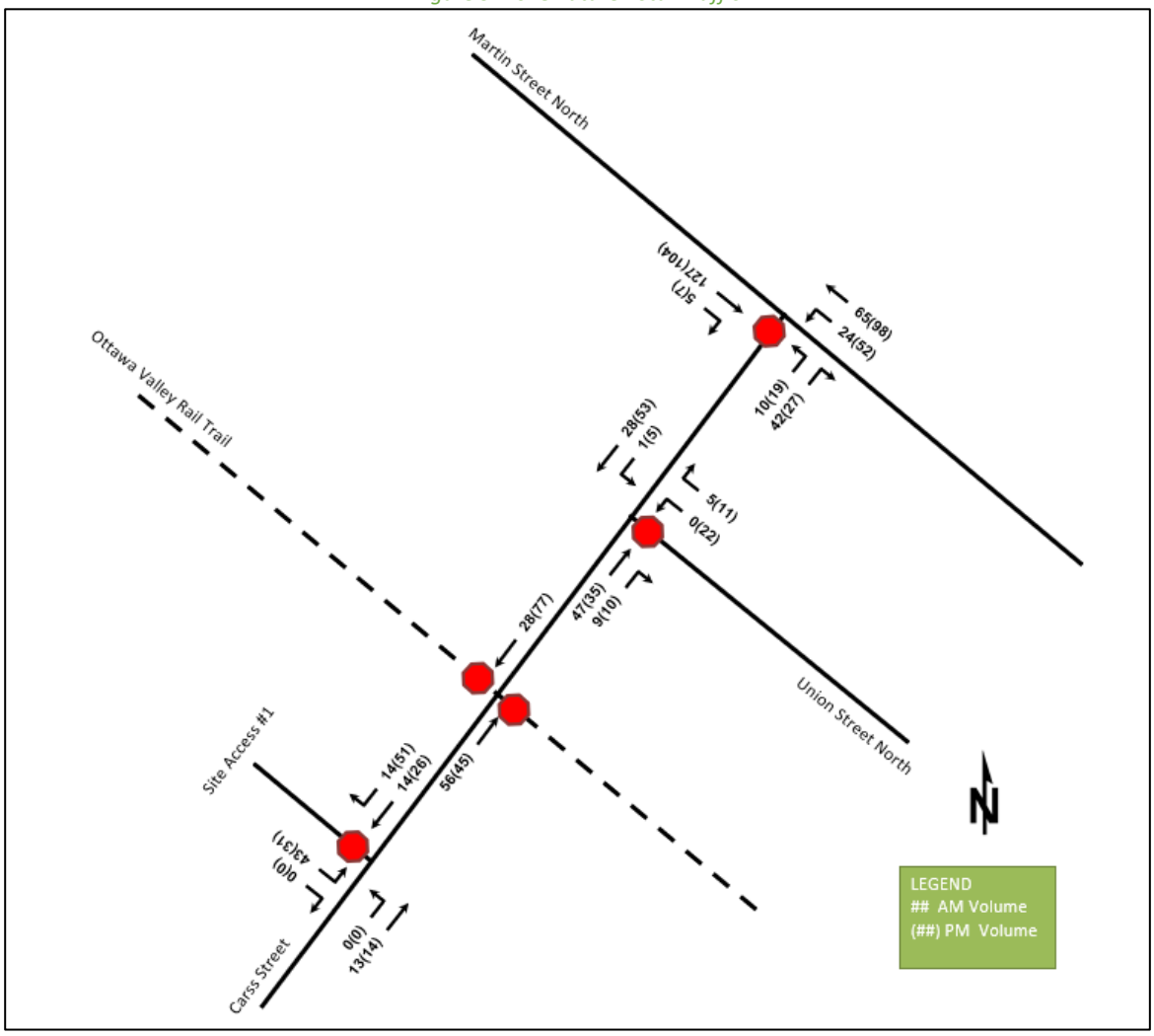
Figure 8: New Site-Generated Traffic Volumes



3.3 Future Total Travel Demands

The 2028 site generated traffic has been combined with the 2028 future background traffic volumes to estimate the 2028 future total traffic volumes shown in Figure 9. Access configuration details are discussed in Section 5.2.

Figure 9: 2028 Future Total Traffic



3.3.1 Roadway Classification

As noted in Section 1.1.1, Carss Street is identified as a local road west of Union Street North, and a minor collector road east of Union Street North, Martin Street North is identified as a collector road, and Union Street North is identified as a minor collector road. All roads are shown to have rural cross-sections. The Geometric Design Guide for Canadian Roads – Chapter 2 – Design Controls, Classification and Consistency identifies rural local roadways as having an AADT of less than 1000 and collector roadways as having an AADT of less than 5000. Using the 2028 future total volumes presented in Figure 9 above, the projected AADT along the Study Area road segments have been determined and are shown in Table 5 below.

Table 5: 2028 FT AADT Projections

Segment	Two-way PM peak Volume	AADT
Carss St west of Site Access #1	40	400
Carss St btwn Site Access #1 & Union St	122	1220
Carss St east of Union St	104	1040
Union St south of Carss St	48	480
Martin St north of Carss St	228	2280
Martin St south of Carss St	281	2810

As shown above, all roadway segments have projected AADT values below the identified AADT maximums and operate with sufficient roadway capacity based on their classification with the exception of Carss Street between Access #1 and Union Street. As a result of existing traffic volumes, future background growth, and the site generated vehicle trips along this segment of roadway, the AADT is projected to be 1220 which is just over the rural local road AADT maximum. As such, it is recommended that the roadway classification for this segment of Carss Street be re-evaluated by Municipal staff.

The 20-metre local road right-of-way standard cross-section, and the 24-metre collector road right-of-way standard cross-section are shown in Figure 10 and Figure 11, respectively. As previously discussed in Section 1.1.1, a measured right-of-way taken from the Municipality of Mississippi Mills Mapping Application of 20.0 metres is noted on Carss Street west of Union Street North, and a measured right-of-way of 15.0 metres is noted on Carss Street east of Union Street North. Additionally, Carss Street east of Union Street North is not reflective of the 24-metre collector road cross-section and does not have pavement markings or 11 metres of paved roadway surface. As such, even if the roadway classification of Carss Street west of Union Street North is re-evaluated and changed to a collector roadway, changes to the paved roadway surface and additional right-of-way reservations are not anticipated to be required within this context.

Figure 10: 20-metre Local Road Cross-section

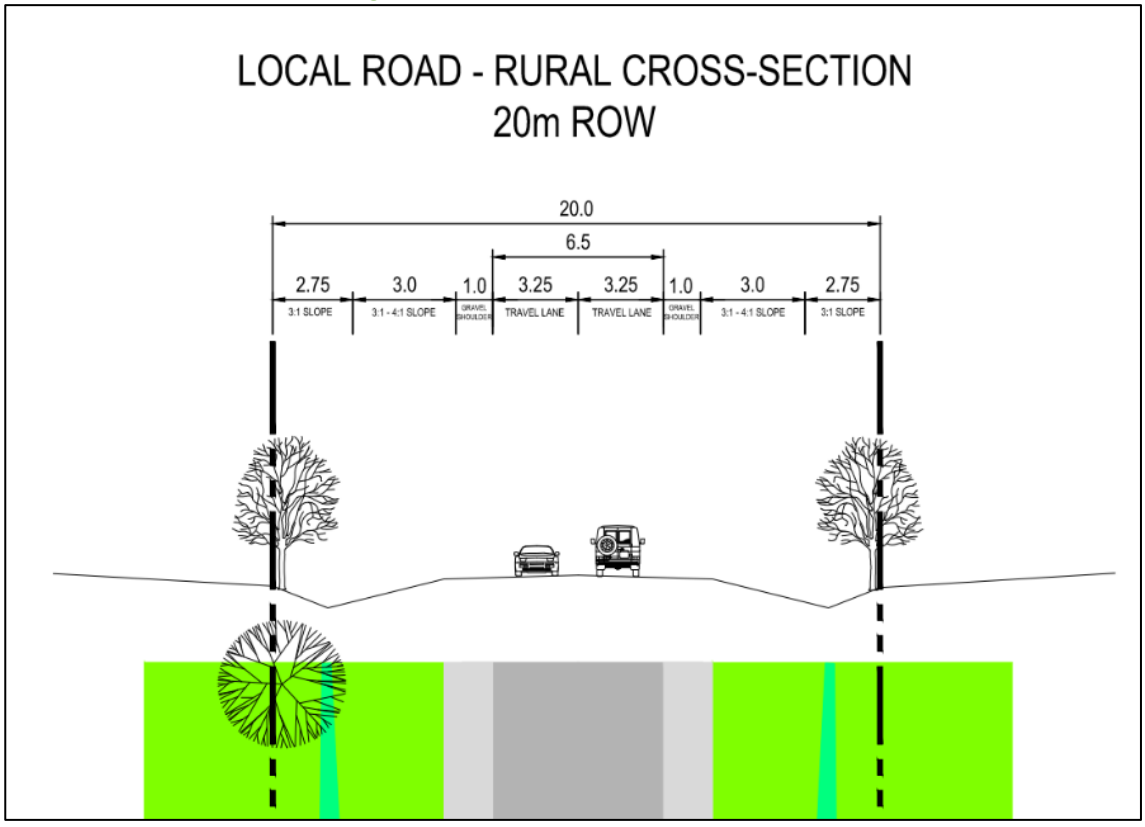
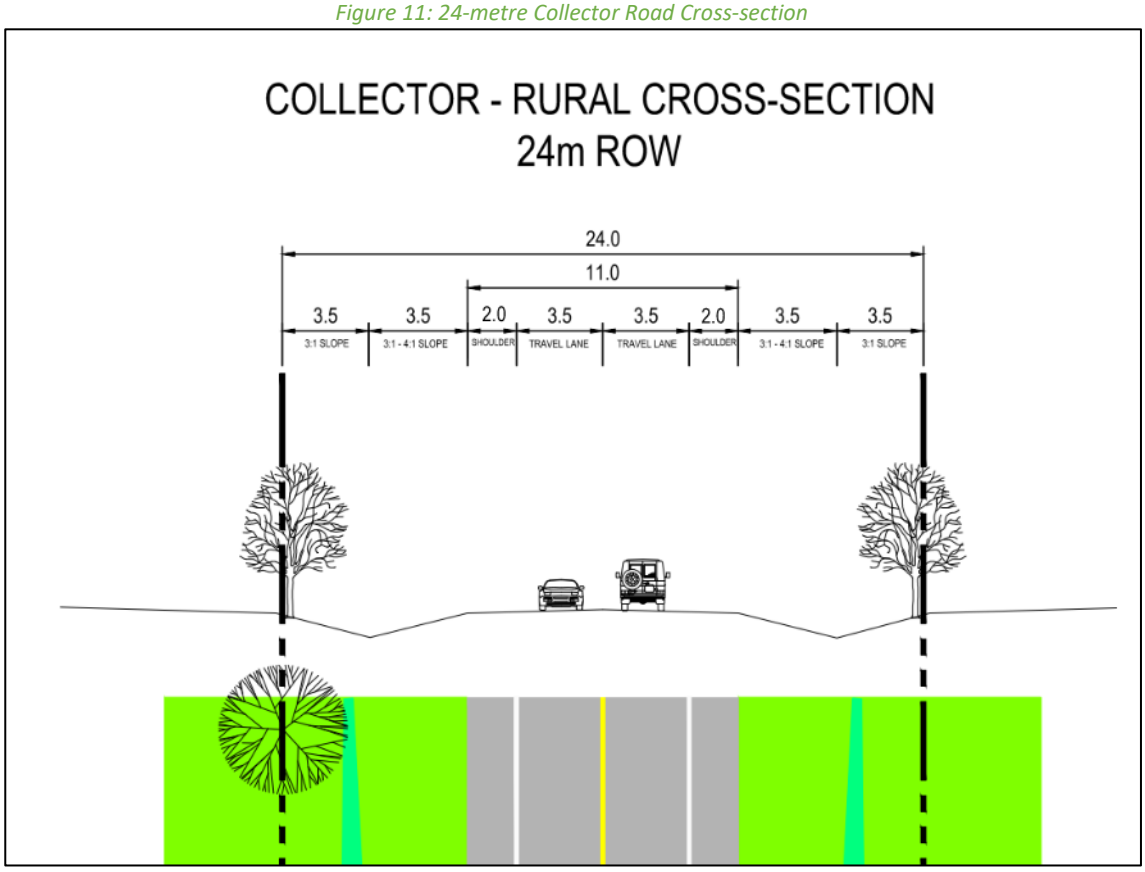


Figure 11: 24-metre Collector Road Cross-section



3.4 Ottawa Valley Rail Trail

The need for a pedestrian crossing treatment at Carss Street and the Ottawa Valley Rail Trail has been evaluated using OTM Book 15 Section 5 which provides guidance for the selection of the most appropriate pedestrian crossing treatments based on a comprehensible set of data. This data includes vehicular and pedestrian volumes, number of lanes, distance to the nearest controlled intersection, and system connectivity. To support the selection process, a Decision Support Tool (DST) is used to determine if a pedestrian crossing control is necessary at potential locations. An algorithm is provided by the DST (preliminary assessment) and shown in Figure 12 to decide if a site is a candidate for pedestrian crossing control.

Figure 12: Decision Support Tool

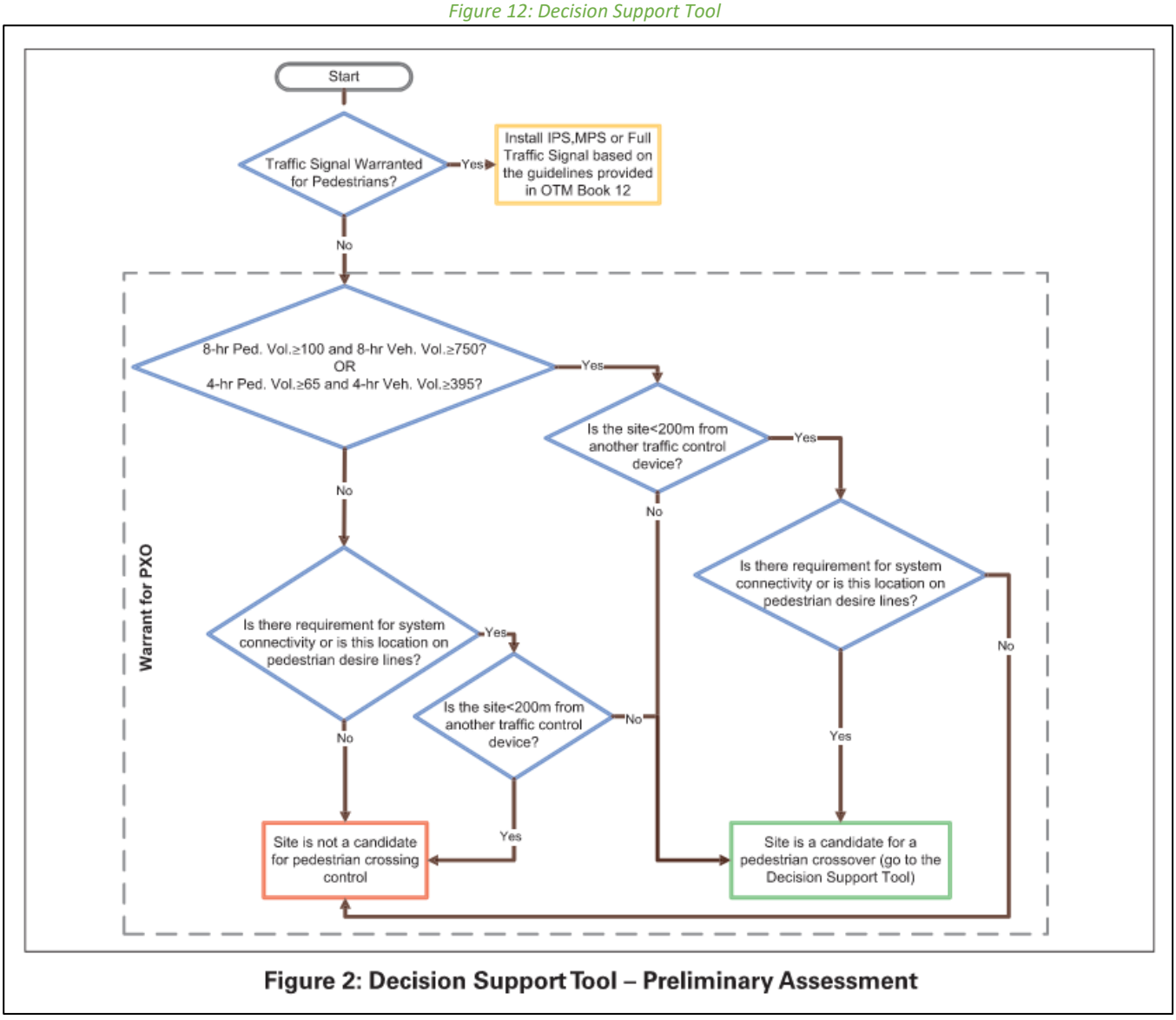


Figure 2: Decision Support Tool – Preliminary Assessment

The pedestrian crossover (PXO) selection matrix illustrated in Figure 13 is used to determine the appropriate type of pedestrian crossover treatment to be used at the site. There are four criteria that are used when selecting the appropriate PXO:

- 8-hour or 4-hour two-way vehicular and pedestrian volumes of the roadway at the location of the crosswalk,
- Posted speed limit of the roadway
- Total number of lanes for the roadway cross-section; and,
- Presence of raised pedestrian refuge (i.e., refuge island or median)

Figure 13: Pedestrian Crossover Selection Matrix

Two-way Vehicular Volume			Posted Speed Limit (km/h	Total Number of Lanes for the Roadway Cross Section[1]			
Time Period	Lower Bound	Upper Bound		1 or 2 Lanes	3 lanes	4 lanes w/raised refuge	4 lanes w/o raised refuge
8 Hour	750	2,250	≤50	Level 2 Type D	Level 2 Type C[3]	Level 2 Type D[2]	Level 2 Type B
4 Hour	395	1,185					
8 Hour	750	2,250	60	Level 2 Type C	Level 2 Type B	Level 2 Type C[2]	Level 2 Type B
4 Hour	395	1,185					
8 Hour	2,250	4,500	≤50	Level 2 Type D	Level 2 Type B	Level 2 Type D[2]	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	2,250	4,500	60	Level 2 Type C	Level 2 Type B	Level 2 Type C[2]	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	4,500	6,000	≤50	Level 2 Type C	Level 2 Type B	Level 2 Type C[2]	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	4,500	6,000	60	Level 2 Type B	Level 2 Type B	Level 2 Type C[2]	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	6,000	7,500	≤50	Level 2 Type B	Level 2 Type B	Level 2 Type C[2]	Level 1 Type A
4 Hour	3,155	3,950					
8 Hour	6,000	7,500	60	Level 2 Type B	Level 2 Type B		
4 Hour	3,155	3,950					
8 Hour	7,500	17,500	≤50	Level 2 Type B	Level 2 Type B		
4 Hour	3,950	9,215					
8 Hour	7,500	17,500	60	Level 2 Type B			
4 Hour	3,950	9,215					

In this case, estimates of the four-hour pedestrian volume can be developed based on the existing pedestrian volumes noted at the Ottawa Valley Rail Trail Crossing at Carss Street as shown in Table 2 above. While not all crossings noted are pedestrians, all crossings will be assumed to be pedestrians in this case in order to determine a conservative estimate. The resulting four-hour pedestrian volume is eight pedestrians. While the number of pedestrians projected to use the trail in the future as a result of the subject development is unknown, in order to meet the four-hour pedestrian volume threshold of 65 pedestrians as shown in Figure 12 above, the existing pedestrian volumes would need to multiplied by eight. As such, it is reasonable to assume that in the future analysis horizons, the four-hour pedestrian volume threshold will not be met or exceeded. There is however a

requirement for system connectivity, and this is the location of a pedestrian desire line. As such, the pedestrian crossover selection matrix can still be used by looking at the top two rows. As the posted speed limit is assumed to be 50km/h, and Carss Street falls under the "1 to 2 lanes" column, a Level 2 Type D pedestrian crossing should be considered at the intersection of the Ottawa Valley Rail Trail and Carss Street.

It is noted that the requirement for this crossing is not the result of the impact of the subject development but is warranted based on existing pedestrian desire lines and connectivity needs along the Ottawa Valley Rail Trail. As part of the construction of the subject development, the implementation of a Level 2 Type D pedestrian crossing will however be considered and will be in accordance with Figure 41 in OTM Book 15, as shown in Figure 14 below for the benefit of the surrounding community. Further details will be refined at future submission stages.

Figure 14: Pedestrian Crossover Level 2 Type D - Mid-block (1-lane, 1-way)

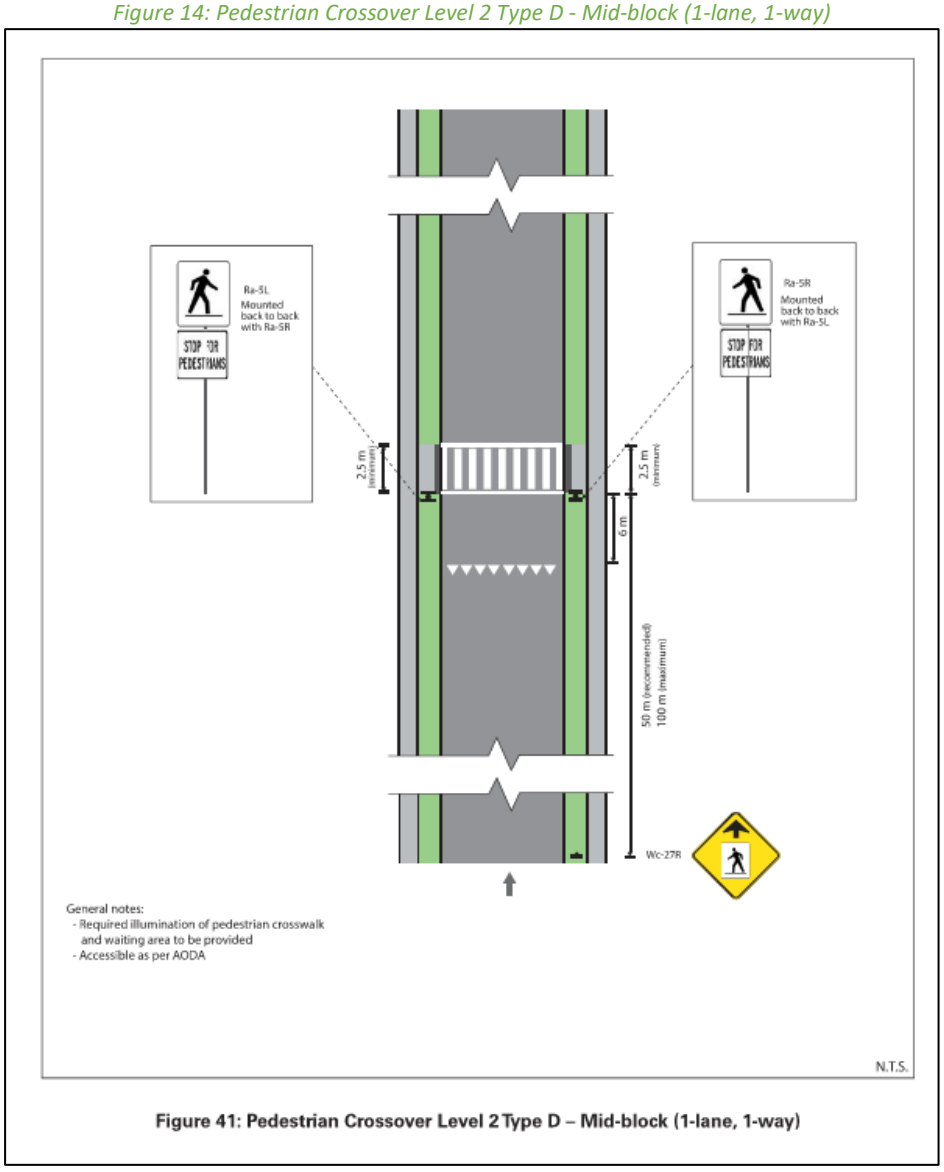


Figure 41: Pedestrian Crossover Level 2 Type D – Mid-block (1-lane, 1-way)

4 Operational Analysis

To understand the operational characteristics of the Study Area intersections, a Synchro model has been created using Trafficware's Synchro (Version 10).

Heavy Vehicle percentages (HV%) have been calculated for each movement based on the existing turning movement counts for the Study Area intersections and have been applied to both the existing and future analysis horizons. Any HV% calculated to be less than 2% was entered as 2% in Synchro to ensure a conservative analysis. At intersections where no Heavy Vehicle percentage is available, 2% has been used. Heavy Vehicle percentage calculations can be found in Appendix D.

Cyclist and pedestrian volumes, where present, were provided for all intersections with turning movement count information collected in 2022 and have been applied to the existing and future conditions analysis. At the site access intersection, a conservative assumption of 5 pedestrians/h and 5 cyclists/h has been used for each intersection leg.

Peak Hour Factors (PHF) have been entered for each intersection based on the turning movement counts provided. The Peak Hour Factors used for each intersection are shown below in Table 6.

Table 6: Peak Hour Factors

Intersection	Peak Hour Factor	
	AM	PM
Carss Street & Martin Street North	0.77	0.91
Carss Street & Union Street North	0.67	0.79
Carss Street & Site Access	0.67*	0.79*
**PHF taken from adjacent intersection of Carss Street & Union Street North*		

All other parameters have been coded using accepted best practices and default parameters, where applicable.

LOS has been defined using the HCM 2010 definition for LOS at unsignalized intersections in Table 7 below.

Table 7: Level of Service Criteria for Unsignalized Intersections

Delay (s)	LOS
≤10	A
>10 and ≤15	B
>15 and ≤25	C
>25 and ≤35	D
>35 and ≤50	E
>50	F

Critical movements and critical intersections have been defined as individual movements with LOS F or a V/C ratio of 1.00 or greater, and intersections with an overall LOS F. Critical movements and critical intersections will be indicated in red below and require mitigation measures.

4.1 2022 Existing Operational Analysis

Table 8 summarizes the operational analysis for the 2022 existing conditions in both the AM and PM peak periods. Critical movements, as defined above, have been identified in red. Synchro worksheets for the 2022 existing traffic conditions are included in Appendix E.

The Study Area intersections have been designed based on aerial photos and turning lane storage lengths have been rounded to the closest five-metre.

Table 8: 2022 Existing Intersections Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Carss Street / Martin Street North ***Unsignalized***	EBL/R	A	0.02	9.3	0.8	A	0.03	9.8	0.8
	NBL/T	A	0.01	7.6	0.0	A	0.01	7.5	0.0
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**1.1**	**-**	**A**	**-**	**1.5**	**-**
Carss Street / Union Street North ***Unsignalized***	EBT/R	-	-	-	-	-	-	-	-
	WBL/T	A	0.00	7.3	0.0	A	0.01	7.7	0.0
	NBL/R	A	0.01	8.4	0.0	A	0.02	8.6	0.8
	Overall	**A**	**-**	**1.6**	**-**	**A**	**-**	**3.5**	**-**

Generally, the Study Area intersections are shown to operate with good overall LOS and low delays and no identified critical movements (V/C ratio greater than 0.90 or LOS E or worse).

4.2 Future Background Conditions

4.2.1 Future Background Traffic Control Warrants

Using Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants, the unsignalized Study Area intersections have been analyzed. In the future background horizon signalization is not warranted. Traffic control warrant sheets have been included in Appendix F

4.2.2 Future Background Intersection Design

The Ministry of Transportation Ontario (MTO) Geometric Design Standards for Ontario Highways (GDSOH) has been reviewed to determine the need for a northbound left-turn at the two-lane highway unsignalized intersection of Carss Street at Martin Street and a westbound left-turn lane at the two-lane highway unsignalized intersection of Carss Street at Union Street for the future background horizons. Using the GDSOH methodology and appropriate design speeds, it was found that left-turn lanes will not be warranted at either intersection. Left turn lane warrant analysis sheets have been included in Appendix G.

Therefore, all Study Area intersections have been analyzed with the same configuration as shown in existing conditions.

4.2.3 Future Background 2028 Conditions

The 2028 future background intersection volumes have been analyzed to allow for a comparison of the future volumes with and without the proposed development.

Table 9 summarizes the operational analysis for the 2028 future background conditions in both the AM and PM peak periods. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.2.1 and Section 4.2.2, respectively. Synchro worksheets for the 2028 future background traffic conditions are included in Appendix H.

Table 9: 2028 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Carss Street / Martin Street North	EBL/R	A	0.03	9.4	0.8	A	0.03	9.9	0.8
	NBL/T	A	0.01	7.6	0.0	A	0.02	7.5	0.0
	SBT/R	-	-	-	-	-	-	-	-
Unsignalized	**Overall**	**A**	**-**	**1.1**	**-**	**A**	**-**	**1.5**	**-**
Carss Street / Union Street North	EBT/R	-	-	-	-	-	-	-	-
	WBL/T	A	0.00	7.3	0.0	A	0.01	7.7	0.0
	NBL/R	A	0.01	8.4	0.0	A	0.02	8.6	0.8
Unsignalized	**Overall**	**A**	**-**	**1.5**	**-**	**A**	**-**	**3.6**	**-**

Generally, the Study Area intersections are operating in a similar manner to the existing conditions with good overall LOS and low delays and no identified critical movements (V/C ratio greater than 0.90 or LOS E or worse)

4.3 Future Total Conditions

4.3.1 Future Total Traffic Control Warrants

Using Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants the unsignalized Study Area intersections, as well as the intersection of Site Access #1 and Carss Street have been analyzed. In the future total horizon signalization is not warranted. Traffic control warrant sheets have been included in Appendix F.

4.3.2 Future Total Intersection Design

The Ministry of Transportation Ontario (MTO) Geometric Design Standards for Ontario Highways (GDSOH) has been reviewed to determine the need for a northbound left-turn at the two-lane highway unsignalized intersection of Carss Street at Martin Street and a westbound left-turn lane at the two-lane highway unsignalized intersection of Carss Street at Union Street for the future total horizons. Using the GDSOH methodology and appropriate design speeds, it was found that left-turn lanes will not be warranted at either intersection. Left turn lane warrant analysis sheets have been included in Appendix G. Therefore, all Study Area intersections have been analyzed with the same configuration as shown in existing conditions.

A left-turn lane warrant analysis has not been performed for the eastbound left-turn movement into the site access intersection. This is because vehicles are not expected to turn left into the subject development as Carss Street is a dead-end to the west of the site access intersection.

4.3.3 Future Total 2028 Conditions

The proposed development's trip generation has been added to the 2028 future background traffic volumes to project the impact of the new traffic on the future road network.

Table 10 summarizes the operational analysis for the 2028 future total conditions in both the AM and PM peak periods. Critical movements, as defined above, have been identified in red where applicable. The intersections have been analyzed based on the identified signal control and intersection configurations in Section 4.3.1 and Section 4.3.2, respectively. Synchro worksheets for the 2028 future total traffic conditions are included in Appendix I.

Table 10: 2028 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Carss Street / Martin Street North ***Unsignalized***	EBL/R	A	0.08	9.8	2.0	B	0.07	10.5	1.8
	NBL/T	A	0.02	7.6	0.5	A	0.04	2.8	0.9
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.6**	**-**	**A**	**-**	**3.0**	**-**
Carss Street / Union Street North ***Unsignalized***	EBT/R	-	-	-	-	-	-	-	-
	WBL/T	A	0.00	0.2	0.0	A	0.00	0.7	0.1
	NBL/R	A	0.02	8.7	0.2	A	0.05	9.2	1.1
	Overall	**A**	**-**	**0.5**	**-**	**A**	**-**	**2.5**	**-**
Site Access #1 / Carss Street ***Unsignalized***	EBL/T	A	-	0.0	0.0	A	-	0.0	0.0
	WBT/R	-	0.02	0.0	-	-	-	-	-
	SBL/R	A	0.07	9.1	1.5	A	0.06	9.2	1.0
	Overall	**A**	**-**	**4.7**	**-**	**A**	**-**	**2.3**	**-**

Generally, the Study Area intersections are shown to operate in a similar manner to the 2028 future background conditions with good overall LOS and low delays and no identified critical movements (V/C ratio greater than 0.90 or LOS E or worse). This indicates that the addition of site traffic from the proposed development will have a minimal impact on the Study Area intersection and therefore no mitigation is required.

It is noted that the site is anticipated to generate additional low volumes on Carss Street. Given the low crossing volumes on Carss Street at the Ottawa Valley Rail Trail and the stop control provided on the trail for active transportation, the addition of site traffic is not expected to have a negative impact at this crossing.

5 Site Plan Review

This section provides an overview of site accesses, site circulation, parking and active mode facilities. The proposed concept Site Plan was previously illustrated in Figure 2.

5.1 Site Circulation

At this time, the Site Plan may be subject to future design changes and as such is to be considered a high-level depiction of the planned development. Therefore, the geometry and analysis of the site access will be refined at the Site Plan approval stage to ensure safe fire routes and servicing access.

5.2 Site Access

The proposed development will be an unsignalized full movement access on Carss Street approximately 150 metres west of Mitcheson Street.

As discussed above, a signal warrant analysis has been conducted for the 2028 future total horizon using the OTM Book 12 Justification 7 criteria. Using this criteria, it was found that a signal is not warranted at the site access intersection. Appendix E includes the signal warrants for the access.

The volume on the eastbound left-turn movement at the site access intersection is zero as Carss Street is a dead-end to the west of the site access intersection. Therefore, no left-turn lane warrant has been examined at the access.

5.3 Parking Supply

The required parking is subject to Municipality of Mississippi Mills Zoning By-Law #11-83, 2020, and will be provided accordingly. The parking supply will be further examined at the site plan application stage.

5.4 Active Mode Considerations

The proposed development will provide active mode facilities and connections within the development as well as connections to the surrounding road and trail network in the Study Area. Pedestrian facilities will be provided within the proposed development along one side of the private access roads with direct connections to all residential buildings and parking spaces. These pedestrian facilities will also connect to the Ottawa Valley Rail Trail via a walkway and trails to the west.

The active mode facilities can be seen in Figure 2 and will encourage pedestrian traffic within the proposed development as well as within the overall Study Area.

6 Findings and Recommendations

a) The Hilan Village development includes 39 single family detached units, 48 single-family attached units, and 40 units mid-rise condo units.
b) The proposed development will have an unsignalized access located on Carss Street.
c) The full build-out horizon year of 2028 has been analyzed.
d) No significant planned changes to area transportation network have been noted and no surrounding background developments have been considered.
e) The proposed development is projected to generate 57 veh/h during the weekday AM Peak and 82 veh/hr during the weekday PM Peak.
f) A 1.5% compound annual growth rate was selected to generate the 2028 future background traffic volumes.
g) Using the existing 2022 traffic volumes, adjusted for the impact of COVID-19, an operational analysis of existing conditions was undertaken. As no high v/c ratios or high delays were noted, no mitigation measures were recommended.
h) The 2028 future background traffic volumes, including the background growth was analyzed. It was found that turning movements operate with reasonable LOS and delay and in a similar manner as existing conditions.
i) With the addition of site traffic volumes to the Study Area intersections, the intersections operate with minimally worse LOS and higher delays in the 2028 future horizon. These changes are minor and do not cause critical movements. Additionally, the site access intersection operates well with no required mitigation measures.
j) The vehicle trips generated by the subject site are anticipated to have a negligible impact on the Ottawa Valley Rail Trail crossing on Carss Street given the low crossing volumes and stop control provided on approaches for active transportation. As part of the construction of the subject development, the implementation of a Level 2 Type D pedestrian crossing will however be considered and will be in accordance with Figure 41 in OTM Book 15, for the benefit of the surrounding community.
k) Traffic volumes within the Study Area are relatively low, and as such, signalization is not warranted at unsignalized intersections at any analysis horizon.
l) Traffic volumes within the Study Area are relatively low, and as such, left-turn lanes are not warranted at the intersection of Martin Street North and Carss Street or at the intersection Union Street North and Carss Street.
m) The required parking will be provided in accordance with the requirements outlined in the Municipality of Mississippi Mills Zoning By-Law and will be further examined at the site plan application stage.

n) The proposed development will encourage active transportation through the provision of active mode facilities on-site and through connections to the surrounding Study Area transportation network.

The Hilan Village development will have a minor impact on the Study Area road network. The proposed access will operate with reasonable LOS and delay on the turning movements into and out of the site. Additionally, through the provision of on-site facilities, this development will be supportive of active mode transportation. It is recommended that, from a transportation perspective, the proposed development application proceed.

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Appendix A

Terms of Reference (TOR) & Comment-response

Technical Memorandum

To:	Sean Derouin & Terry McCann – Lanark County Cory Smith – Municipality of Mississippi Mills	Date:	2022-02-02
Cc:	Mark Crockford – CGH Transportation Adam O'Connor – Keeper Co.		
From:	Robin Marinac	Project Number:	2021-133

Re: Hilan Village TOR - Terms of Reference

We have been asked to undertake the scoped Transportation Impact Assessment to support the proposed development of Hilan Village in the Ward of Almonte, located at the northwest corner of Carss Street and the Ottawa Valley Recreational Trail and is currently designated as a Development (D2) Zone. The site is proposed to include a minimum of 94 residential units, and a maximum of 125 residential units. While it is unlikely that the maximum number of residential units will be 125, this scenario has still been evaluated below to ensure a conservative analysis is provided. The proposed development is anticipated to have a full build-out and occupancy year of 2028.

The primary site access is located on Carss Street approximately 150 metres west of Mitcheson Street, and a secondary access to the future adjacent development to the north is proposed. This access to the north is dependent on development by others and is considered to be part of the ultimate design of the proposed development. The site plan can be seen in Attachment 1.

We have prepared the following scope of work for review and endorsement. Please let us know if you have any comments or additions. All data requests are noted in *red* and have also been summarized at the end of the memo.

Scoped Transportation Impact Assessment Requirements (TIA):

The study will be in accordance with the *Institute of Transportation Engineers Transportation Impact Analyses for Site Development* as well as *Section 4.6.12 Traffic Impact Assessment* within the *Municipality of Mississippi Mills Community Official Plan*. As fewer than 100 peak period vehicle trips are anticipated to be generated by the proposed development, based on the ITE guidelines, a scoped TIS is considered sufficient to support the proposed development.

Study Area:

- An overview of the transportation system existing conditions will be documented (including transit, cycling, pedestrian and automobile modes).
- A summary of existing transportation policies within the Study Area will be identified.
- An overview of the Study Area road network will be provided including the road classification and descriptions of:
    - Carss Street

- Martin Street North

The following intersections will be included in the scoped Transportation Impact Assessment:

- Carss Street and Martin Street North
- All proposed Site Accesses (two accesses assumed – one on Carss Street, one to the north to future development)

Existing Traffic Data:

- As Turning Movement Counts (TMCs) are unavailable at the intersection of Carss Street and Martin Street North, current TMCs will be collected by a third-party consultant.
  - Given the current COVID-19 related restrictions, the collected intersection data will be compared and if needed, factored based on previously collected 2015 data shown in the Municipality of Mississippi Mills Comprehensive Transportation Master Plan (2016).
  - Please provide the 2015 volume data collected on Martin Street North. *(Data request)*
- A compound annual growth rate of 1.5%, as indicated by Lanark County staff, will be applied to all turning movements of the Study Area intersection to determine the 2022 existing traffic volumes.
- Collision data has not been requested as Lanark County staff have indicated no collisions are present in the Study Area.

Study Horizon and Peak Periods:

- Base year 2022, followed by a build-out future horizon of 2028.
- AM and PM peak hours for all horizons.

Background Growth:

- A compound annual growth rate of 1.5%, as indicated by Lanark County staff, will be applied to all turning movements of the Study Area intersection to determine the 2028 background traffic volumes.
- Surrounding development traffic impact assessments and reports will be used as reference to confirm identify additional growth from surrounding developments in the area. Any relevant reports are requested. *(Data request)*

Changes to Area Transportation Network:

- The Municipality of Mississippi Mills Active Transportation Plan indicates Martin Street North as a future primary cycling urban route. As no specific timing information has been indicated for this improvement, it has been assumed to occur beyond the future analysis horizons. Please provide additional timing information if this is not the case. *(Data request)*
- The Municipality of Mississippi Mills Active Transportation Plan indicates a future proposed sidewalk on Carss Street between Union Street North and Martin Street North. As no specific timing information has been indicated for this improvement, it has been assumed to occur beyond the future analysis horizons. Please provide additional timing information if this is not the case. *(Data request)*
- The Municipality of Mississippi Mills Active Transportation Plan indicates a future multi-use pathway on the Ottawa Valley Rail Trail north of the proposed development. As no specific timing information has been indicated for this improvement, it has been assumed to occur beyond the future analysis horizons. Please provide additional timing information if this is not the case. *(Data request)*

Development Site Traffic:

- Trip generation: ITE Trip Generation Manual 11th Edition.
- Existing Modal Split: If applicable, please provide modal splits to be used. *(Data request)*
- Trip distribution and assignment of auto trips: Surrounding area characteristics.

Traffic Analysis:

- Traffic analysis to be performed using Synchro 10 on Study Area network intersections to determine the LOS, delay, V / C ratio and the 95th percentile queues for overall intersections as well as individual movements using Highway Capacity Manual 2010 (HCM) methodology
    - Heavy Vehicle %, pedestrian volumes, and cyclist volumes will be taken from the collected TMC data. Where information is not available, a pedestrian volume of 5 pedestrians/hour, a cyclist volume of 5 cyclists/hour, and a Heavy Vehicle % of 2% will be used.
    - Other Synchro inputs will be based on site observations and Synchro default parameters.
- A qualitative transit, cycling, and pedestrian analysis including consideration of any planned improvements
- Qualitative access location analysis and site review where necessary

Recommendations:

- Any recommended offsite and onsite improvements or mitigation measures, which may include turn lane requirements, pedestrian / cycling / transit amenities, TDM measures, construction impacts, safety measures etc.

The following is a list of requested information, some of which has been indicated in *red* above, that we are requesting to inform the Scoped TIS:

- Any other guidelines you would like us to consider
- 2015 volume counts on Martin Street South, as referenced in the Municipality of Mississippi Mills Comprehensive Transportation Master Plan (2016)
- Any relevant developments that may influence the background growth within the proposed Study Area
- Specific changes to the Study Area Road network that you would like us to consider

Project Number	2023-165
Project	Westview Projects Hilan Village
Document	Parsons Hilan Subdivision Transportation Impact Assessment (TIA) Peer Review
Date	March 1, 2024

Comment #	Comment	Response
Peer Review		
Community Concerns related to Transportation		
	The following points provide a general summary of comments/concern heard at the Council Meeting (August 15th, 2023) in regard to traffic and transportation. The assessment was based on a review of the recorded session:	Noted.
1	Active transportation facilities should be provided within all streets of the subdivision. Cycling and pedestrians should be prioritized over vehicular traffic with easy access to the OVRT.	Noted. Active transportation facilities will be proposed within the subdivision where appropriate.
2	Walking trails should be created along the Mississippi River.	Noted. This improvement would not be performed as a result of the build-out of the subject development.
3	The amount of traffic funneling through the neighborhood is concerning.	Noted. The number of vehicle trips generated by the subject development is just below one additional trip every minute in the AM peak hour and just above one additional trip every minute in the PM peak hour. No operational issues are noted at any intersections adjacent to the subject development.
4	Carss/Union Street and Carss/OVRT intersections are challenging given their proximity to each other. Navigating through two intersections requires caution, especially during winter conditions given the road profile of Carss Street.	Noted.
5	Consider one-way entry through Carss Street and one way exit through the future Lansdowne Street.	Noted.
6	During the winter months, snowmobile traffic on OVRT crossing Carss Street is concerning. Reference was made to the low number of snowmobiles recorded during the Wednesday count conducted in February 2022 that was completed by CGH to support the transportation study.	Noted.
Technical Review of the TIA		
	Overall, the TIA (prepared by CGH, April 2022) provides a comprehensive assessment of the proposed Hilan Subdivision and fully complies with industry standards and guidelines. The Term of Reference (TOR) was comprehensive, as outlined in the TIA Appendix B, and understood to be developed with input from the Municipality. The following points reflect specific technical matters:	Noted.
1	It is recommended that the community concerns noted above (August 15th Council Meeting) in regard to traffic and transportation be reviewed and addressed by the proponent's consultant.	Noted. These have been have been reviewed and addressed within this comment-response document.
2	The 2016 and 2019 ADT tables should be confirmed with Appendix A (ADT tables in email dated March 8th, 2022). It appears the 2016 and 2019 ADT values within the tables below should be swapped. As a result, also confirm the ADT factors noted below in the table. It is unlikely that the result of the analysis and therefore any study conclusions would be impacted by this minor adjustment.	Noted. This is observation is correct. The tables will be updated, however the overall conclusion and resulting COVID increase factor will remain unchanged at 1.50.

3	Page 8 Table 2 depicts total OVRT users; the counts are reflective of activity during the wintertime (February 2022) and not peak season counts. It is noted that summertime counts were likely not feasible at the time of the study given study timeline constraints.	Noted. Counts at the Study Area intersections as well as the OVRT were collected in February of 2022 as a result of timeline constraints. Additionally, traffic data is typically collected during school months to ensure the most concentrated, and therefore conservative, vehicle AM and PM peak hour is represented at the OVRT crossing. It is noted that while the winter may not be considered peak season for use of the OVRT, during the summer a significant increase in use of the trail is not anticipated during the AM and PM peak hours identified for data collection.
4	There is little mention in the report of the Future Lansdowne Street (noted as Street 4 in site plan) as a potential future access point to the site. Albeit this future road might be in place beyond the development horizon year, it should be noted under Planned Conditions (Changes to Area Transportation Network) Section as it would provide an alternative future access point to the development and alleviate traffic funneling through Carss Street.	Noted. This has been discussed in the Planned Conditions Section. It is agreed that future road connections to Mitcheson Street or Martin Street via Lansdowne Street will decrease traffic being directed to Carss Street however the operational analysis shows that the subject development does not rely on the presence of this connection. As the timeline and details of this connection are unknown, it has not been considered within the operational analysis int he TIA.
5	Appendix G depicts the Left-turn Warrants. For the Carss Street at Martin Street, 70km/hr design speed graph was used to assess the NBL warrant for future 2028 background traffic volumes, but 80 km/hr design speed was used for future 2028 total traffic volumes. Martin Street is a 60 km/hr posted speed, although conclusions likely would not be impacted, is there a rationale behind using 70km/hr for background and 80km/hr for future total volumes.	Noted. The 2028 FB and 2028 FT left-turn lane warrants have been updated to show the same posted speed. As indicated, the resulting conclusions have not changed.
Suggestions for TIA Refinement		
	It would be helpful to add more details that explains potential impacts to the road network and community in a simplified form. This should give concerned residents an improved understanding of the development's transportation impact and may alleviate some concerns. Some suggestions include:	Noted.
6	Provide a qualitative assessment of the site generated traffic volumes on the local road network. For example, during the morning peak hour, 44 vehicles are expected to depart. This equates to less than 1 vehicle every minute on average. The same observations should be made for afternoon peak hour of travel demand.	Noted. This has been added to the TIA.
7	Indicate that often trips from residential land uses are spread out over a period of 2-to-3 hours during the peak period. Therefore, not every trip is made during the same morning or afternoon peak hour, especially with current hybrid conditions.	Noted. This has been added to the TIA.
8	Given the current hybrid conditions and flexibility of working from home, travel patterns are changing. Vehicle traffic has become more spread out during the peak periods and over the weekdays, therefore emphasize more on current working conditions and indicate that the study assumes worst case condition in terms of site traffic volumes during the peak hour given factors were used to increase 2022 traffic volumes. This assumes hybrid work conditions were not factored into the site traffic volumes.	Noted. This has been added to the TIA.
9	It would be helpful to provide additional language about road classifications and their capacity in general. For example, what is the accepted vehicle capacity for a minor collector and local road? Compare the theoretical capacity to the future traffic volumes. This exercise will provide the reader a perspective on the theoretical capacity and the residual capacity for the study area streets.	Noted. This has been added to the TIA.

10	With the advent of the proposed development, proximity of OVRT/Carss intersection to Union Street N and community concerns noted above about this location, it is suggested that mitigation measures be implemented to improve the interaction zone of Carss Street with OVRT. This could include pavement marking to indicate crossing area and signage as outlined in OTM Book 15 (Pedestrian Crossing Treatments). Also, mitigation measures are encouraged to ensure proper sightlines are available for users of OVRT crossing Carss Street.	Noted. A Level 2 Type D - Mid-block pedestrian crossover as shown in Figure 41 within OTM Book 15 will be implemented a this intersection. It should be noted that the requirement for this crossover is the result of existing pedestrian desire lines along the trail and not the impact of the proposed subject development.
	Traffic Management Plan during Construction	
11	It is understood that the development of the subdivision would be done through two phases; Phase 1 has an expected completion year 2025, while phase 2 has an expected completion year 2028. This section provides our assessment of possible construction traffic access routes for the Hilan Subdivision. A qualitative assessment was undertaken for three potential routes that could serve as access for construction-related traffic. Figure 1 below illustrates the colour coded potential construction routes for the proposed subdivision.	-
12	Route A: Construction vehicles would use Union Street North to access the proposed site by way of Main Street East. Union Street North is classified as minor collector road with 2-lane cross-section (narrow roadway) with multiple residential driveways and local street intersections. Union Street North is also going to be reconstructed from Carss Street to Main Street East in the near future. The risk of having this road being used by construction traffic is disruptive to local residents and damage to a newly rehabilitated road is possible. The length of the road (800m) between Main Street and Carss Street could be challenging for large construction trucks to navigate through given the nature of the road and distance required to travel on a residential road to reach the site.	-
13	Route B: Construction vehicles would use Carss Street to access the proposed site by way of Martin Street North. It should be noted that Carss Street is a minor collector road between Union Street North and Martin Street North and local road west of Union Street. The road is characterized by a narrow cross-section, multiple driveways, steep road profile west of Mitcheson Street and gravel road west of OVRT. The advantage of this road could be the shorter distance for construction vehicles to travel to reach the site. Similar to Union Street North, the roadway is classified as residential with multiple driveways that could cause disruption to local residents. The roads profile would also be a disadvantage to larger vehicles along with potential sightline issues.	-

14	Route C: Construction trucks would use the future Lansdowne Street that connects to Martin Street as illustrated below (Street 4 Block as illustrated in site plan – alignment noted below is an estimate location). The street would initially be open as an exclusive temporary construction access with potentially being converted to a trail or utility corridor with Municipality assuming responsibility. Ultimately, this would become a Municipal Road providing another access to the subdivision. The route provides the least disruption to residents, but it also comes with risk which include: • Construction trucks would require crossing OVRT. Proper signage and mitigation measures would be required to ensure safety of OVRT users at this location. • Security and safety during non-construction times. Proper measures would be required to ensure the road is properly signed and gated to avoid non-construction traffic from using the road. • Maintenance of the road especially during winter conditions. Whether the road would be paved or gravel initially, conditions should be in place to ensure the road is maintained until Municipality takes ownership. • Ensure the entrance at Martin St N/Temporary Future Lansdowne Street accommodates construction truck turning movements. • Impact on the overhead utility wires along west side of Martin Street at the entrance location. More detailed assessment would be required to ensure trucks can be accommodated without impacting these wires.	-
15	It is recommended that the Municipality review the above potential construction routes in detail. The least disruptive route to the community is through the Future Lansdowne Street (Route C). Whichever route is selected by the Municipality for truck access should ensure the risks are mitigated and proper conditions are implemented to maximize the safe operation of the road and its users.	-
Town Comments - Road Layout and Traffic Impact Assessment (TIA)		
16	Please provide more information with respect to Block 61. Conveyance of a 0.3 m reserve does not address the previous comment: *Please provide a temporary cul-de-sac at the termination of Street 1 or provide details as to how the termination of Street 1 will be dealt with respect to the access to Block 44 and the ability for the Municipality to maintain this area with respect to snow removal etc.*	Block 47 (previously Block 44) is anticipated to be an apartment building with the proposed parking lot entrance at the south end of the block and onto the constructed portion of Street 1. In the event that the extension of Street 1 further north is never built, access to this block will still be provided via this parking lot entrance.
17	Please consider the seasonal fluctuation the OVRT counting study result. The data shown in Table 2 does not reflect summer season.	Noted. Counts at the Study Area intersections as well as the OVRT were collected in February of 2022 as a result of timeline constraints. Additionally, traffic data is typically collected during school months to ensure the most concentrated, and therefore conservative, vehicle AM and PM peak hour is represented at the OVRT crossing. It is noted that while the winter may not be considered peak season for use of the OVRT, during the summer a significant increase in use of the trail is not anticipated during the AM and PM peak hours identified for data collection.
18	The municipality's Union Street project will provide a road improvement and slight re-alignment including the intersection of Carss and Union. The attached document will provide design information.	Noted. This has been reviewed. As no changes to the intersection configuration are noted, the analysis results at this intersection remain unchanged.

19	Section 4.3, Union Street has been identified as a proposed collector in existing Transportation Master Plan. The municipality requests working with the applicant to study the left turn option.	Noted. A left-turn lane warrant was completed as part of the TIA for the westbound left-turn at the intersection of Union Street North and Carss Street. A left-turn lane was not shown to be warranted. Additionally, a northbound left-turn lane is not shown to be required based on the Synchro analysis results. In the 2028 future total analysis, the shared northbound left-turn / right-turn lane is shown to have LOS A in both the AM and PM peak periods of analysis and has low v/c ratios and delay. As such, left-turn lanes at this intersection are not considered to be required.

Attachment 1

Site Plan

CONCEPT PLAN SITE STATS

- **LINEAR FRONTAGE** **= 1,163m (3816 ft)**
- **UNIT COUNT** = 125 (94 w/o Condo)

- **GROSS SITE AREA** **= 73,740m²** / 7.374ha / 18.22ac
- **NET SITE AREA (Excl. Slope Lands)** **= 52,492m²** / 5.25ha / 12.97ac
- **GROSS AREA FOR USES:**
  - **RESIDENTIAL** = 33,834m²
  - **ROAD ALLOWANCES** = 14,568m²
  - **PARK & GROVES** = 4,090m²
  - **SLOPED HAZARD LANDS** = 21,248m²

no.	date	revision
01		GENERAL REVIEW

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

Copyright reserved.

Hobin Architecture Incorporated
63 Parrilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com

HOBIN ARCHITECTURE

PROJECT/LOCATION:
38 CARRS ST
ALMONTE
ONTARIO

DRAWING TITLE:
SITE PLAN

DRAWN BY:	DATE:	SCALE:
TD	DEC, 2021	1:600

PROJECT NORTH
TRUE NORTH

PROJECT: 2122

DRAWING NO.: SP-1

REVISION NO.:

None
HILAN ALMONTE SITE PLAN

Robin Marinac

From: Terry McCann <TMcCann@lanarkcounty.ca>
Sent: March 8, 2022 2:07 PM
To: Robin Marinac
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Robin
Please proceed as outlined below
Thanks

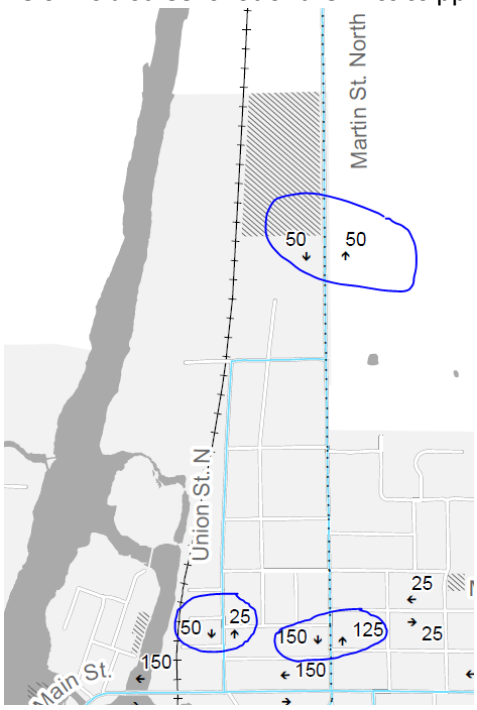
Terry McCann
E: tmccann@lanarkcounty.ca

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: March 8, 2022 2:04 PM
To: Terry McCann <TMcCann@lanarkcounty.ca>
Cc: Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Terry,

Below is a screenshot of the Mississippi Mills TMP 2015 AM Peak volumes. I've circled the volumes of interest.



As you can see, these volumes are not as close to the intersections of interest and have multiple residential roads that will act as traffic generators and contribute to an inaccurate adjustment factor when compared to the ADT volumes you provided us with. At the time of the TOR, these ADT volumes had not been sent to us yet so the 2015 TMP volumes

were the best (and only) option. Now that we have the ADT volumes from 2016 and 2019 (2021 will not be used as it was taken during COVID) we have determined these volumes to be more applicable for our uses as they were taken on Martin Street close to Brookdale Street which is much closer to Carss Street, were collected more recently than the 2015 volumes, and also provide PM peak volumes for comparison whereas the TMP does not. It is noted that the 2016 and 2019 ADT counts will be grown to a 2022 horizon to allow for a proper volume comparison.

The 2016 ADT volumes are shown here:

Average Daily Volume							
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
North	0	874	839	906	0	0	0
South	0	791	777	837	0	0	0
Combined	0	1665	1616	1743	0	0	0
AM Pk North	-	65	49	59	-	-	-
PM Pk North	-	102	85	94	-	-	-
AM Pk South	-	79	77	83	-	-	-
PM Pk South	-	62	61	68	-	-	-
Days	-	1	1	1	-	-	-

Report created 16:21 Monday, June 06, 2016 using MTE version 4.0.6.0

The 2019 ADT volumes are shown here:

Average Daily Volume							
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
North	0	944	924	841	0	0	0
South	0	872	850	766	0	0	0
Combined	0	1816	1774	1607	0	0	0
AM Pk North	-	64	57	52	-	-	-
PM Pk North	-	117	97	84	-	-	-
AM Pk South	-	63	72	66	-	-	-
PM Pk South	-	71	63	56	-	-	-
Days	-	1	1	1	-	-	-

Report created 13:17 Thursday, October 10, 2019 using MTE version 4.0.6.0

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Terry McCann <TMcCann@lanarkcounty.ca>
Sent: March 8, 2022 12:14 PM
To: Robin Marinac <robin.marinac@cghtransportation.com>

Cc: Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Robin
Without me looking it up what were the numbers for 2015 compared to the data we sent you ?

Terry McCann
E: tmccann@lanarkcounty.ca

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: March 8, 2022 11:25 AM
To: Terry McCann <TMcCann@lanarkcounty.ca>
Cc: Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

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Hi Terry,

I just wanted to follow up on our phone conversation a couple weeks ago where you provided your approval for our TOR with the requests that we examine the implications of development traffic on the Ottawa Valley Rail Trail crossing on Carss Street, as well as amend our description of the trail.

One change to the TOR that we have made since your approval is with respect to the calculation of the COVID-19 adjustment factor. In our TOR we indicated that should an adjustment factor be required, it would be calculated using the 2015 AM peak hour data shown in the Municipality of Mississippi Mills Comprehensive Transportation Master Plan. We have since received the ADTs from you for Martin Street North that were collected more recently than what is shown in the TMP. Additionally, these ADTs provide us with PM peak period information as well and are located closer to our Study Area intersections of interest. As such, we are proposing to use a COVID-19 adjustment factor calculated based on the ADTs that you sent as opposed to the TMP volumes originally discussed in the TOR. The adjustment factor will be applied to both Study Area intersections. Please advise if this approach is acceptable to you and we will proceed.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: February 2, 2022 11:09 AM
To: 'Sean Derouin' <SDerouin@lanarkcounty.ca>; 'Terry McCann' <TMcCann@lanarkcounty.ca>; 'csmith@mississippimills.ca' <csmith@mississippimills.ca>
Cc: 'keeper.co.ltd@gmail.com' <keeper.co.ltd@gmail.com>; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi all,

I have re-attached the TOR for your review as the previous version did not contain Attachment 1. Apologies for any confusion this may have caused.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: February 2, 2022 10:46 AM
To: Sean Derouin <SDerouin@lanarkcounty.ca>; Terry McCann <TMcCann@lanarkcounty.ca>; csmith@mississippimills.ca
Cc: keeper.co.ltd@gmail.com; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi Cory, Sean, and Terry,

Please find attached our Hilan Village Transportation Impact Assessment Terms of Reference (TOR) for your review. Please let us know if you have any comments or questions as we would like to ensure that our TOR reflects the appropriate scope of work to support the proposed development.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

Robin Marinac

From: Robin Marinac
Sent: March 29, 2022 8:34 AM
To: Cory Smith
Cc: Michelle Chen
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi Cory,

We are finishing up our traffic report and I realized I forgot to follow up with you and thank you for taking the time to discuss and approve our amended approach to calculating a COVID-19 adjustment factor, as well as confirming no background studies are to be included. We appreciate you taking the time to speak with us earlier this month.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: March 8, 2022 5:15 PM
To: Cory Smith <csmith@mississippimills.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi Cory,

9:00 am tomorrow sounds great. I'll send you a Microsoft Teams invitation shortly.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Cory Smith <csmith@mississippimills.ca>
Sent: March 8, 2022 3:01 PM
To: Robin Marinac <robin.marinac@cghtransportation.com>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Perhaps we can talk tomorrow at 9:00am

Regards,

Cory Smith, C.Tech.
A/Director of Roads and Public Works
Municipality of Mississippi Mills
3131 Old Perth Rd.
P.O. Box 400
Almonte, ON
K0A 1A0
csmith@mississippimills.ca
(613)256-2064 x229

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: March 8, 2022 2:11 PM
To: Cory Smith <csmith@mississippimills.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Michelle Chen <michelle.chen@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

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Hi Cory,

I just wanted to follow up on my phone call and message regarding availability of traffic reports for the surrounding background developments mentioned below, as well as an amendment to our TOR.

Since receiving your approval on our TOR we have received additional ADT data on Martin Street that changes our proposed approach to calculating the COVID-19 adjustment factor. In our TOR we indicated that should an adjustment factor be required, it would be calculated using the 2015 AM peak hour data shown in the Municipality of Mississippi Mills Comprehensive Transportation Master Plan. We have since received the ADTs from Terry McCann at Lanark County that were collected more recently than what is shown in the TMP. Additionally, these ADTs provide us with PM peak period information as well and are located closer to our Study Area intersections of interest. As such, we are proposing to use a COVID-19 adjustment factor calculated based on the ADTs that were provided as opposed to the TMP volumes originally discussed in the TOR. The adjustment factor will be applied to both Study Area intersections. Please advise if this approach is acceptable to you and we will proceed.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: March 2, 2022 9:11 AM
To: Cory Smith <csmith@mississippimills.ca>

Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi Cory,

I just wanted to follow up on my request for any traffic studies we can use to account for the traffic generated by the future developments listed below. Without these we will have to assume that the traffic generated by these future developments is accounted for in the compound annual growth rate applied at our Study Area intersections. Please indicate if there are any available studies for use, or if accounting for these background developments using the compound annual growth rate applied to our Study Area intersections is acceptable.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Cory Smith <csmith@mississippimills.ca>
Sent: February 8, 2022 1:01 PM
To: Robin Marinac <robin.marinac@cghtransportation.com>; Sean Derouin <SDerouin@lanarkcounty.ca>; Terry McCann <TMcCann@lanarkcounty.ca>
Cc: keeper.co.ltd@gmail.com; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

We do not have traffic counts in that area newer than the years referenced in you TOR. It is important to maintain linkages to the unopened Lansdowne Road allowance and the adjacent property that is in the urban boundary. In addition, the intersection of Carss and Union should be looked at with consideration for the OVRT being right there.

There are future developments to the northeast directly above mitcheson, with mitcheson being extended to Lansdowne. Directly across Carss there will be a large facility developed as well. And the property to the north needs to have accessibility maintained for future development.

Regards,

Cory Smith, C.Tech.
A/Director of Roads and Public Works
Municipality of Mississippi Mills
3131 Old Perth Rd.
P.O. Box 400
Almonte, ON
K0A 1A0
csmith@mississippimills.ca
(613)256-2064 x229

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: February 2, 2022 11:09 AM

To: Sean Derouin <SDerouin@lanarkcounty.ca>; Terry McCann <TMcCann@lanarkcounty.ca>; Cory Smith <csmith@mississippimills.ca>
Cc: keeper.co.ltd@gmail.com; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

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Hi all,

I have re-attached the TOR for your review as the previous version did not contain Attachment 1. Apologies for any confusion this may have caused.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: February 2, 2022 10:46 AM
To: Sean Derouin <SDerouin@lanarkcounty.ca>; Terry McCann <TMcCann@lanarkcounty.ca>; csmith@mississippimills.ca
Cc: keeper.co.ltd@gmail.com; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: Hilan Village Transportation Impact Assessment Terms of Reference Scoping Document

Hi Cory, Sean, and Terry,

Please find attached our Hilan Village Transportation Impact Assessment Terms of Reference (TOR) for your review. Please let us know if you have any comments or questions as we would like to ensure that our TOR reflects the appropriate scope of work to support the proposed development.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

Appendix B

Adjustment Factor

Carss Street / Martin Street N											
NBL	**NBT**	**NBR**	**WBL**	**WBT**	**WBR**	**SBL**	**SBT**	**SBR**	**EBL**	**EBT**	**EBR**
7	39	0	0	0	2	0	77	2	2	0	8
12	60	0	0	0	2	0	63	2	5	0	8

2016 ADT Martin St btwn Ottawa St & Brookdale St		
	NB	SB
AM	65	79
PM	102	62

2019 ADT Martin St btwn Ottawa St & Brookdale St		
	NB	SB
AM	64	63
PM	117	71

2022 ADT Martin St btwn Ottawa St & Brookdale St		
	NB	SB
AM	72	87
PM	112	68

2022 ADT Martin St btwn Ottawa St & Brookdale St		
	NB	SB
AM	67	66
PM	123	75

	North of Carss	
	NB	SB
	Carss Street / Martin Street N	
AM	41	79
PM	65	65

	South of Carss	
	NB	SB
	Carss Street / Martin Street N	
AM	46	85
PM	72	71

	NB	SB	Average		
ADT AM	1.57	1.02	1.29		
ADT PM	1.71	1.06	1.38	Use:	1.50

Lanark County
99 Christie Lake Road, Perth Ontario K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

Traffic Summary

Station # - FJ199DQZ, Cr 17 017229 Ottawa Street to Brookdale Street
Date - Tuesday, July 09, 2019 to Friday, July 12, 2019 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	5197	5197	0	1732	1732	0
North	2709	2709	0	903	903	0
South	2488	2488	0	829	829	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	53.6	53.6	-	km/h
Median speed	54.4	54.4	-	km/h
85% speed	63.7	63.7	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	76	1.5%	76	0
2 - PC	3768	72.5%	3768	0
3 - 2A-4T	1184	22.8%	1184	0
4 - BUS	21	0.4%	21	0
5 - 2A-6T	108	2.1%	108	0
6 - 3A-SU	30	0.6%	30	0
7 - 4A-SU	3	0.1%	3	0
8 - <5A DBL	3	0.1%	3	0
9 - 5A DBL	1	0.0%	1	0
10 - >6A DBL	3	0.1%	3	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	0	0.0%	0	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
North	0	944	924	841	0	0	0
South	0	872	850	766	0	0	0
Combined	0	1816	1774	1607	0	0	0
AM Pk North	-	64	57	52	-	-	-
PM Pk North	-	117	97	84	-	-	-
AM Pk South	-	63	72	66	-	-	-
PM Pk South	-	71	63	56	-	-	-
Days	-	1	1	1	-	-	-

Report created 13:17 Thursday, October 10, 2019 using MTE version 4.0.6.0

Lanark County
99 Christie Lake Road, Perth Ontario K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

Traffic Summary

Station # - HF44807F, Cr17 017229 Ottawa Street to Brookdale Street
Date - 0:00 Tuesday, May 03, 2016 to 0:00 Friday, May 06, 2016 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	5024	5024	0	1675	1675	0
North	2619	2619	0	873	873	0
South	2405	2405	0	802	802	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	50.5	50.5	-	km/h
Median speed	51.1	51.1	-	km/h
85% speed	60.1	60.1	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	42	0.8%	42	0
2 - PC	3593	71.5%	3593	0
3 - 2A-4T	1195	23.8%	1195	0
4 - BUS	43	0.9%	43	0
5 - 2A-6T	57	1.1%	57	0
6 - 3A-SU	72	1.4%	72	0
7 - 4A-SU	3	0.1%	3	0
8 - <5A DBL	1	0.0%	1	0
9 - 5A DBL	3	0.1%	3	0
10 - >6A DBL	15	0.3%	15	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	0	0.0%	0	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
North	0	874	839	906	0	0	0
South	0	791	777	837	0	0	0
Combined	0	1665	1616	1743	0	0	0
AM Pk North	-	65	49	59	-	-	-
PM Pk North	-	102	85	94	-	-	-
AM Pk South	-	79	77	83	-	-	-
PM Pk South	-	62	61	68	-	-	-
Days	-	1	1	1	-	-	-

Report created 16:21 Monday, June 06, 2016 using MTE version 4.0.6.0

Appendix C

Traffic Data

Turning Movement Count
Bicycle Summary
Flow Diagram

Carss Street & Martin Street North — **Almonte, ON**

Bicycles
(Including electric bicycles and electric scooters)
Note: Bicycle volumes are NOT included in vehicle totals.

Includes all bicycles travelling on sidewalks.

Carss St. — Martin St. (N)

(A) 0 | 0 | 0 | 0 | 0 | 0 | 0

(B) 0 | 0 | 0 | 0 | 0 | 0 | 0

(C) 0 | 0 | 0 | 0 | 0 | 0 | 0

No bicycles observed.

Total bicycle volume, all approaches. (A + B + C)

Bicycles comprise **0.00%** of total traffic

Thursday, January 20, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A

All Pedestrian Crossings: 0 | 2 | 0 | 1 | Total 3

	Carss St.					N/A					Martin St. (N)					Martin St. (N)				
	Eastbound					Westbound					Northbound					Southbound				
Time Period	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT	ST	RT	UT	SB Tot	GR Tot
0700-0800	0		0	0	0						0	0		0	0		0	0	0	0	0
0800-0900	0		0	0	0						0	0		0	0		0	0	0	0	0
0900-1000	0		0	0	0						0	0		0	0		0	0	0	0	0
1500-1600	0		0	0	0						0	0		0	0		0	0	0	0	0
1600-1700	0		0	0	0						0	0		0	0		0	0	0	0	0
1700-1800	0		0	0	0						0	0		0	0		0	0	0	0	0
Totals	0		0	0	0						0	0		0	0		0	0	0	0	0

No bicycles observed.

Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams
All Vehicles Except Bicycles

Carss Street & Martin Street North — **Almonte, ON**

All Vehicles
(Except Bicycles & Electric Scooters)

Carss St. — Martin St. (N)

(A) 294 | 609 | 315 | 294 | 10 | 284 | 0

(B) 43 | 48 | 91 | 43 | 0 | 13 | 30

(C) 314 | 654 | 340 | 340 | 0 | 38 | 302

677

Total vehicle volume, all approaches. (A + B + C)

Thursday, January 20, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A

All Pedestrian Crossings: 0 | 2 | 0 | 1 | Total 3

AM Peak Hour Flow Diagram

Carss St. — Martin St. (N)

(A) 79 | 120 | 41 | 79 | 2 | 77 | 0

(B) 10 | 9 | 19 | 10 | 0 | 2 | 8

(C) 85 | 46 | 131 | 46 | 0 | 7 | 39

135

Total vehicle volume, all approaches. (A + B + C)

Pedestrian Crossings During **AM** Peak Hr.: 0 | 1 | N/A

Summary - AM Peak Hr.

Peak Hr.	0730-0830
Volume	135
PHF	0.77

PM Peak Hour Flow Diagram

Carss St. — Martin St. (N)

(A) 65 | 130 | 65 | 65 | 2 | 63 | 0

(B) 13 | 14 | 27 | 13 | 0 | 5 | 8

(C) 71 | 72 | 143 | 72 | 0 | 12 | 60

150

Total vehicle volume, all approaches. (A + B + C)

Pedestrian Crossings During **PM** Peak Hr.: 0 | 0 | N/A

Summary - PM Peak Hr.

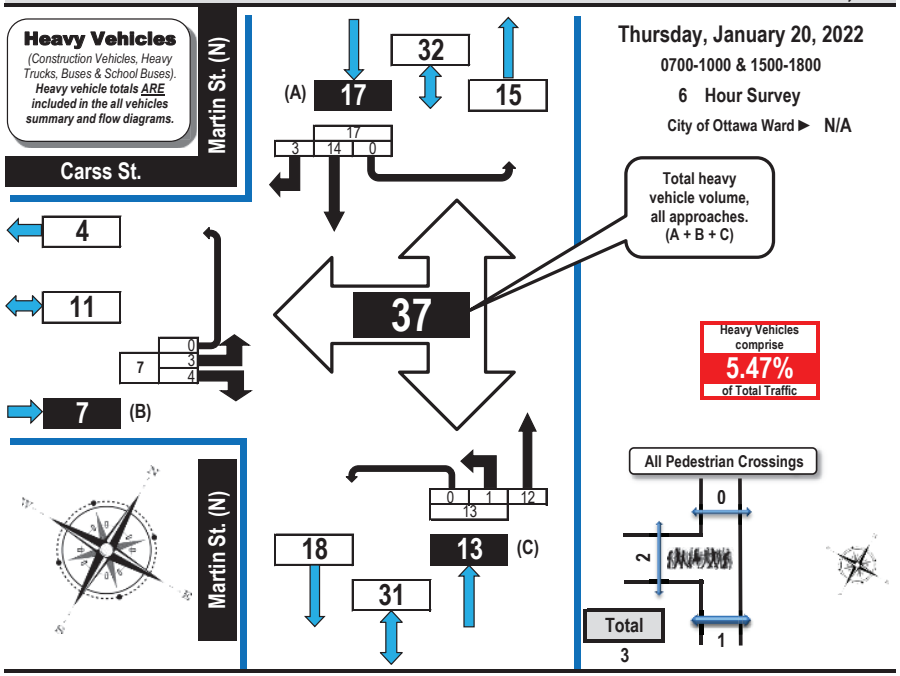
Peak Hr.	1515-1615
Volume	150
PHF	0.91

Turning Movement Count
Heavy Vehicle Summary
Flow Diagram

Carss Street & Martin Street North — **Almonte, ON**

Heavy Vehicles
(Construction Vehicles, Heavy Trucks, Buses & School Buses).
Heavy vehicle totals ARE included in the all vehicles summary and flow diagrams.

Thursday, January 20, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A



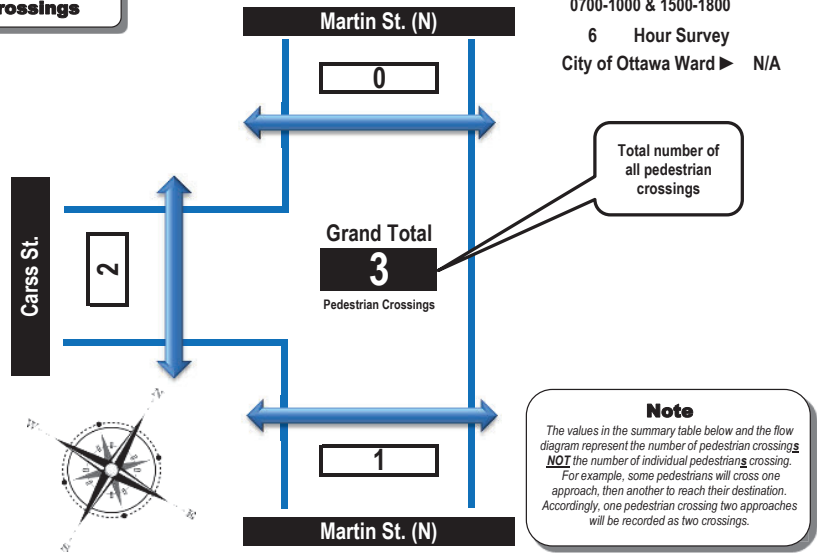
	Carss St.					N/A					Martin St. (N)					Martin St. (N)				
	Eastbound					Westbound					Northbound					Southbound				
Time Period	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT	ST	RT	UT	SB Tot	GR Tot
0700-0800	0		0	0	0						0	1		0	1		4	0	0	4	5
0800-0900	0		1	0	1						0	4		0	4		1	0	0	1	6
0900-1000	0		0	0	0						0	2		0	2		3	1	0	4	6
1500-1600	3		1	0	4						1	3		0	4		5	0	0	5	13
1600-1700	0		1	0	1						0	1		0	1		1	1	0	2	4
1700-1800	0		1	0	1						0	1		0	1		0	1	0	1	3
Totals	3		4	0	7						1	12		0	13		14	3	0	17	37

Turning Movement Count
Pedestrian Crossings Summary and Flow Diagram

Carss Street & Martin Street North — **Almonte, ON**

Pedestrian Crossings

Thursday, January 20, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A



Note
*The values in the summary table below and the flow diagram represent the number of pedestrian crossings **NOT** the number of individual pedestrians crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Time Period	West Side Crossing Carss St.	East Side Crossing N/A	Street Total	South Side Crossing Martin St. (N)	North Side Crossing Martin St. (N)	Street Total	Grand Total
0700-0800	1		1	0	0	0	1
0800-0900	1		1	1	0	1	2
0900-1000	0		0	0	0	0	0
1500-1600	0		0	0	0	0	0
1600-1700	0		0	0	0	0	0
1700-1800	0		0	0	0	0	0
Totals	2		2	1	0	1	3

Comments:
Traffic count was conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open for in-class learning commencing on 18 January, 2022; however, all restaurants closed to all residents for in-person dining. Gyms and all entertainment venues closed to all residents. School buses comprise 45.95% of the heavy vehicle traffic.

Turning Movement Count
Summary Report
Including AM and PM Peak Hours
All Vehicles Except Bicycles

Carss Street & Martin Street North — Almonte, ON

Survey Date: Thursday, January 20, 2022 | **Start Time:** 0700 | **AADT Factor:** 1.0
Weather AM: Clear -18° C | **Survey Duration:** 6 Hrs. | **Survey Hours:** 0700-1000 & 1500-1800
Weather PM: Clear -22° C | **Surveyor(s):** T. Carmody

	Carss St.					N/A					Martin St. (N)					Martin St. (N)					
	Eastbound					Westbound					Northbound					Southbound					
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	1	0	3	0	4	0	0	0	0	0	4	1	37	0	0	38	0	60	1	0	61	99	103
0800-0900	2	0	7	0	9	0	0	0	0	0	9	11	31	0	0	42	0	60	1	0	61	103	112
0900-1000	1	0	2	0	3	0	0	0	0	0	3	1	34	0	0	35	0	36	2	0	38	73	76
1500-1600	5	0	5	0	10	0	0	0	0	0	10	10	69	0	0	79	0	54	1	0	55	134	144
1600-1700	3	0	10	0	13	0	0	0	0	0	13	8	66	0	0	74	0	45	2	0	47	121	134
1700-1800	1	0	3	0	4	0	0	0	0	0	4	7	65	0	0	72	0	29	3	0	32	104	108
Totals	13	0	30	0	43	0	0	0	0	0	43	38	302	0	0	340	0	284	10	0	294	634	677

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0

AADT 12-hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor ➡					0.77							Highest Hourly Vehicle Volume Between 0700h & 1000h											
AM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot	Gr. Total
0730-0830	2	0	8	0	10	0	0	0	0	0	10	7	39	0	0	46	0	77	2	0	79	125	135

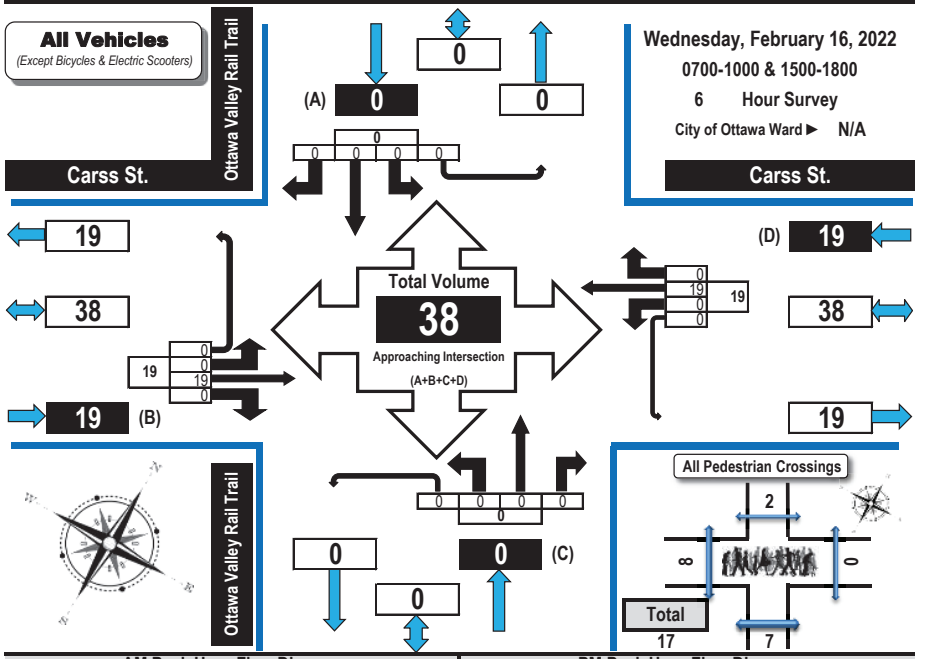
PM Peak Hour Factor ➡					0.91							Highest Hourly Vehicle Volume Between 1500h & 1800h											
PM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot	Gr. Total
1515-1615	5	0	8	0	13	0	0	0	0	0	13	12	60	0	0	72	0	63	2	0	65	137	150

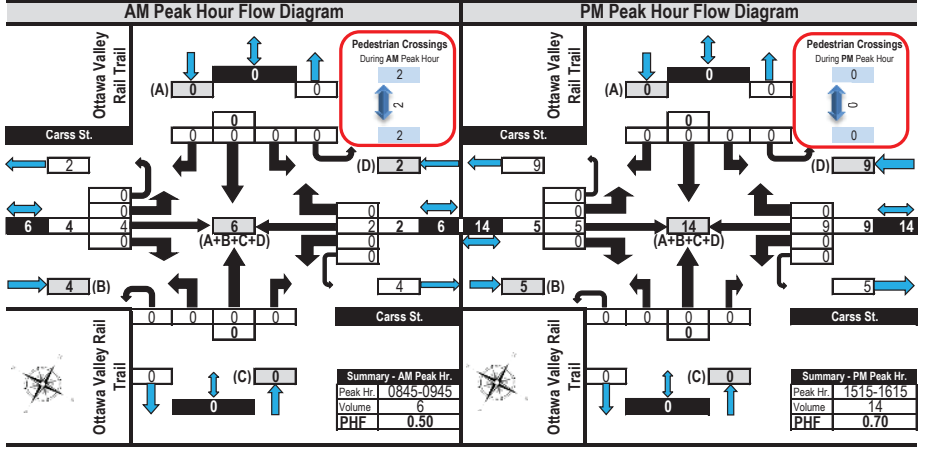
Comments:
Traffic count was conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open for in-class learning commencing on 18 January, 2022; however, all restaurants closed to all residents for in-person dining. Gyms and all entertainment venues closed to all residents. School buses comprise 45.95% of the heavy vehicle traffic.

Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Turning Movement Count
Summary, AM and PM Peak Hour
Flow Diagrams
All Vehicles Except Bicycles

Carss Street & Ottawa Valley Rail Trail — Almonte, ON



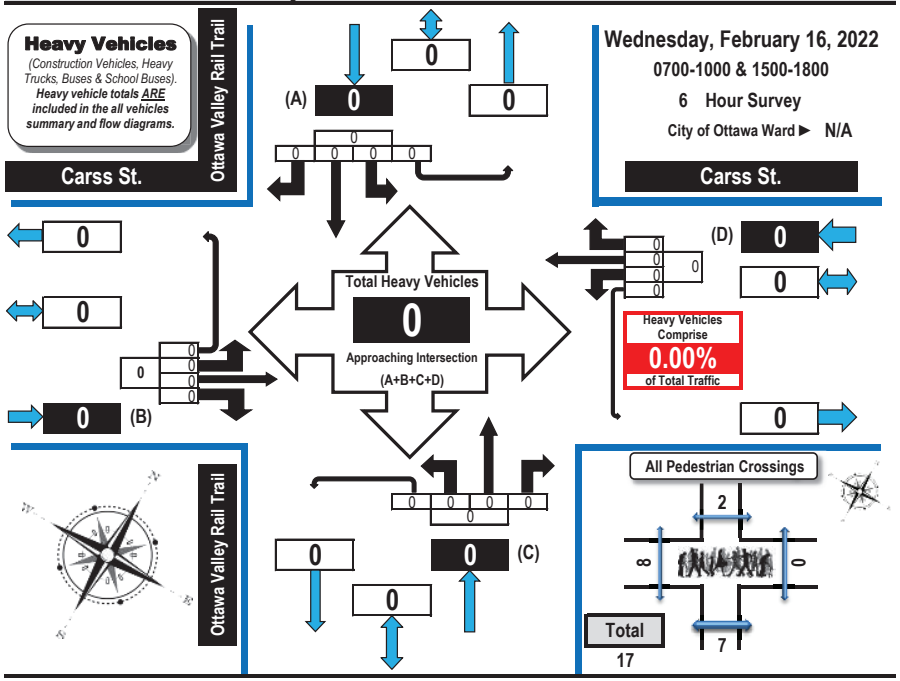


Turning Movement Count
Heavy Vehicle Summary (FHWA Class 4-13)
Flow Diagram

Carss Street & Ottawa Valley Rail Trail — **Almonte, ON**

Heavy Vehicles
(Construction Vehicles, Heavy Trucks, Buses & School Buses).
Heavy vehicle totals ARE included in the all vehicles summary and flow diagrams.

Wednesday, February 16, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A



	Carss St. Eastbound					Carss St. Westbound					Ottawa Valley Rail Trail Northbound					Ottawa Valley Rail Trail Southbound					
Time Period	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT	ST	RT	UT	SB Tot	GR Tot
0700-0800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0800-0900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900-1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1500-1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600-1700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1700-1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. There were no heavy vehicles (school buses or trucks), bicycles or ATV's observed.

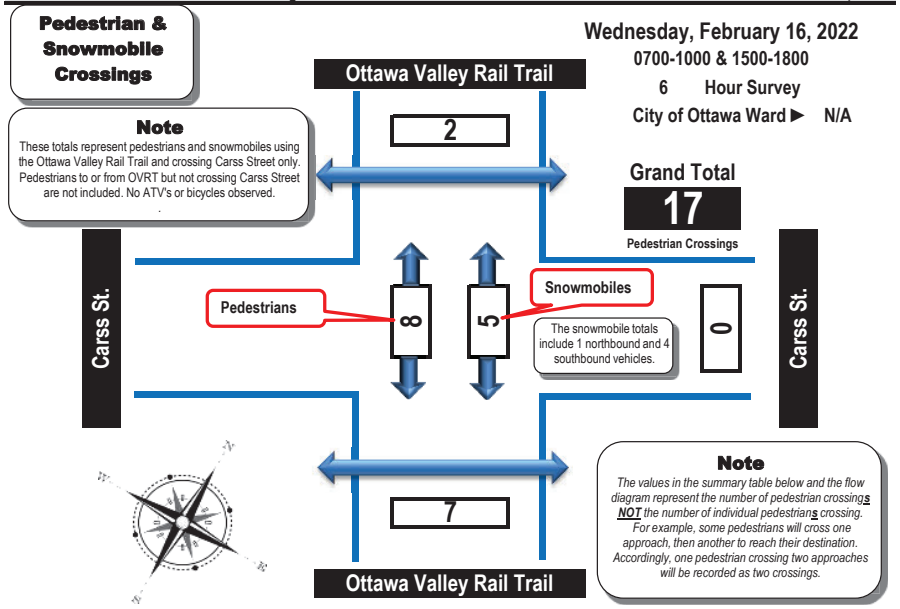
Turning Movement Count
Pedestrian and Snowmobile Crossings Summary and Flow Diagram

Carss Street & Ottawa Valley Rail Trail — **Almonte, ON**

Pedestrian & Snowmobile Crossings

Wednesday, February 16, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A

Note
These totals represent pedestrians and snowmobiles using the Ottawa Valley Rail Trail and crossing Carss Street only. Pedestrians to or from OVRT but not crossing Carss Street are not included. No ATV's or bicycles observed.



Note
*The values in the summary table below and the flow diagram represent the number of pedestrian crossing**s** **NOT** the number of individual pedestrian**s** crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Time Period	Ottawa Valley Rail Trail Crossing Carss St.		Street Total	South Side Crossing Ottawa Valley Rail Trail	North Side Crossing Ottawa Valley Rail Trail	Street Total	Grand Total
0700-0800	4	0	4	3	0	3	7
0800-0900	0	0	0	2	2	4	4
0900-1000	2	0	2	2	0	2	4
1500-1600	0	0	0	0	0	0	0
1600-1700	1	0	1	0	0	0	1
1700-1800	1	0	1	0	0	0	1
Totals	8	0	8	7	2	9	17

Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. There were no heavy vehicles (school buses or trucks), bicycles or ATV's observed.

Turning Movement Count
Summary Report
Including AM and PM Peak Hours
All Vehicles Except Bicycles

Carss Street & Ottawa Valley Rail Trail — Almonte, ON

Survey Date: Wednesday, February 16, 2022 **Start Time:** 0700 **AADT Factor:** 1.0
Weather AM: Overcast -12° C **Survey Duration:** 6 Hrs. **Survey Hours:** 0700-1000 & 1500-1800
Weather PM: Overcast +5° C **Surveyor(s):** T. Carmody

	Carss St. Eastbound					Carss St. Westbound						Ottawa Valley Rail Trail Northbound					Ottawa Valley Rail Trail Southbound					
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	0	1	0	0	1	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	2
0800-0900	0	3	0	0	3	0	1	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	4
0900-1000	0	3	0	0	3	0	2	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	5
1500-1600	0	7	0	0	7	0	7	0	0	7	14	0	0	0	0	0	0	0	0	0	0	0	14
1600-1700	0	3	0	0	3	0	4	0	0	4	7	0	0	0	0	0	0	0	0	0	0	0	7
1700-1800	0	2	0	0	2	0	4	0	0	4	6	0	0	0	0	0	0	0	0	0	0	0	6
Totals	0	19	0	0	19	0	19	0	0	19	38	0	0	0	0	0	0	0	0	0	0	0	38

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39																							
Equ. 12 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0																							
AADT 12-hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31																							
AADT 24 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor ➡ 0.50												Highest Hourly Vehicle Volume Between 0700h & 1000h										
AM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Total
0845-0945	0	4	0	0	4	0	2	0	0	2	6	0	0	0	0	0	0	0	0	0	0	0	6

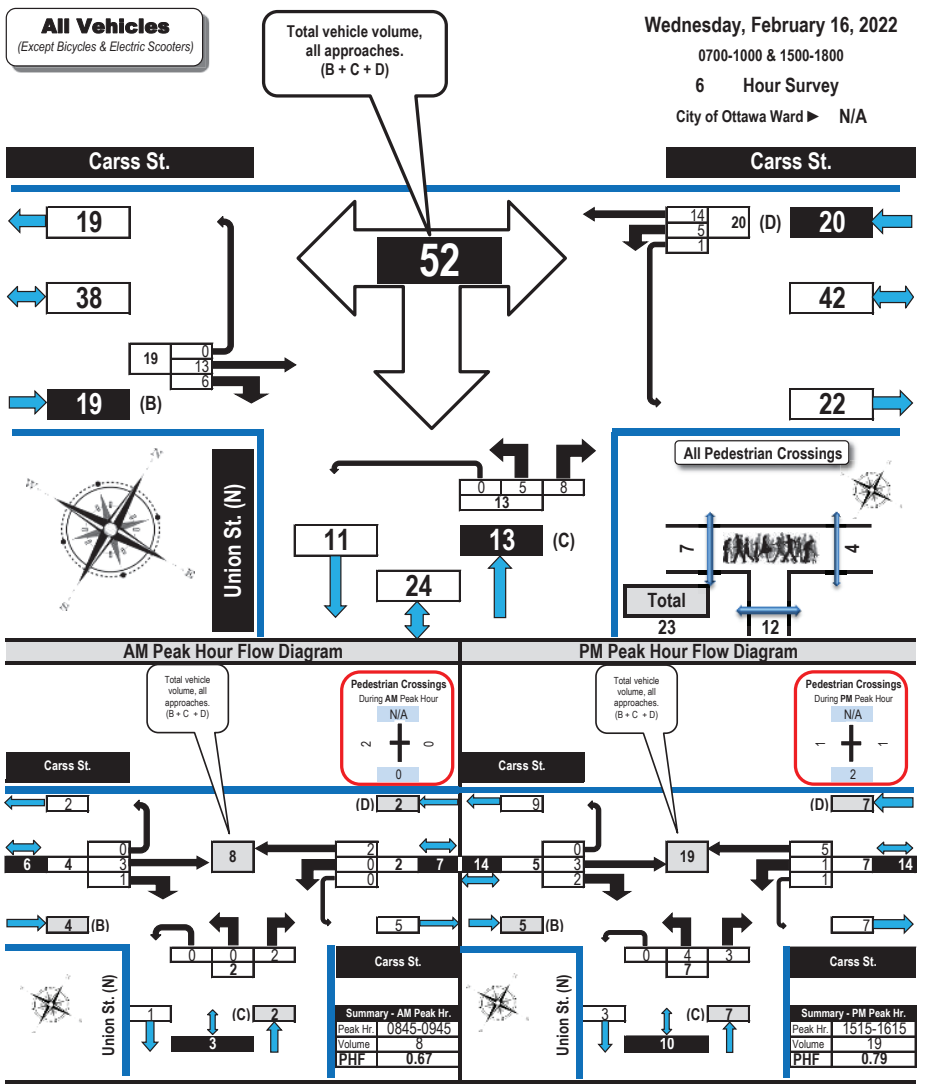
PM Peak Hour Factor ➡ 0.70												Highest Hourly Vehicle Volume Between 1500h & 1800h										
PM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1515-1615	0	5	0	0	5	0	9	0	0	9	14	0	0	0	0	0	0	0	0	0	0	0	14

Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. There were no heavy vehicles (school buses or trucks), bicycles or ATV's observed.

Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Turning Movement Count
Summary, AM and PM Peak Hour
Flow Diagrams
All Vehicles Except Bicycles

Carss Street & Union Street North — Almonte, ON



Turning Movement Count
Heavy Vehicle Summary (FHWA Class 4 to 13)
Flow Diagram

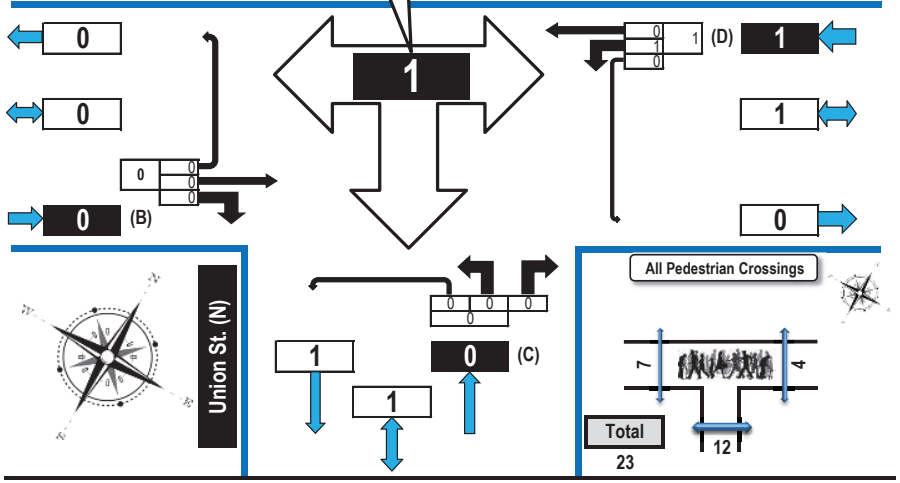
Carss Street & Union Street North — **Almonte, ON**

Heavy Vehicles
(Construction Vehicles, Heavy Trucks, Buses & School Buses).
Heavy vehicle totals ARE included in the all vehicles summary and flow diagrams.

Total heavy vehicle volume, all approaches. (B + C + D)

Heavy Vehicles Comprise **1.92%** of Total Traffic

Wednesday, February 16, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A



	Carss St.					Carss St.					Union St. (N)					N/A					
	Eastbound					Westbound					Northbound					Southbound					
Time Period	LT	ST	RT	UT	EB Tot	LT	ST	RT	UT	WB Tot	LT	ST	RT	UT	NB Tot	LT	ST	RT	UT	SB Tot	GR Tot
0700-0800		0	0	0	0	0	0		0	0	0		0	0	0						0
0800-0900		0	0	0	0	0	0		0	0	0		0	0	0						0
0900-1000		0	0	0	0	0	0		0	0	0		0	0	0						0
1130-1230		0	0	0	0	0	0		0	0	0		0	0	0						0
1230-1330		0	0	0	0	0	0		0	0	0		0	0	0						0
1500-1600		0	0	0	0	1	0		0	1	0		0	0	0						1
1600-1700		0	0	0	0	0	0		0	0	0		0	0	0						0
1700-1800		0	0	0	0	0	0		0	0	0		0	0	0						0
Totals		0	0	0	0	1	0		0	1	0		0	0	0						1

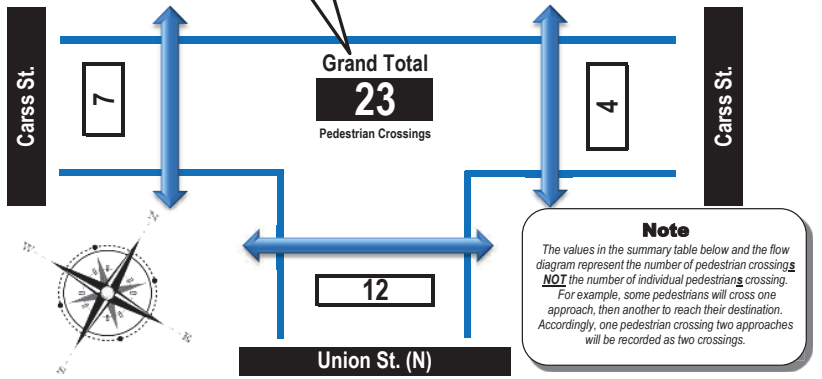
Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. The single school bus comprised 100.00% of the heavy vehicle traffic. No bicycles were observed.

Turning Movement Count
Pedestrian Crossings Summary and Flow Diagram

Carss Street & Union Street North — **Almonte, ON**

Pedestrian Crossings

Wednesday, February 16, 2022
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward ► N/A



Note
*The values in the summary table below and the flow diagram represent the number of pedestrian crossing**s** **NOT** the number of individual pedestrian**s** crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Time Period	West Side Crossing Carss St.	East Side Crossing Carss St.	Street Total	South Side Crossing Union St. (N)	North Side Crossing N/A	Street Total	Grand Total
0700-0800	0	1	1	3		3	4
0800-0900	1	0	1	3		3	4
0900-1000	4	0	4	0		0	4
1130-1230	0	0	0	0		0	0
1230-1330	0	0	0	0		0	0
1500-1600	0	1	1	2		2	3
1600-1700	2	0	2	2		2	4
1700-1800	0	2	2	2		2	4
Totals	7	4	11	12		12	23

Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. The single school bus comprised 100.00% of the heavy vehicle traffic. No bicycles were observed.

ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count
Summary Report Including Peak Hours, AADT and Expansion Factors
All Vehicles Except Bicycles

Carss Street & Union Street North — Almonte, ON

Survey Date: Wednesday, February 16, 2022 **Start Time:** 0700 **AADT Factor:** 1.0
Weather AM: Overcast -12° C **Survey Duration:** 6 Hrs. **Survey Hours:** 0700-1000 & 1500-1800
Weather PM: Overcast +5° C **Surveyor(s):** T. Carmody

	Carss St.					Carss St.					Union St. (N)					N/A						
	Eastbound					Westbound					Northbound					Southbound						
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800		1	0	0	1	0	1		0	1	2	0		1	0	1						1	3
0800-0900		2	1	0	3	1	1		0	2	5	0		1	0	1						1	6
0900-1000		2	1	0	3	1	2		0	3	6	0		1	0	1						1	7
1130-1230		0	0	0	0	0	0		0	0	0	0		0	0	0						0	0
1230-1330		0	0	0	0	0	0		0	0	0	0		0	0	0						0	0
1500-1600		5	2	0	7	1	4		1	6	13	3		2	0	5						5	18
1600-1700		3	0	0	3	0	3		0	3	6	1		1	0	2						2	8
1700-1800		0	2	0	2	2	3		0	5	7	1		2	0	3						3	10
Totals		13	6	0	19	5	14		1	20	39	5		8	0	13						13	52

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
Applicable to the Day and Month of the Turning Movement Count
Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0

AADT 12-hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor ➡ 0.67												Highest Hourly Vehicle Volume Between 0700h & 1000h										
AM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
0845-0945	0	3	1	0	4	0	2	0	0	2	6	0	0	2	0	2	0	0	0	0	0	2	8
OFF Peak Hour Factor ➡ #DIV/0!												Highest Hourly Vehicle Volume Between 1130h & 1330h										
OFF Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1230-1330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM Peak Hour Factor ➡ 0.79												Highest Hourly Vehicle Volume Between 1500h & 1800h										
PM Peak Hr	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	LT	ST	RT	UT	Total	LT	ST	RT	UT	Total	Str. Tot.	Gr. Tot.
1515-1615	0	3	2	0	5	1	5	0	1	7	12	4	0	3	0	7	0	0	0	0	0	7	19

Comments:
Traffic count conducted during the SARS-CoV-2 (Covid-19) pandemic. All schools open to in-person classes; however, all restaurants, gyms and entertainment venues open to vaccinated residents only. The single school bus comprised 100.00% of the heavy vehicle traffic. No bicycles were observed.

Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Appendix D

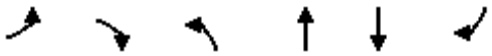
Heavy Vehicle Percentage Calculations

[1]Carss Street / Martin Street N												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	1	0	0	4	0	0	0	0	0	0	0
Total Volume	7	39	0	0	77	2	2	0	8	0	0	0
HV%	0%	3%	-	-	5%	0%	0%	-	0%	-	-	-
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	1	3	0	0	5	0	3	0	1	0	0	0
Total Volume	12	60	0	0	63	2	5	0	8	0	0	0
HV%	8%	5%	-	-	8%	0%	60%	-	13%	-	-	-

[2] Carss Street/ Union Street N												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	2	0	0	0	0	3	1	0	2	0
HV%	-	-	0%	-	-	-	-	0%	0%	-	0%	-
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	0	0	0	0	0	1	0	0
Total Volume	4	0	3	0	0	0	0	3	2	2	5	0
HV%	0%	-	0%	-	-	-	-	0%	0%	50%	0%	-

Appendix E

2022 Existing Synchro Worksheets



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	12	11	59	116	3
Future Volume (vph)	3	12	11	59	116	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.892				0.997	
Flt Protected	0.990			0.992		
Satd. Flow (prot)	1627	0	0	1812	1785	0
Flt Permitted	0.990			0.992		
Satd. Flow (perm)	1627	0	0	1812	1785	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Confl. Peds. (#/hr)		1				1
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	2%	2%	2%	3%	5%	2%
Adj. Flow (vph)	4	16	14	77	151	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	0	91	155	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	12	11	59	116	3
Future Vol, veh/h	3	12	11	59	116	3
Conflicting Peds, #/hr	0	1	0	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	3	5	2
Mvmt Flow	4	16	14	77	151	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	259	155	156	0	-	0
Stage 1	154	-	-	-	-	-
Stage 2	105	-	-	-	-	-
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	730	891	1424	-	-	-
Stage 1	874	-	-	-	-	-
Stage 2	919	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	721	889	1423	-	-	-
Mov Cap-2 Maneuver	721	-	-	-	-	-
Stage 1	864	-	-	-	-	-
Stage 2	918	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	1.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1423	-	849	-	-
HCM Lane V/C Ratio	0.01	-	0.023	-	-
HCM Control Delay (s)	7.6	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	10	2	1	13	0	5
Future Volume (vph)	10	2	1	13	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.977				0.865	
Flt Protected				0.998		
Satd. Flow (prot)	1800	0	0	1838	1593	0
Flt Permitted				0.998		
Satd. Flow (perm)	1800	0	0	1838	1593	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	163.5			226.5	392.5	
Travel Time (s)	11.8			16.3	28.3	
Confl. Peds. (#/hr)					2	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	15	3	1	19	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	20	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

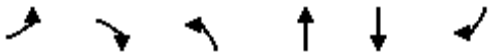
Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	10	2	1	13	0	5
Future Vol, veh/h	10	2	1	13	0	5
Conflicting Peds, #/hr	0	0	0	0	2	0
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	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	3	1	19	0	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	18	0	40	17
Stage 1	-	-	-	-	17	-
Stage 2	-	-	-	-	23	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1599	-	972	1062
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	1000	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1599	-	969	1062
Mov Cap-2 Maneuver	-	-	-	-	969	-
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	997	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	8.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1062	-	-	1599	-
HCM Lane V/C Ratio	0.007	-	-	0.001	-
HCM Control Delay (s)	8.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	12	18	90	95	3
Future Volume (vph)	8	12	18	90	95	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.920				0.996	
Flt Protected	0.980			0.992		
Satd. Flow (prot)	1281	0	0	1767	1736	0
Flt Permitted	0.980			0.992		
Satd. Flow (perm)	1281	0	0	1767	1736	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	60%	13%	8%	5%	8%	0%
Adj. Flow (vph)	9	13	20	99	104	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	0	119	107	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	12	18	90	95	3
Future Vol, veh/h	8	12	18	90	95	3
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	60	13	8	5	8	0
Mvmt Flow	9	13	20	99	104	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	245	106	107	0	-	0
Stage 1	106	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	7	6.33	4.18	-	-	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	4.04	3.417	2.272	-	-	-
Pot Cap-1 Maneuver	633	919	1447	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	624	919	1447	-	-	-
Mov Cap-2 Maneuver	624	-	-	-	-	-
Stage 1	780	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	1.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1447	-	773	-	-
HCM Lane V/C Ratio	0.014	-	0.028	-	-
HCM Control Delay (s)	7.5	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	10	3	5	16	6	10
Future Volume (vph)	10	3	5	16	6	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.968				0.916	
Flt Protected				0.989	0.981	
Satd. Flow (prot)	1783	0	0	1643	1655	0
Flt Permitted				0.989	0.981	
Satd. Flow (perm)	1783	0	0	1643	1655	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	163.5			226.5	392.5	
Travel Time (s)	11.8			16.3	28.3	
Confl. Peds. (#/hr)		2	2		1	1
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	2%	2%	50%	2%	2%	2%
Adj. Flow (vph)	13	4	6	20	8	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	0	26	21	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	10	3	5	16	6	10
Future Vol, veh/h	10	3	5	16	6	10
Conflicting Peds, #/hr	0	2	2	0	1	1
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	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	50	2	2	2
Mvmt Flow	13	4	6	20	8	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	19	0	50	18
Stage 1	-	-	-	-	17	-
Stage 2	-	-	-	-	33	-
Critical Hdwy	-	-	4.6	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.65	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1335	-	959	1061
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	989	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1333	-	951	1058
Mov Cap-2 Maneuver	-	-	-	-	951	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	983	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1015	-	-	1333	-
HCM Lane V/C Ratio	0.02	-	-	0.005	-
HCM Control Delay (s)	8.6	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Appendix F

Signal Warrants

Carss St @ Martin St
FB 2028

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	118	16%	8%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	14	8%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	108	15%	4%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	3	4%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Carss St @ Martin St
FT 2028

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	145	20%	20%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	37	22%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	121	17%	10%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	7	10%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Carss St @ Union St
FB 2028

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	22	3%	3%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	9	5%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	16	2%	2%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	2	2%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Carss St @ Union St
FT 2028

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	57	8%	8%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	14	8%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	47	7%	7%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	6	7%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Future Access @ Carss St
FT 2028

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	52	11%	11%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	28	23%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	33	7%	7%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	19	37%		

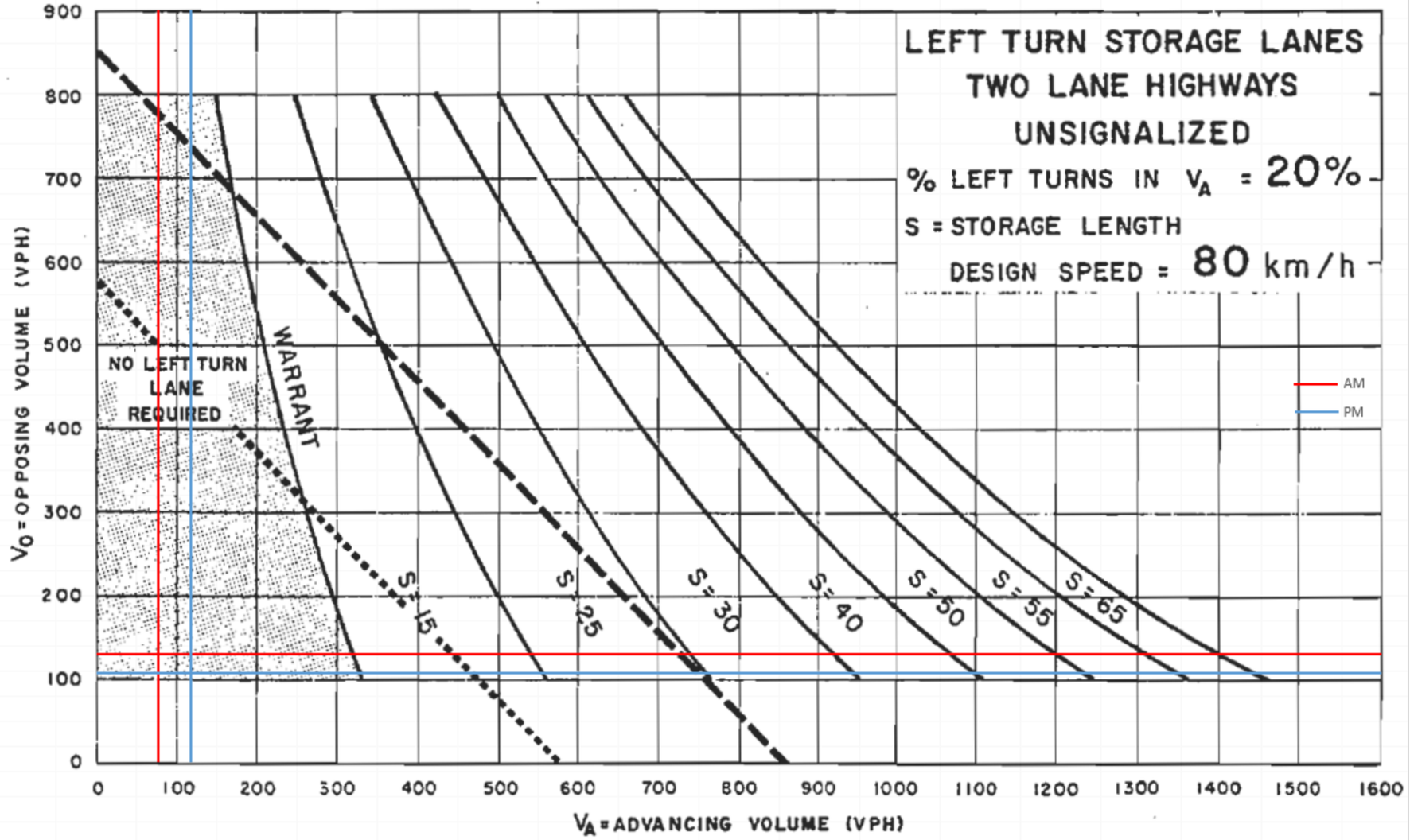
Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Appendix G

Left-turn Lane Warrants

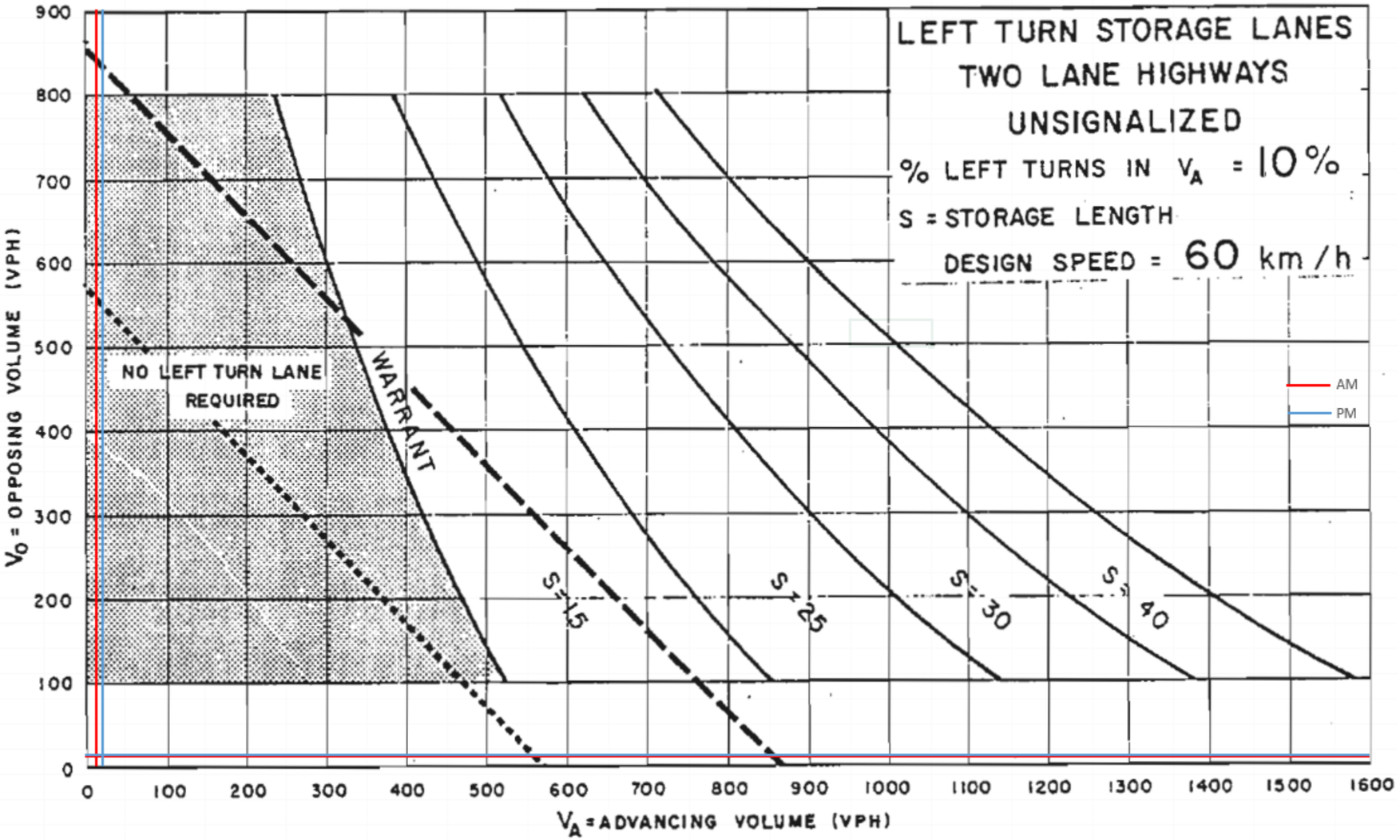
Carss Street at Martin Street 2028FB

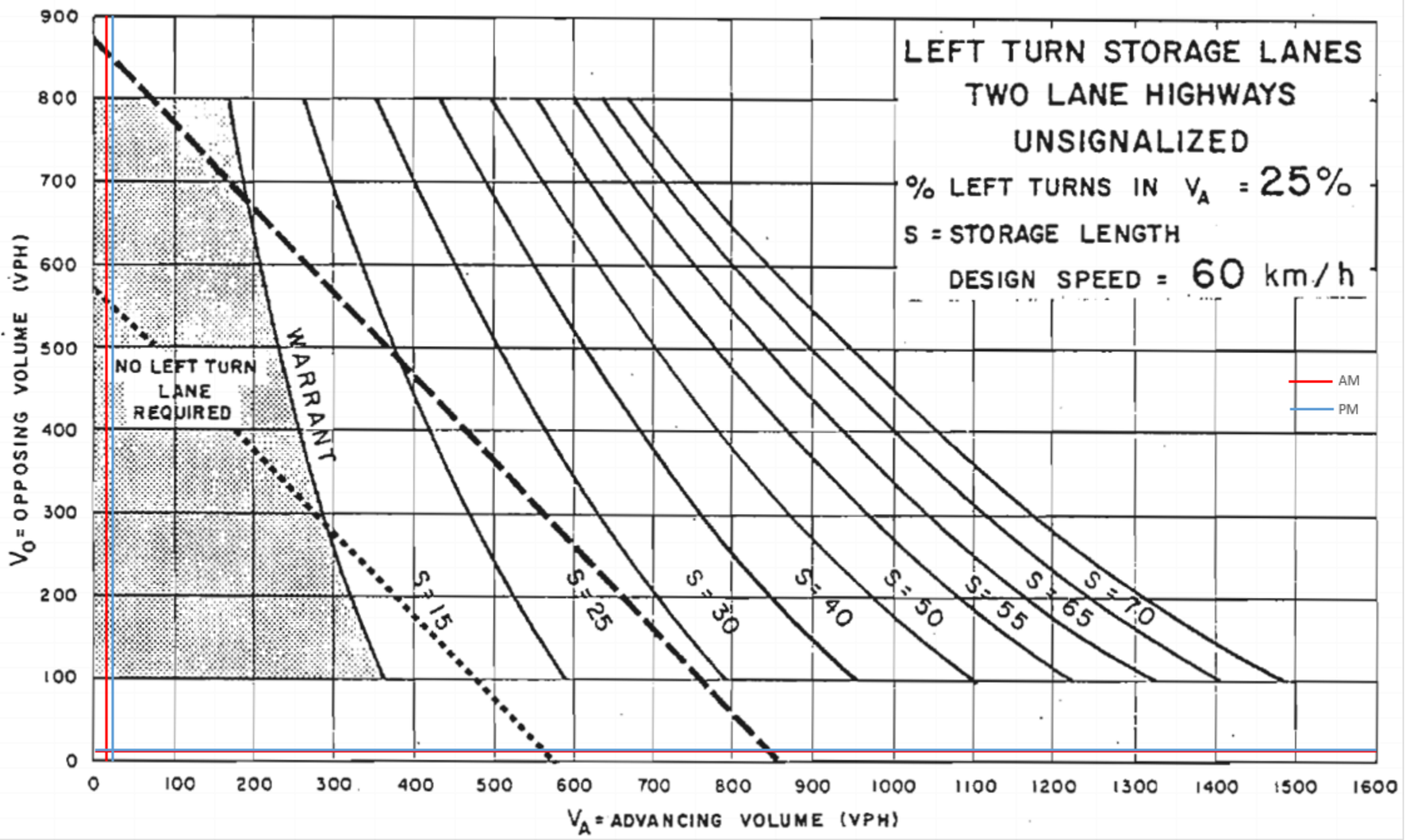
Design Speed	Northbound Left															
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
	AM	3	0	13	0	0	0	12	65	0	0	127	3	15.6%	77	130
	PM	9	0	13	0	0	0	20	98	0	0	104	3	16.9%	118	107


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 20%
S = STORAGE LENGTH
DESIGN SPEED = 80 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
900
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Carss Street at Union Street 2028 FB

Design Speed	Westbound Left				Yes											
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
	AM	0	11	2	1	14	0	0	0	5	0	0	0	6.7%	15	13
	PM	0	11	3	5	17	0	7	0	11	0	0	0	22.7%	22	14

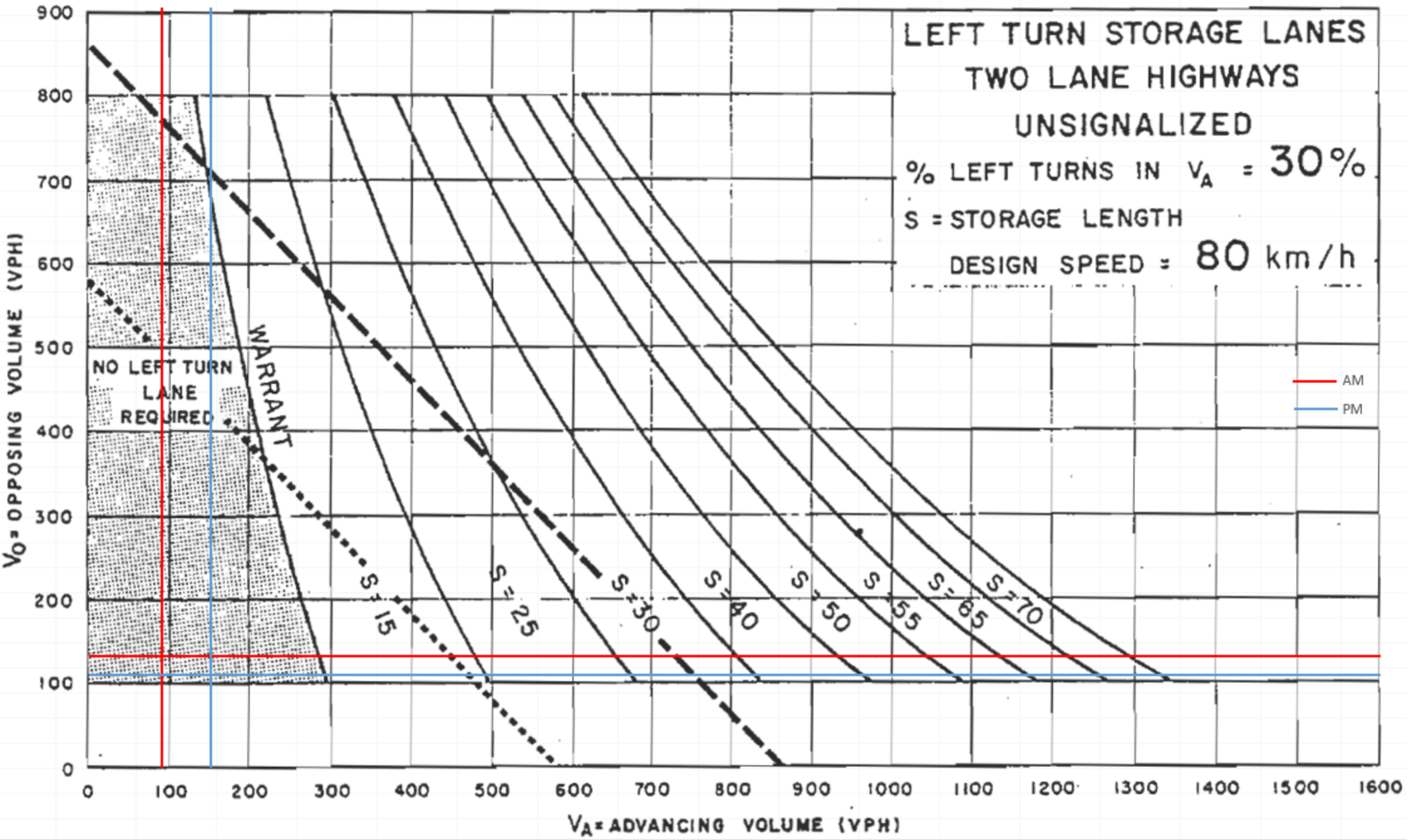

LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 10%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

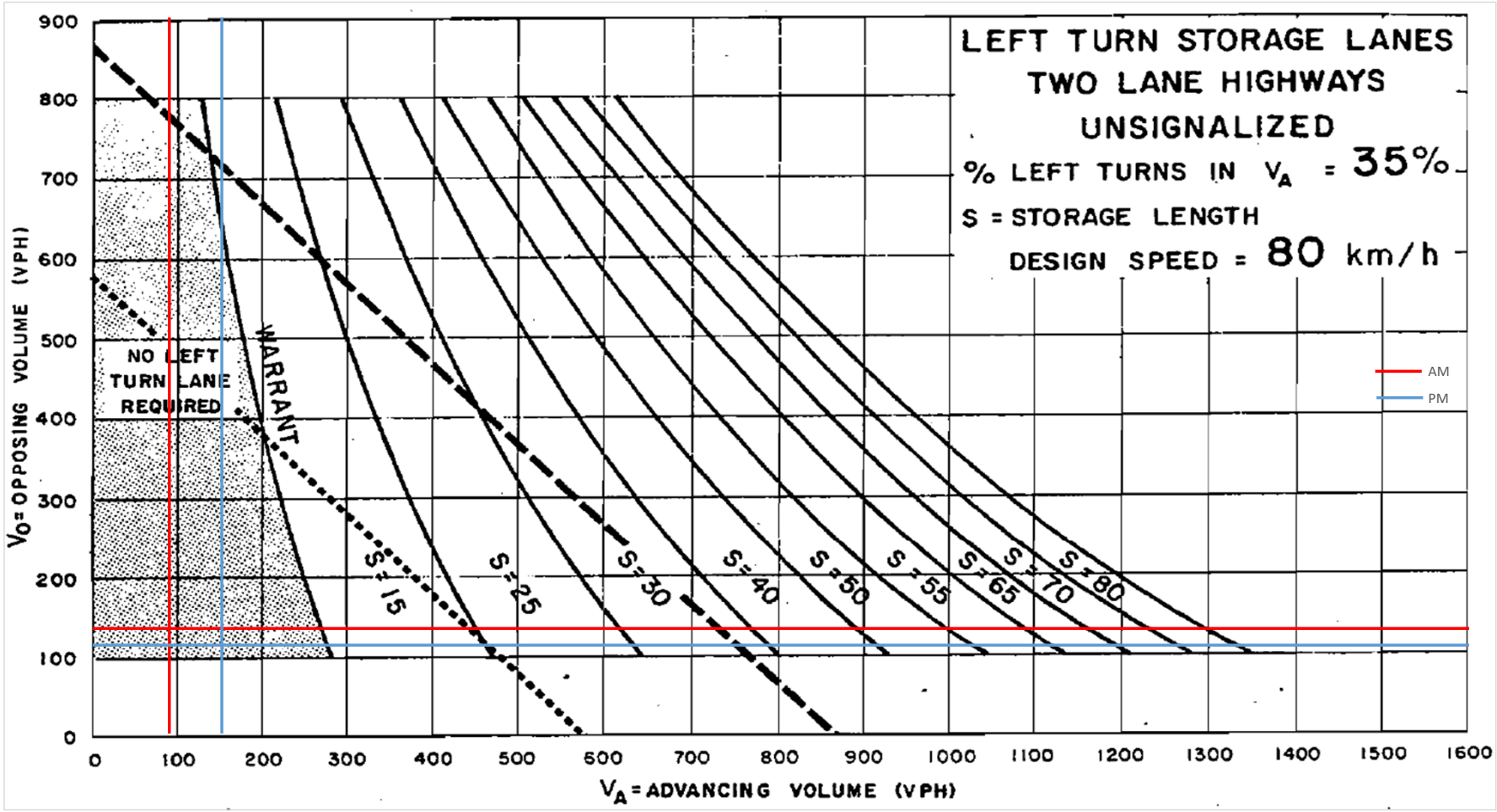

LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 25%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
S=70
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Carss Street at Martin Street 2028FT

Design Speed	Northbound Left															
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
	AM	10	0	42	0	0	0	24	65	0	0	127	5	27.0%	89	132
	PM	19	0	27	0	0	0	52	98	0	0	104	7	34.7%	150	111

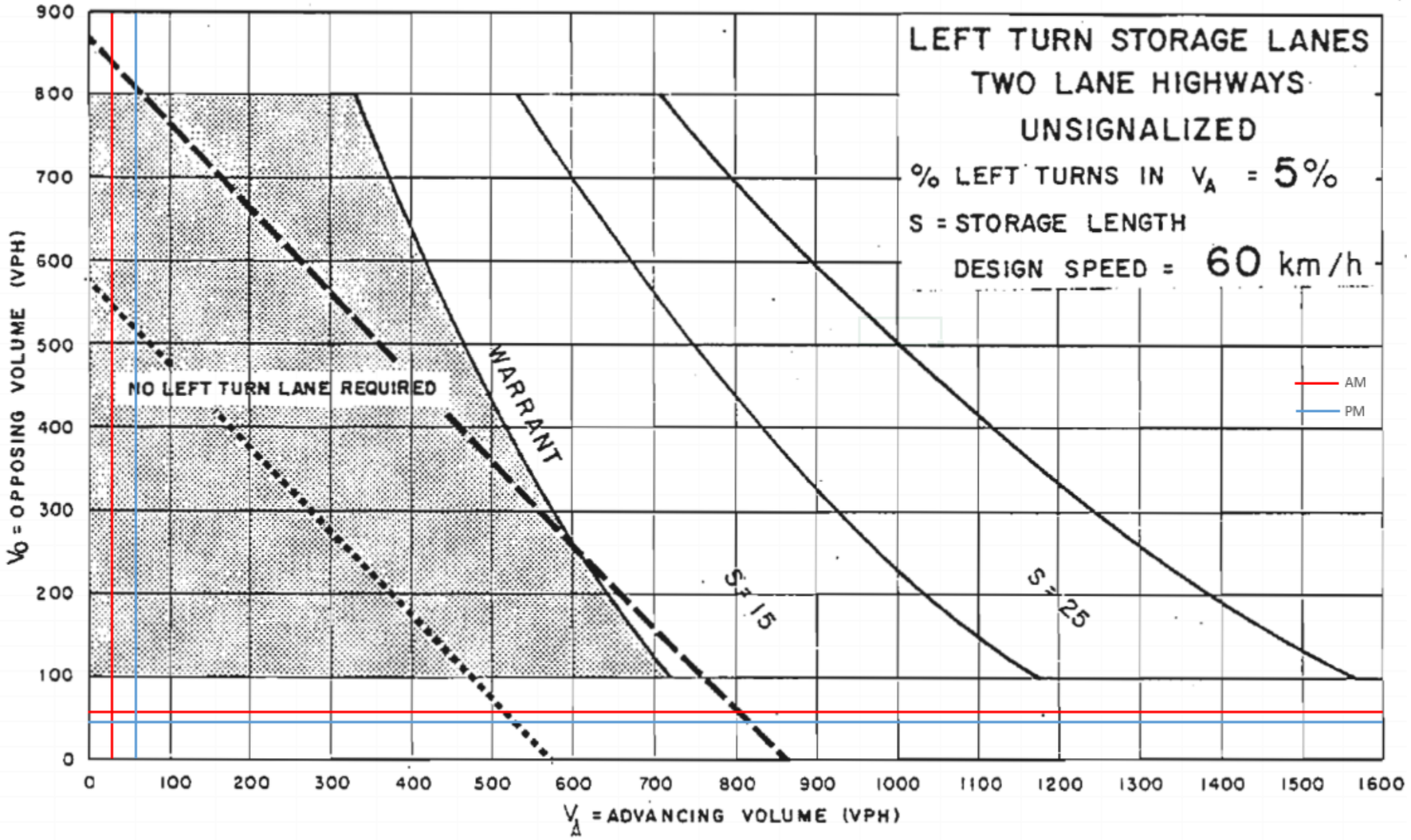
Yes

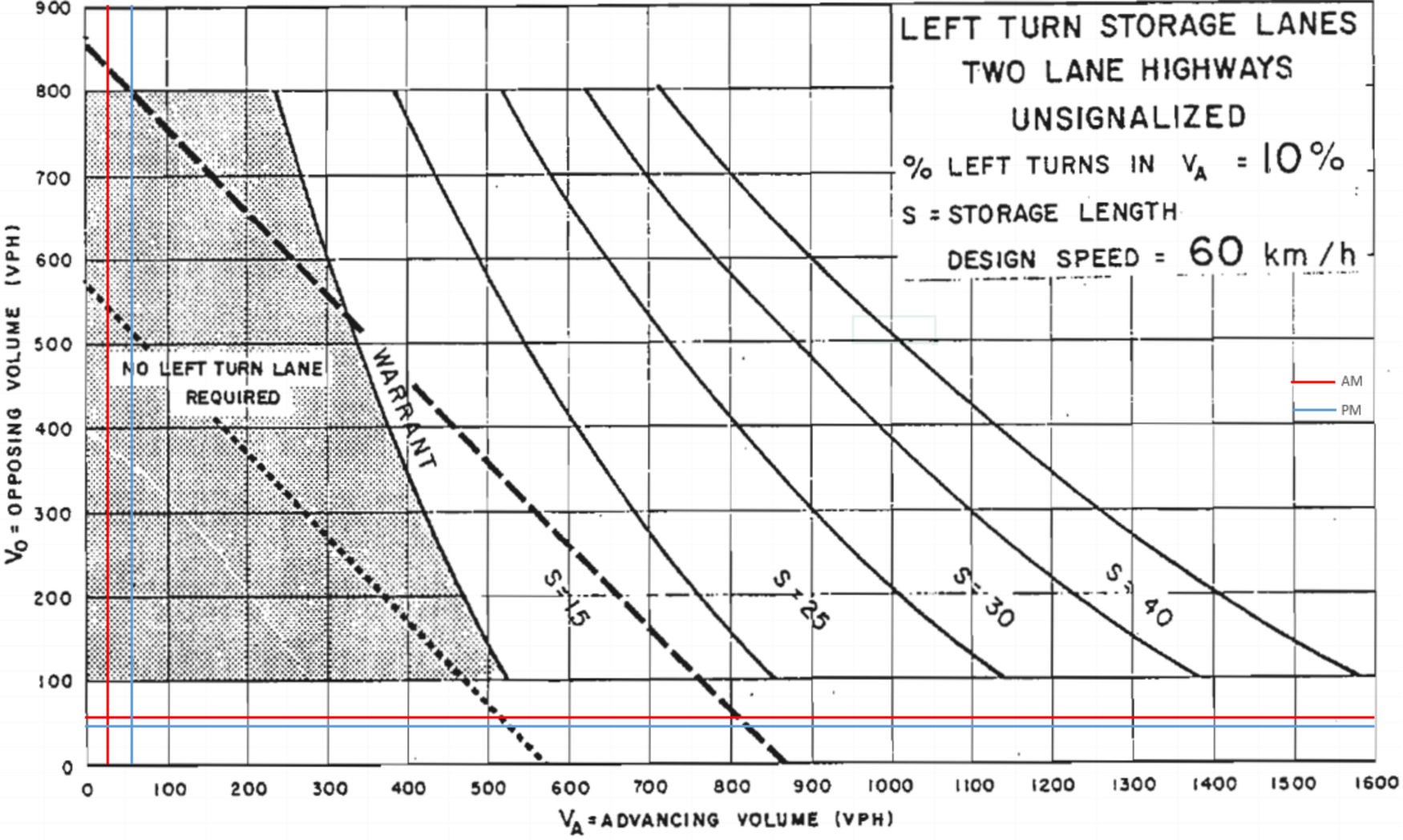

LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 30%
S = STORAGE LENGTH
DESIGN SPEED = 80 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
S=70
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 35%
S = STORAGE LENGTH
DESIGN SPEED = 80 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
S=70
S=80
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Carss Street at Union Street 2028 FT

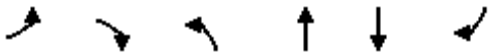
Design Speed	Westbound Left															
60 km/h		Yes														
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
	AM	0	47	9	1	28	0	0	0	0	5	0	0	3.4%	29	56
	PM	0	35	10	5	53	0	22	0	0	11	0	0	8.6%	58	45


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 10%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
900
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Appendix H

2028 Future Background Synchro Worksheets



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	13	12	65	127	3
Future Volume (vph)	3	13	12	65	127	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.891				0.997	
Flt Protected	0.991			0.992		
Satd. Flow (prot)	1626	0	0	1812	1785	0
Flt Permitted	0.991			0.992		
Satd. Flow (perm)	1626	0	0	1812	1785	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Confl. Peds. (#/hr)		1				1
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	2%	2%	2%	3%	5%	2%
Adj. Flow (vph)	4	17	16	84	165	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	0	0	100	169	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	13	12	65	127	3
Future Vol, veh/h	3	13	12	65	127	3
Conflicting Peds, #/hr	0	1	0	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	3	5	2
Mvmt Flow	4	17	16	84	165	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	284	169	170	0	-	0
Stage 1	168	-	-	-	-	-
Stage 2	116	-	-	-	-	-
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	706	875	1407	-	-	-
Stage 1	862	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	696	873	1406	-	-	-
Mov Cap-2 Maneuver	696	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	908	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	1.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1406	-	833	-	-
HCM Lane V/C Ratio	0.011	-	0.025	-	-
HCM Control Delay (s)	7.6	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	11	2	1	14	0	5
Future Volume (vph)	11	2	1	14	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979				0.865	
Flt Protected				0.998		
Satd. Flow (prot)	1803	0	0	1838	1593	0
Flt Permitted				0.998		
Satd. Flow (perm)	1803	0	0	1838	1593	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.4			226.5	392.5	
Travel Time (s)	3.4			16.3	28.3	
Confl. Peds. (#/hr)					2	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	16	3	1	21	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	19	0	0	22	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

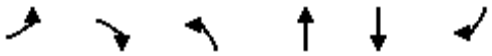
Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	11	2	1	14	0	5
Future Vol, veh/h	11	2	1	14	0	5
Conflicting Peds, #/hr	0	0	0	0	2	0
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	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	3	1	21	0	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	19	0	43	18
Stage 1	-	-	-	-	18	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1597	-	968	1061
Stage 1	-	-	-	-	1005	-
Stage 2	-	-	-	-	998	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1597	-	965	1061
Mov Cap-2 Maneuver	-	-	-	-	965	-
Stage 1	-	-	-	-	1005	-
Stage 2	-	-	-	-	995	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	8.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1061	-	-	1597	-
HCM Lane V/C Ratio	0.007	-	-	0.001	-
HCM Control Delay (s)	8.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	13	20	98	104	3
Future Volume (vph)	9	13	20	98	104	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.921				0.997	
Flt Protected	0.980			0.992		
Satd. Flow (prot)	1279	0	0	1767	1738	0
Flt Permitted	0.980			0.992		
Satd. Flow (perm)	1279	0	0	1767	1738	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	60%	13%	8%	5%	8%	0%
Adj. Flow (vph)	10	14	22	108	114	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	24	0	0	130	117	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	13	20	98	104	3
Future Vol, veh/h	9	13	20	98	104	3
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	60	13	8	5	8	0
Mvmt Flow	10	14	22	108	114	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	268	116	117	0	-	0
Stage 1	116	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	7	6.33	4.18	-	-	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	4.04	3.417	2.272	-	-	-
Pot Cap-1 Maneuver	613	907	1435	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	603	907	1435	-	-	-
Mov Cap-2 Maneuver	603	-	-	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	752	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	1.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1435	-	752	-	-
HCM Lane V/C Ratio	0.015	-	0.032	-	-
HCM Control Delay (s)	7.5	0	9.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	11	3	5	17	7	11
Future Volume (vph)	11	3	5	17	7	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.970				0.918	
Flt Protected				0.989	0.981	
Satd. Flow (prot)	1787	0	0	1655	1659	0
Flt Permitted				0.989	0.981	
Satd. Flow (perm)	1787	0	0	1655	1659	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	42.5			226.5	392.5	
Travel Time (s)	3.1			16.3	28.3	
Confl. Peds. (#/hr)		2	2		1	1
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	2%	2%	50%	2%	2%	2%
Adj. Flow (vph)	14	4	6	22	9	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	28	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	11	3	5	17	7	11
Future Vol, veh/h	11	3	5	17	7	11
Conflicting Peds, #/hr	0	2	2	0	1	1
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	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	50	2	2	2
Mvmt Flow	14	4	6	22	9	14

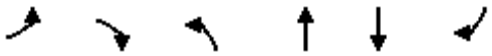
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	20	0	53	19
Stage 1	-	-	-	-	18	-
Stage 2	-	-	-	-	35	-
Critical Hdwy	-	-	4.6	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.65	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1334	-	955	1059
Stage 1	-	-	-	-	1005	-
Stage 2	-	-	-	-	987	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1332	-	947	1056
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	981	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1011	-	-	1332	-
HCM Lane V/C Ratio	0.023	-	-	0.005	-
HCM Control Delay (s)	8.6	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Appendix I

2028 Future Total Synchro Worksheets



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	42	24	65	127	5
Future Volume (vph)	10	42	24	65	127	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.891				0.995	
Flt Protected	0.991			0.987		
Satd. Flow (prot)	1626	0	0	1805	1782	0
Flt Permitted	0.991			0.987		
Satd. Flow (perm)	1626	0	0	1805	1782	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Confl. Peds. (#/hr)		1				1
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	2%	2%	2%	3%	5%	2%
Adj. Flow (vph)	13	55	31	84	165	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	0	0	115	171	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	42	24	65	127	5
Future Vol, veh/h	10	42	24	65	127	5
Conflicting Peds, #/hr	0	1	0	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	3	5	2
Mvmt Flow	13	55	31	84	165	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	315	170	172	0	-	0
Stage 1	169	-	-	-	-	-
Stage 2	146	-	-	-	-	-
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	678	874	1405	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	881	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	661	872	1404	-	-	-
Mov Cap-2 Maneuver	661	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	2.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1404	-	822	-	-
HCM Lane V/C Ratio	0.022	-	0.082	-	-
HCM Control Delay (s)	7.6	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	47	9	1	28	0	5
Future Volume (vph)	47	9	1	28	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979				0.865	
Flt Protected				0.999		
Satd. Flow (prot)	1803	0	0	1840	1593	0
Flt Permitted				0.999		
Satd. Flow (perm)	1803	0	0	1840	1593	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.4			226.5	392.5	
Travel Time (s)	3.4			16.3	28.3	
Confl. Peds. (#/hr)					2	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	70	13	1	42	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	83	0	0	43	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

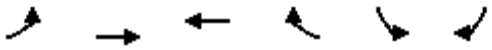
Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	47	9	1	28	0	5
Future Vol, veh/h	47	9	1	28	0	5
Conflicting Peds, #/hr	0	0	0	0	2	0
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	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	70	13	1	42	0	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	83	0	123	77
Stage 1	-	-	-	-	77	-
Stage 2	-	-	-	-	46	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1514	-	872	984
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	976	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1514	-	869	984
Mov Cap-2 Maneuver	-	-	-	-	869	-
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	973	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	984	-	-	1514	-
HCM Lane V/C Ratio	0.008	-	-	0.001	-
HCM Control Delay (s)	8.7	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	13	14	14	43	0
Future Volume (vph)	0	13	14	14	43	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.932			
Flt Protected					0.950	
Satd. Flow (prot)	0	1842	1717	0	1750	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1842	1717	0	1750	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		116.0	47.4		104.8	
Travel Time (s)		8.4	3.4		7.5	
Confl. Peds. (#/hr)	5			5	5	5
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	0	19	21	21	64	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	19	42	0	64	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		

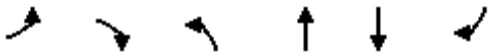
Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	13	14	14	43	0
Future Vol, veh/h	0	13	14	14	43	0
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	-	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	19	21	21	64	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	47	0	-	0	61	42
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	24	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1560	-	-	-	945	1029
Stage 1	-	-	-	-	985	-
Stage 2	-	-	-	-	999	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1553	-	-	-	936	1019
Mov Cap-2 Maneuver	-	-	-	-	936	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	994	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1553	-	-	-	936
HCM Lane V/C Ratio	-	-	-	-	0.069
HCM Control Delay (s)	0	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	19	27	52	98	104	7
Future Volume (vph)	19	27	52	98	104	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.921				0.991	
Flt Protected	0.980			0.983		
Satd. Flow (prot)	1281	0	0	1742	1732	0
Flt Permitted	0.980			0.983		
Satd. Flow (perm)	1281	0	0	1742	1732	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	226.5			393.6	747.4	
Travel Time (s)	16.3			23.6	44.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	60%	13%	8%	5%	8%	0%
Adj. Flow (vph)	21	30	57	108	114	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	0	165	122	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	27	52	98	104	7
Future Vol, veh/h	19	27	52	98	104	7
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	60	13	8	5	8	0
Mvmt Flow	21	30	57	108	114	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	340	118	122	0	-	0
Stage 1	118	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	7	6.33	4.18	-	-	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	4.04	3.417	2.272	-	-	-
Pot Cap-1 Maneuver	553	905	1429	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	530	905	1429	-	-	-
Mov Cap-2 Maneuver	530	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	695	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	2.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1429	-	700	-	-
HCM Lane V/C Ratio	0.04	-	0.072	-	-
HCM Control Delay (s)	7.6	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	35	10	5	53	22	11
Future Volume (vph)	35	10	5	53	22	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.969				0.955	
Flt Protected				0.996	0.968	
Satd. Flow (prot)	1785	0	0	1766	1703	0
Flt Permitted				0.996	0.968	
Satd. Flow (perm)	1785	0	0	1766	1703	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	42.5			226.5	392.5	
Travel Time (s)	3.1			16.3	28.3	
Confl. Peds. (#/hr)		2	2		1	1
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	2%	2%	50%	2%	2%	2%
Adj. Flow (vph)	44	13	6	67	28	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	0	0	73	42	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

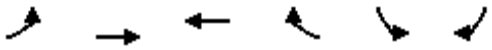
Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	35	10	5	53	22	11
Future Vol, veh/h	35	10	5	53	22	11
Conflicting Peds, #/hr	0	2	2	0	1	1
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	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	50	2	2	2
Mvmt Flow	44	13	6	67	28	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	59	0	133	54
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	80	-
Critical Hdwy	-	-	4.6	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.65	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1287	-	861	1013
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	943	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1285	-	854	1010
Mov Cap-2 Maneuver	-	-	-	-	854	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	937	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	900	-	-	1285	-
HCM Lane V/C Ratio	0.046	-	-	0.005	-
HCM Control Delay (s)	9.2	-	-	7.8	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	14	26	51	31	0
Future Volume (vph)	0	14	26	51	31	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.910			
Flt Protected					0.950	
Satd. Flow (prot)	0	1842	1676	0	1750	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1842	1676	0	1750	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		120.9	42.5		114.6	
Travel Time (s)		8.7	3.1		8.3	
Confl. Peds. (#/hr)	5			5	5	5
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	0	18	33	65	39	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	18	98	0	39	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	14	26	51	31	0
Future Vol, veh/h	0	14	26	51	31	0
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	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	18	33	65	39	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	103	0	-	0	94	76
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	23	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1489	-	-	-	906	985
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	1000	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1482	-	-	-	897	976
Mov Cap-2 Maneuver	-	-	-	-	897	-
Stage 1	-	-	-	-	947	-
Stage 2	-	-	-	-	995	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1482	-	-	-	897
HCM Lane V/C Ratio	-	-	-	-	0.044
HCM Control Delay (s)	0	-	-	-	9.2
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1