Borden Avenue, Belmont

Transportation Impact Study

Paradigm Transportation Solutions Limited

February 2025
240755

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Project Summary

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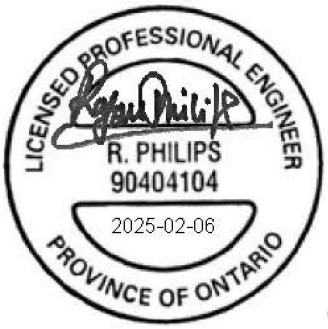
Borden Avenue, Belmont Transportation Impact Study



Rajan Philips, M.Sc. (PI), P.Eng.

Disclaimer

Executive Summary

Content

Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed industrial development located on Borden Avenue in Belmont, Municipality of Central Elgin, Elgin County.

This TIS includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for a five-year horizon from development completion (2032), and assessment of traffic impacts with recommendations to accommodate the proposed development as appropriate.

Development Concept

The subject site is located on the south side of Borden Avenue west of Louise Street. The proposed development includes a 2,571 m^2 building with office and warehouse space for a utility construction company. The company provides directional drilling, underground infrastructure, aerial fiber, data cable placement and splicing/connections throughout southwestern Ontario. The company employs up to 60 employees including office and warehouse employees, mechanics and crews.

Vehicular access is proposed via two driveway connections to Borden Avenue.

The development is anticipated to be completed by 2027.

Study Scope

The scope of the TIS for the proposed development includes:

- **Study Area intersections:**
  - Borden Avenue and Belmont Road (unsignalized); and
  - Two driveway connections to Borden Avenue.
- **Analysis Periods:** Weekday AM and PM peak hours.
- **Traffic Conditions:** Existing (2025) and five-year horizon from development completion (2032).
- **Other Area Developments:** The following developments have been included in the background traffic forecasts:
  - Belmont Elementary School (507 students);

- Craigholme Estates Residential Subdivision (191 units);
- PowerCo Plant (battery plant); and
- St. Thomas Industrial Subdivision (eight industrial park subdivisions – 50% development by 2033 and full development by 2043).

Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is operating with acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 32 and 29 trips during the AM and PM peak hours, respectively.
- **Background Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is forecast to operate with acceptable levels of service, except for the eastbound approach which is forecast to operate with LOS F during the AM and PM peak hours. The moderate v/c ratio indicates that the delay is likely due to the high volume of through traffic on Belmont Road which limits the number of available gaps for side street (Borden Avenue) traffic.
- **Total Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is forecast to operate with similar levels of service as under background traffic conditions. The site driveway intersections on Borden Avenue are forecast to operate with LOS A during the AM and PM peak hours.
- **Site Access:**
  - A clear line of sight is available in either direction along Borden Avenue.
  - Westbound left-turn lanes are not warranted on Borden Avenue at the proposed site driveways under total traffic conditions.
- **Belmont Road and Borden Avenue:** Traffic control signals and all-way stop control are not warranted under background or total traffic conditions. Given the increase in traffic, primarily through background growth and other approved developments in the area, the County should monitor operations at the intersection in the future as the area builds out.

Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval as proposed.

Contents

Appendices

Figures

Tables

1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed industrial development located on Borden Avenue in Belmont, Municipality of Central Elgin, Elgin County. **Figure 1.1** illustrates the subject development location.

The subject site is located on the south side of Borden Avenue west of Louise Street. The proposed development includes a 2,571 m^2 building with office and warehouse space for a utility construction company. The company provides directional drilling, underground infrastructure, aerial fiber, data cable placement and splicing/connections throughout southwestern Ontario. The company employs up to 60 employees including office and warehouse employees, mechanics and crews.

Vehicular access is proposed via two driveway connections to Borden Avenue.

The development is anticipated to be completed by 2027.

1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study, developed in consultation with Municipality of Central Elgin and Elgin County staff via e-mail in January 2025, includes:

- Assessment of the current traffic and site conditions within the study area;
- Estimates of background traffic growth for a five-year horizon from development completion (2032);
- Estimates of additional traffic generated by the subject site;
- Analyses of the impact of future traffic on the surrounding road network, including the following study area intersections:
  - Borden Avenue and Belmont Road (unsignalized); and
  - Two driveway connections to Borden Avenue.
- Recommendations necessary to mitigate the site generated traffic in a satisfactory manner.

Appendix A contains the pre-study consultation material and responses from the Municipality of Central Elgin and Elgin County.

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Location of Subject Site

Borden Avenue, Belmont TIS
240755

Figure 1.1

2 Existing Conditions

2.1 Existing Roadways

The main roadways near the subject site considered in assessing the traffic impacts of the development include:

- **Borden Avenue** is an east-west county road[1] with a two-lane cross section and a posted speed limit of 50 km/h. Sidewalks are provided on the north side of the roadway between Belmont Road and 110 metres west of Louise Street.
- **Belmont Road** is a north-south county road with a two-lane cross section and a posted speed limit of 50 km/h. Sidewalks are provided on both sides of the roadway north of Borden Avenue.

The intersection of Belmont Road and Borden Avenue is unsignalized and operates with stop control on the Borden Avenue approach.

[1] Municipality of Central Elgin, *Official Plan Schedule B1 Roads Classification and Widening*, 2022.

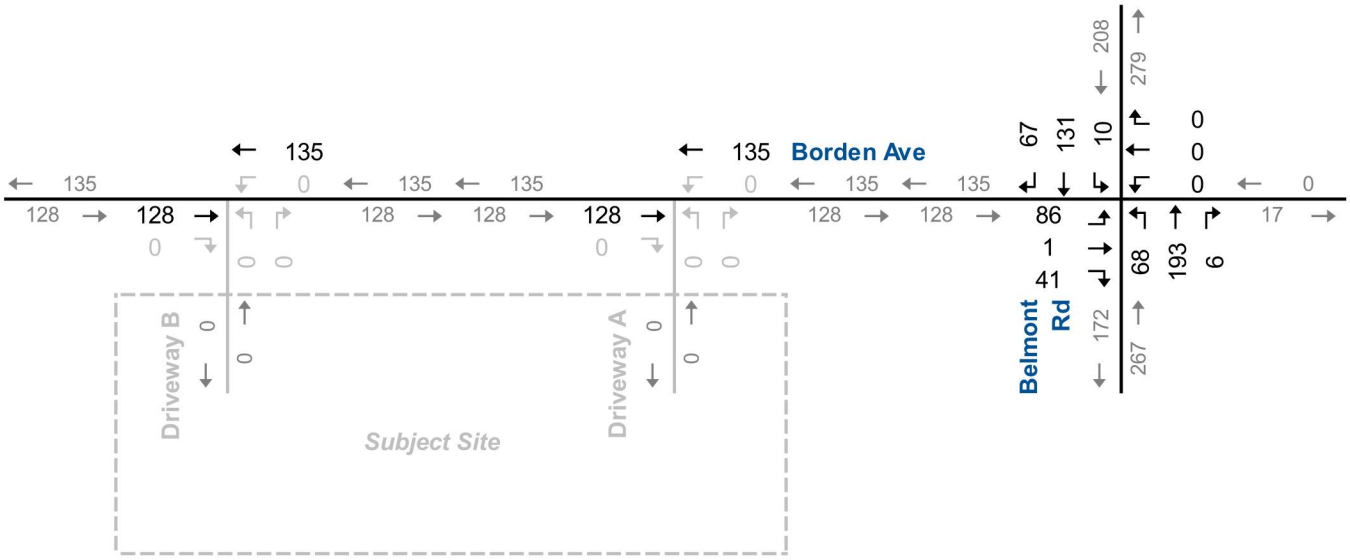
2.2 Traffic Volumes

Turning movement counts were collected by Paradigm on 16 January 2025.

Figure 2.1 illustrates the existing AM (7:15 to 8:15 AM) and PM (4:15 to 5:15 PM) weekday peak hour traffic volumes.

Appendix B contains the detailed traffic counts for the intersection of Borden Avenue and Belmont Road.

AM Peak Hour



PM Peak Hour

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Existing Traffic Volumes

2.3 Traffic Operations

The operations at the study area intersections have been assessed using Synchro 12. The County and Municipality do not have TIS guidelines; therefore, movements at unsignalized intersections are considered critical with level of service (LOS) E or worse.

Intersection LOS is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal to or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented, if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

Table 2.1 summarizes the results of the intersection operational analysis under existing conditions, including the AM and PM peak hour LOS, v/c ratios, and 95th percentile queues.

The results indicate that the intersection of Belmont Road and Borden Avenue is operating with acceptable levels of service, and with no problem movements.

Appendix C contains the detailed Synchro 12 reports.

TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach															
				Eastbound				Westbound				Northbound				Southbound			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach
AM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**
			Delay	<	15	>	**15**	<	0	>	**0**	<	8	>	**2**	<	8	>	**0**
			V/C	<	0.28	>		<	0.00	>		<	0.06	>		<	0.01	>	
			Q	<	9	>		<	0	>		<	2	>		<	0	>	
PM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**
			Delay	<	18	>	**18**	<	13	>	**13**	<	8	>	**1**	<	8	>	**0**
			V/C	<	0.35	>		<	0.03	>		<	0.03	>		<	0.00	>	
			Q	<	12	>		<	1	>		<	1	>		<	0	>	

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared with through movement

3 Development Concept

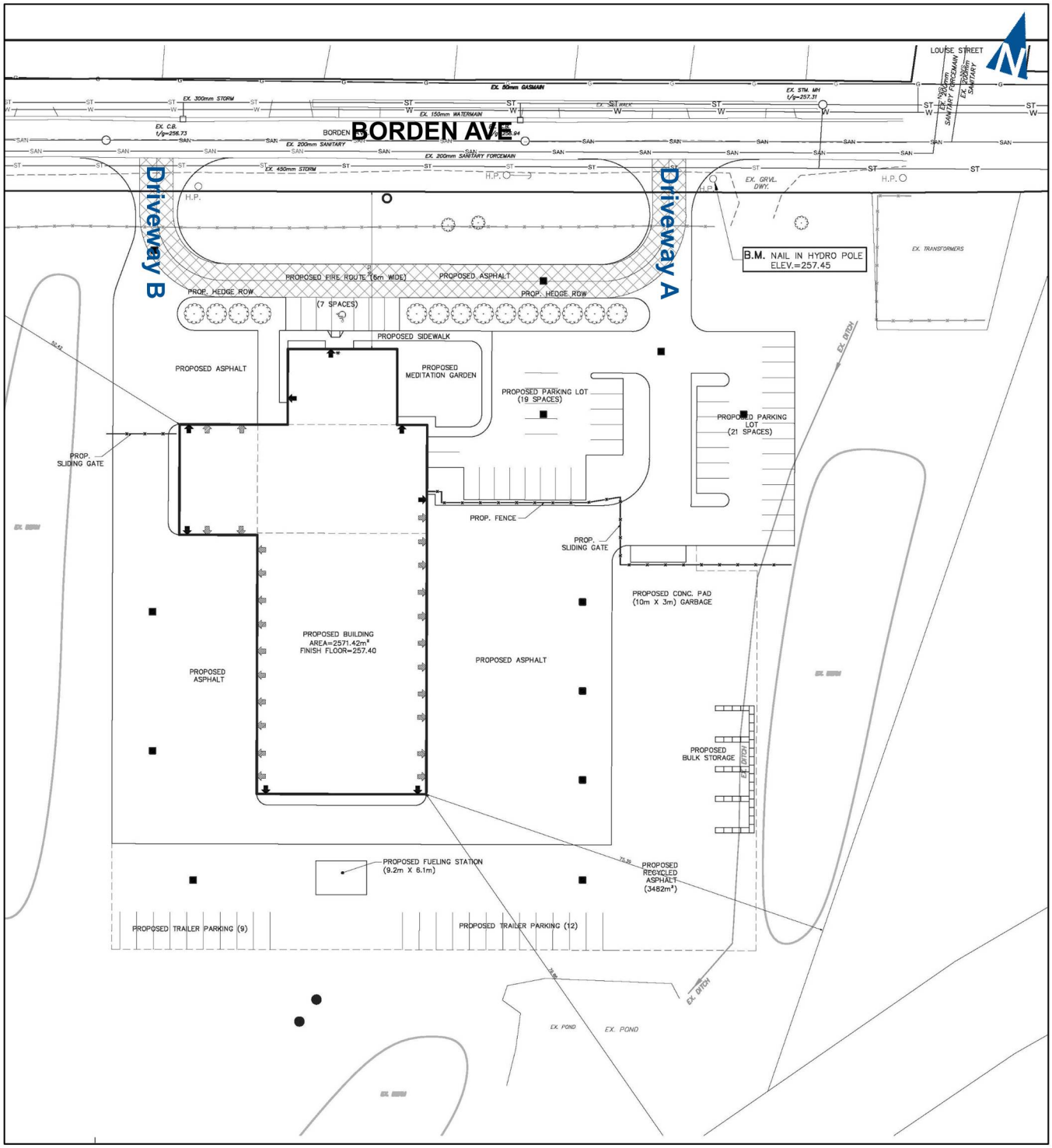
3.1 Development Description

The subject site is located on the south side of Borden Avenue west of Louise Street. The proposed development includes a 2,571 m^2 building with office and warehouse space for a utility construction company. The company provides directional drilling, underground infrastructure, aerial fiber, data cable placement and splicing/connections throughout southwestern Ontario. The company employs up to 60 employees including office and warehouse employees, mechanics and crews.

Vehicular access is proposed via two driveway connections to Borden Avenue.

The development is anticipated to be completed by 2027.

Figure 3.1 shows the development concept.



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Concept Plan

Borden Avenue, Belmont TIS
240755

Figure 3.1

3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual[2] rates for Land Use Code (LUC) 110 General Light Industrial have been used to estimate the peak hour traffic volumes generated by the subject development.

Table 3.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 3.1: TRIP GENERATION

Land Use	Number of Employees	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 110 - General Light Industrial	60	0.53	26	6	**32**	0.49	6	23	**29**
Total Trip Generation			**26**	**6**	**32**		**6**	**23**	**29**

3.3 Development Trip Distribution and Assignment

The trip distribution was determined based on existing travel patterns within the study area. **Table 3.2** displays the breakdown of trip distributions used in this study.

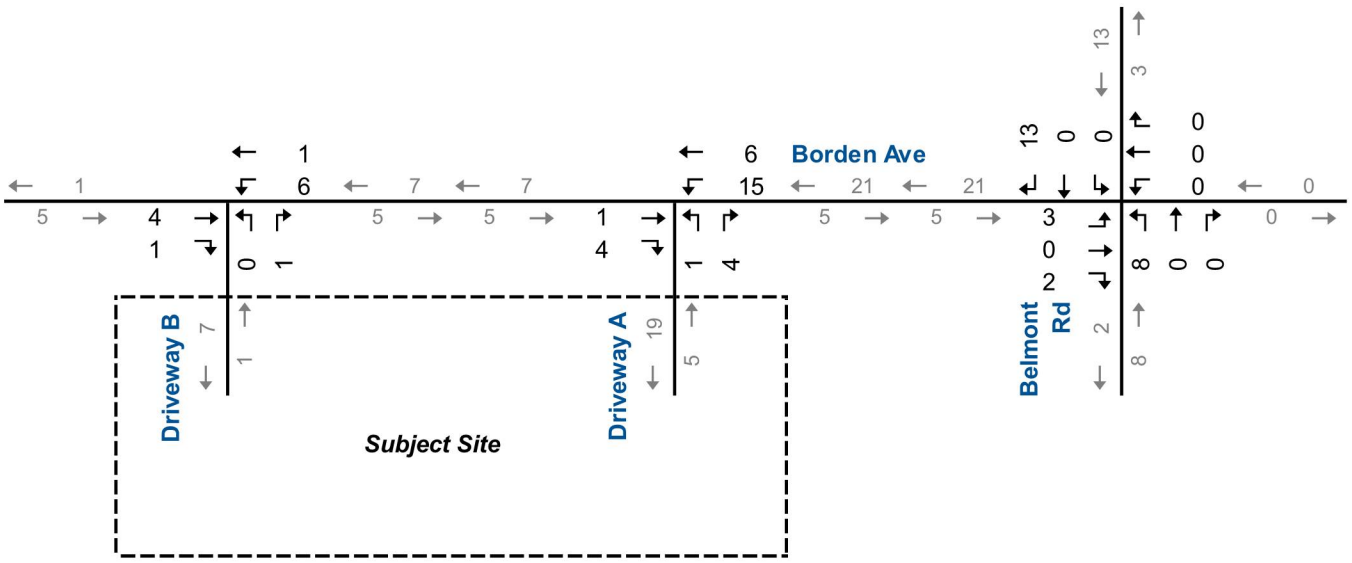
TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	Percentage
North via Belmont Rd	50%
South via Belmont Rd	30%
West via Borden Ave	20%
Total	**100%**

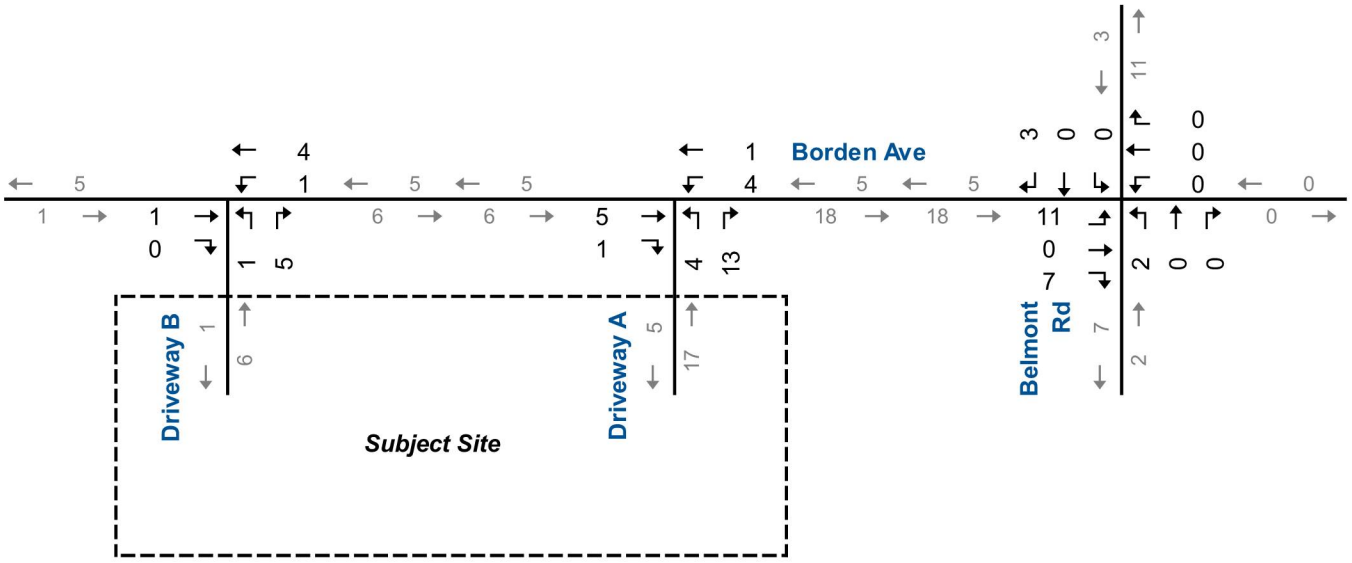
Figure 3.2 illustrates the site-generated traffic volumes for the AM and PM peak hours.

[2] Institute of Transportation Engineers, *Trip Generation Manual,* 11th ed., (Washington, DC: ITE, 2021).

AM Peak Hour



PM Peak Hour



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Site Generated Traffic Volumes

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions in this section includes estimates of future background and total traffic volumes, and the analyses for the 2032 horizon.

4.1 Background Traffic Forecasts

4.1.1 General Growth

To derive the 2032 generalized background traffic volumes, a growth rate of 2% was applied to the existing roadway traffic volumes. This growth rate was confirmed with the County and Municipality during the pre-study consultation.

4.1.2 Other Area Developments

In addition to the above general traffic growth, the following future nearby developments been included in the background traffic forecasts:

- **Belmont Elementary School:** The development is located on the south side of Seventh Avenue, west of Snyders Avenue. The March 2024 TIS[3] completed for the development indicates that the school is proposed to accommodate 507 students and is forecast to generate 380 AM peak hour trips and 81 PM peak hour trips. The TIS indicates that the catchment area includes Belmont and the new school will replace South Dorchester Public School; therefore, 70% of new trips were assigned to/from the south on Belmont Road. Given the residential developments located between Seventh Avenue and Belmont Road, 25% of the southerly trips have been assigned to pass through the Borden Avenue intersection.
- **Craigholme Estates Residential Subdivision:** The residential subdivision is located south of the proposed elementary school, on the west side of Snyders Avenue. The July 2021 TIS[4] indicates that the subdivision is proposed to include 191 units and is forecast to generate 137 AM peak hour trips and 186 PM peak hour trips. Of the trips assigned south on Belmont Road, it has been assumed that approximately 50% would pass through the Borden Avenue intersection.

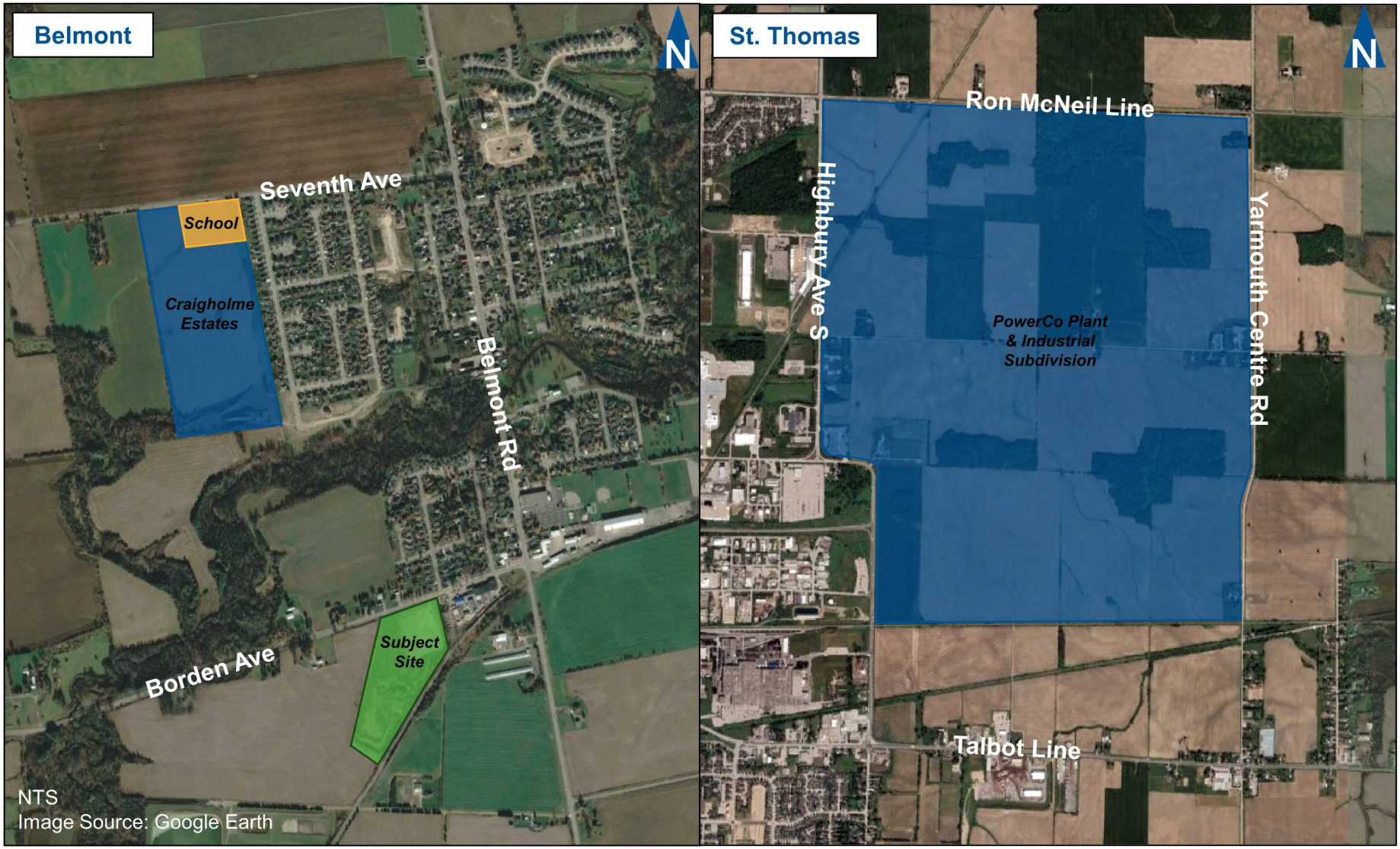
[3] R.J. Burnside & Associates Limited, *Belmont Elementary School TIS Addendum*, March 2024.
[4] R.J. Burnside & Associates Limited, *Craigholme Estates Development Transportation Study Belmont ON Craigholme Estates Ltd.,* July 2021.

- **PowerCo Plant**: The future PowerCo battery plant is located in St. Thomas at the northeast corner of Highbury Avenue South and South Edgeware Road. The November 2023 TIS[5] indicates that the development is forecast to generate 228 AM peak hour trips and 228 PM peak hour trips. The November 2023 TIS indicated a 5% truck and passenger car assignment to Belmont Road.
- **St. Thomas Industrial Subdivision:** Eight industrial park subdivisions are proposed surrounding the PowerCo plant. The November 2023 PowerCo TIS indicates that approximately 50% of the developments will be completed by 2033 and full development by 2043. Given the 2032 horizon year analyzed in this study, 50% of the development has been conservatively included in the background forecasts which is estimated to generate 1,764 AM peak hour trips and 1,764 PM peak hour trips. The November 2023 PowerCo TIS indicates a 15% trip assignment on Belmont Road.

Figure 4.1 illustrates the location of the other area developments.

Appendix D contains the other area development traffic volumes.

[5] Arcadis, *Transportation Impact Assessment – Industrial Development St. Thomas Ontario*, November 2023.



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Other Area Development Locations

4.2 Background Traffic

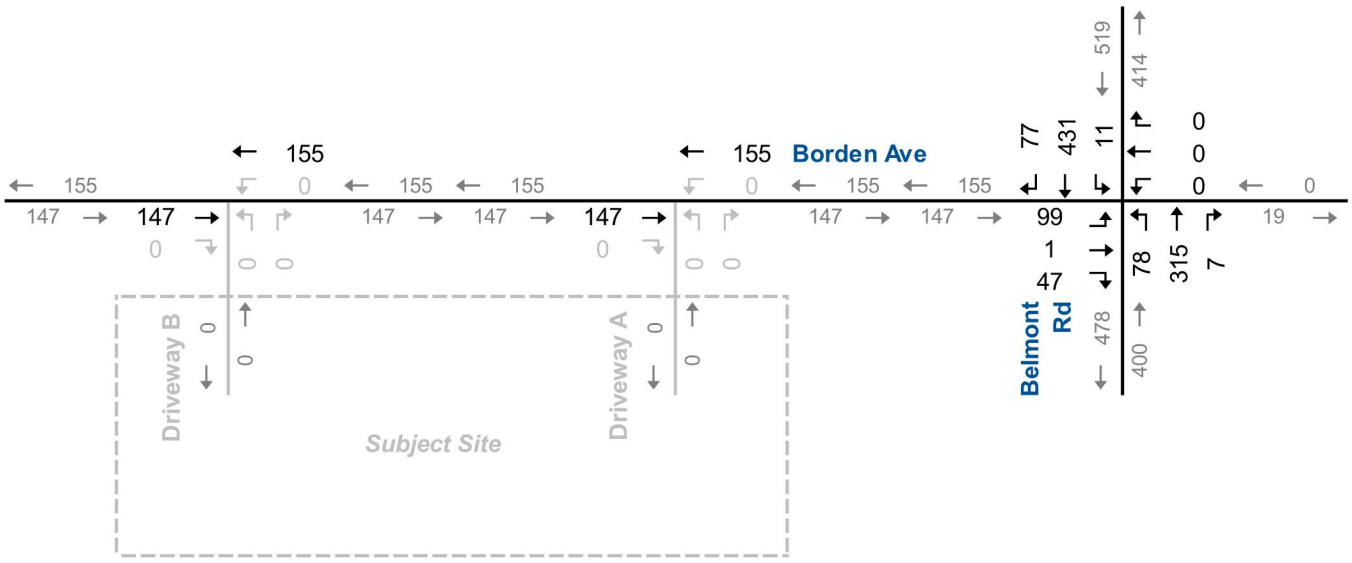
Figure 4.2 illustrates the 2032 background traffic volumes, including road traffic growth and other area development traffic.

The 2032 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

Table 4.1 summarizes the results of the 2032 background traffic operations. The results indicate that the intersection of Belmont Road and Borden Avenue is forecast to operate with acceptable levels of service, except for the eastbound approach which is forecast to operate with LOS F during AM and PM peak hours. The moderate v/c ratio indicates that the delay is likely due to the high volume of through traffic on Belmont Road which limits the number of available gaps for side street (Borden Avenue) traffic.

Appendix E contains the supporting detailed Synchro 12 reports.

AM Peak Hour



PM Peak Hour

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Background Traffic Volumes

Borden Avenue, Belmont TIS
240755

Figure 4.2

TABLE 4.1: BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach															
				Eastbound				Westbound				Northbound				Southbound			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach
AM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	F	>	F	<	A	>	A	<	A	>	A	<	A	>	A
			Delay	<	50	>	50	<	0	>	0	<	9	>	2	<	8	>	0
			V/C	<	0.69	>		<	0.00	>		<	0.08	>		<	0.01	>	
			Q	<	34	>		<	0	>		<	2	>		<	0	>	
PM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	F	>	F	<	C	>	C	<	A	>	A	<	A	>	A
			Delay	<	54	>	54	<	22	>	22	<	9	>	1	<	8	>	0
			V/C	<	0.75	>		<	0.06	>		<	0.04	>		<	0.00	>	
			Q	<	40	>		<	2	>		<	1	>		<	0	>	

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared with through movement

4.3 Total Traffic

Figure 4.3 illustrates the 2032 total traffic volumes, including trips generated by the proposed development.

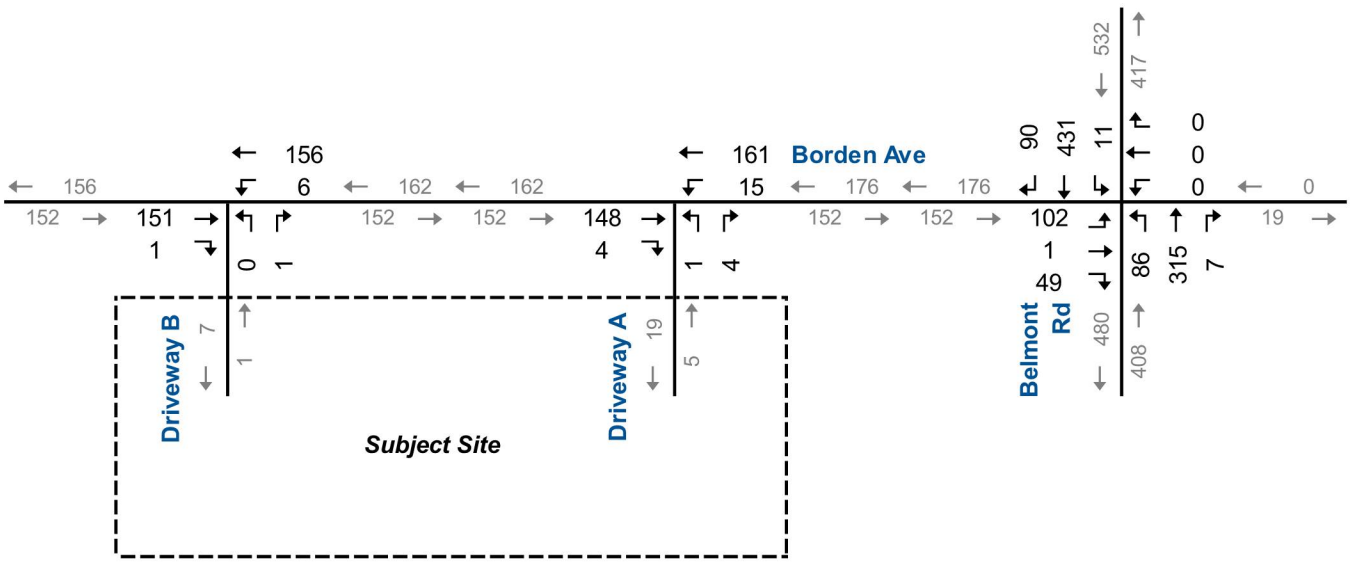
The 2032 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

Table 4.2 summarizes the results of the 2032 total traffic operations. The results indicate that the study area intersections are forecast to operate with similar levels of service as under background traffic conditions.

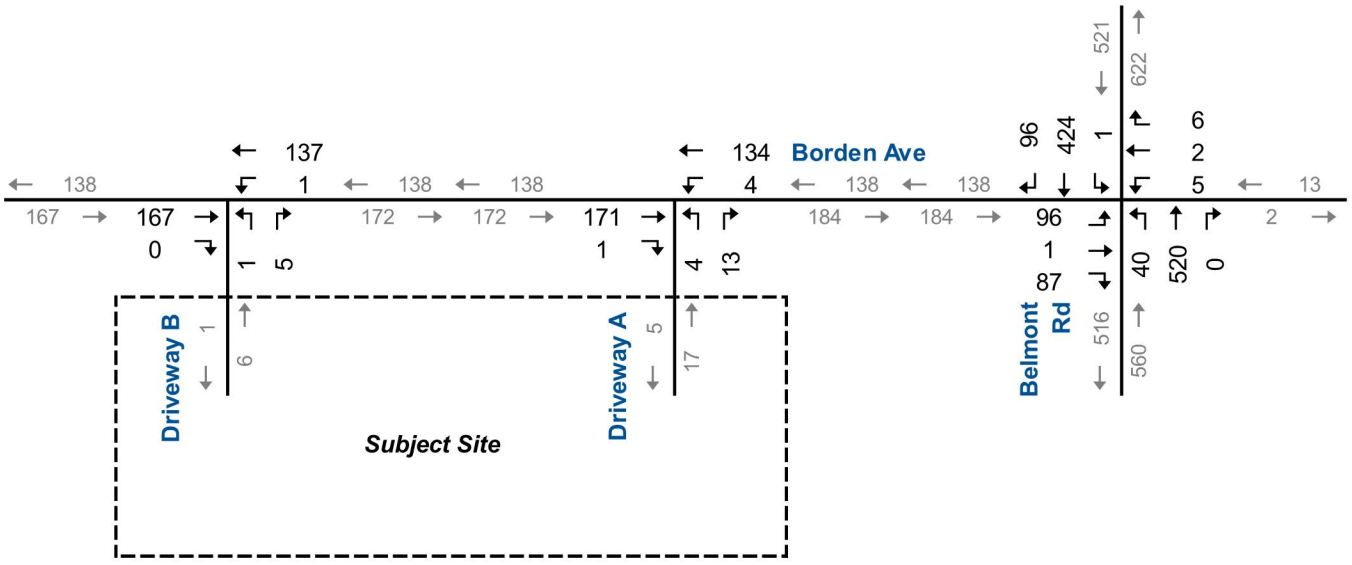
The site driveway intersections on Borden Avenue are forecast to operate with LOS A during the AM and PM peak hours.

Appendix F contains the supporting detailed Synchro 12 reports.

AM Peak Hour



PM Peak Hour



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Total Traffic Volumes

Borden Avenue, Belmont TIS
240755

Figure 4.3

TABLE 4.2: TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach															
				Eastbound				Westbound				Northbound				Southbound			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach
AM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	F	>	F	<	A	>	A	<	A	>	A	<	A	>	A
			Delay	<	58	>	58	<	0	>	0	<	9	>	2	<	8	>	0
			V/C	<	0.75	>		<	0.00	>		<	0.09	>		<	0.01	>	
			Q	<	39	>		<	0	>		<	2	>		<	0	>	
	Driveway A & Borden Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A				
			Delay		0	>	0	<	8		1	10		>	9				
			V/C		0.00	>		<	0.01			0.01		>					
			Q		0	>		<	0			0		>					
	Driveway B & Borden Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A				
			Delay		0	>	0	<	8		0	9		>	9				
			V/C		0.00	>		<	0.01			0.00		>					
			Q		0	>		<	0			0		>					
PM Peak Hour	Belmont Road & Borden Avenue	TWSC	LOS	<	F	>	F	<	C	>	C	<	A	>	A	<	A	>	A
			Delay	<	70	>	70	<	22	>	22	<	9	>	1	<	8	>	0
			V/C	<	0.85	>		<	0.06	>		<	0.04	>		<	0.00	>	
			Q	<	50	>		<	2	>		<	1	>		<	0	>	
	Driveway A & Borden Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A				
			Delay		0	>	0	<	8		0	10		>	10				
			V/C		0.00	>		<	0.00			0.02		>					
			Q		0	>		<	0			1		>					
	Driveway B & Borden Avenue	TWSC	LOS		A	>	A	<	A		A	A		>	A				
			Delay		0	>	0	<	8		0	9		>	9				
			V/C		0.00	>		<	0.00			0.01		>					
			Q		0	>		<	0			0		>					

MOE - Measure of Effectiveness
LOS - Level of Service
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Q - 95th Percentile Queue Length (m)
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< / > - Shared with through movement

4.4 Site Access

4.4.1 Left-Turn Lanes

The *Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads*[6] provides guidance on the assessment and/or need for auxiliary left-turn lanes.

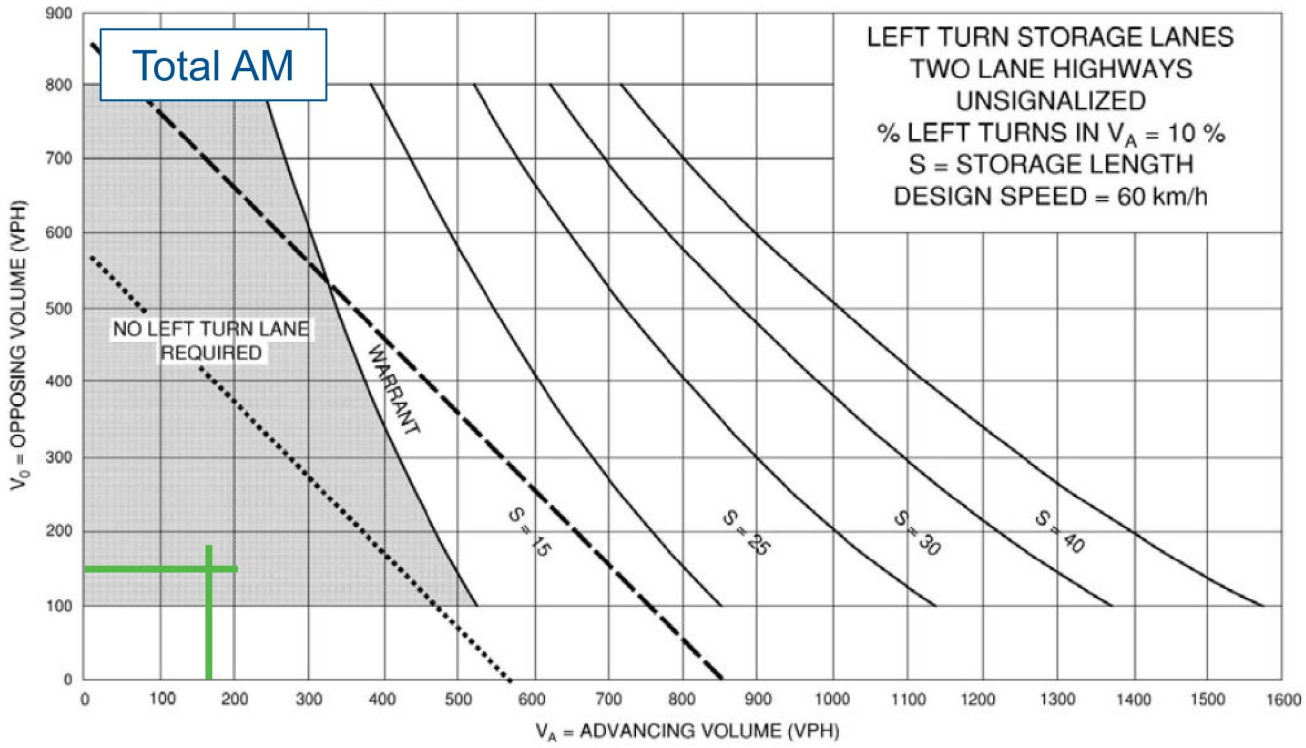
Warrants have been calculated for westbound left-turns on Borden Avenue at the proposed driveways. The warrant was calculated using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 60 km/h (10 km/h over the posted speed limit). Based on this criterion, westbound left-turn lanes are not warranted under total traffic conditions.

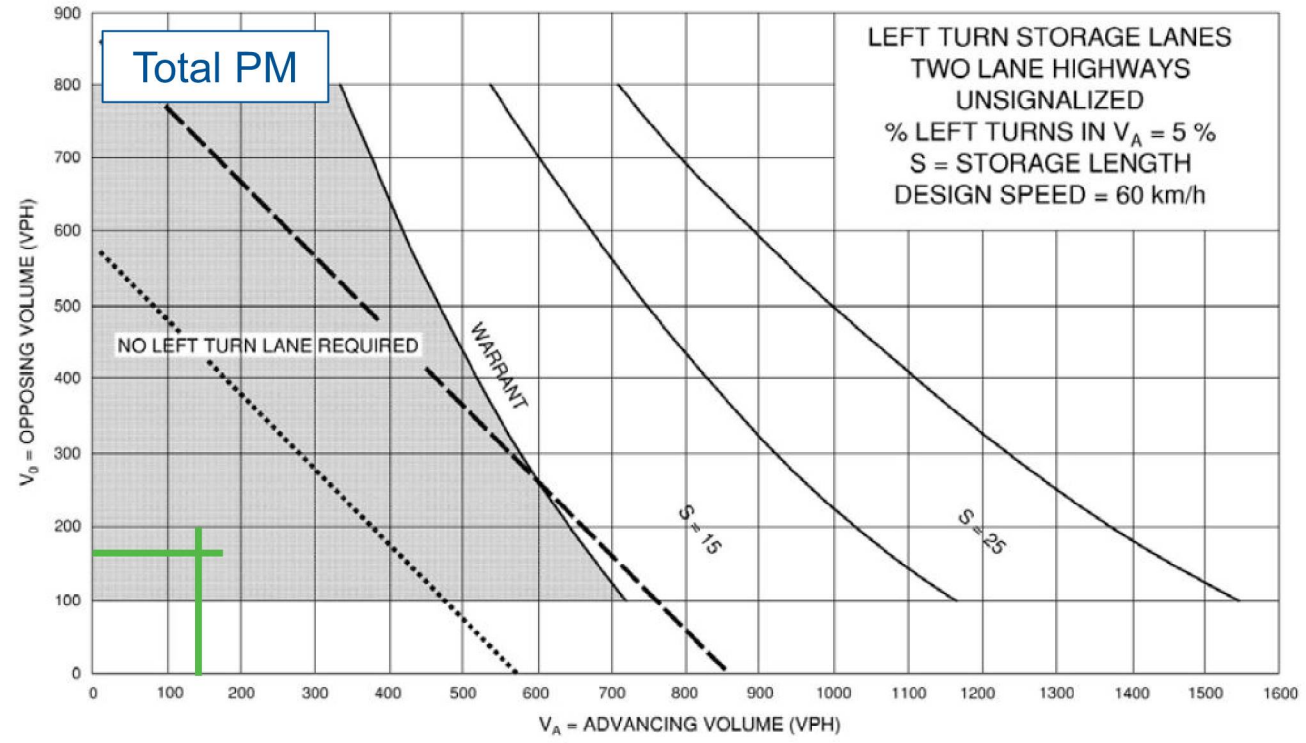
Figure 4.4 shows the warrant nomographs for Driveway A and **Figure 4.5** shows the warrants for Driveway B.

4.4.2 Sight Distance

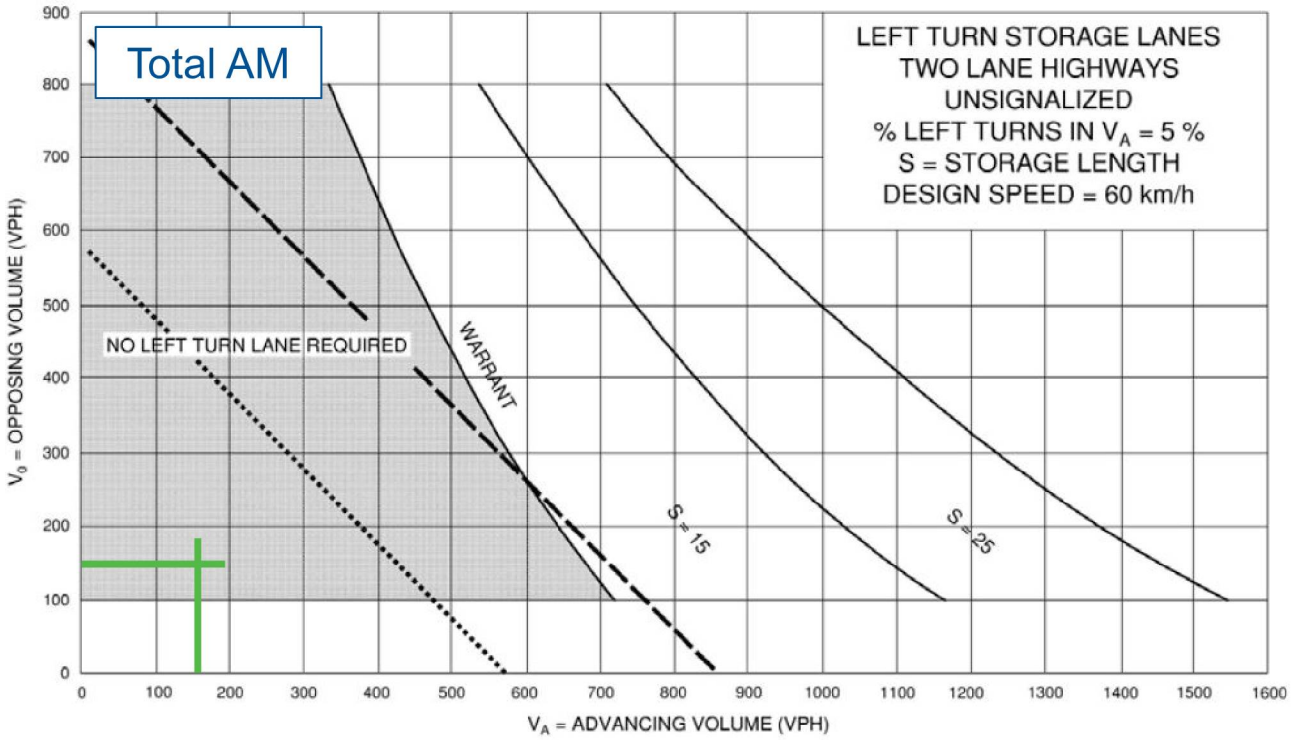
A clear line of sight is available in either direction along Borden Avenue at both driveway locations.

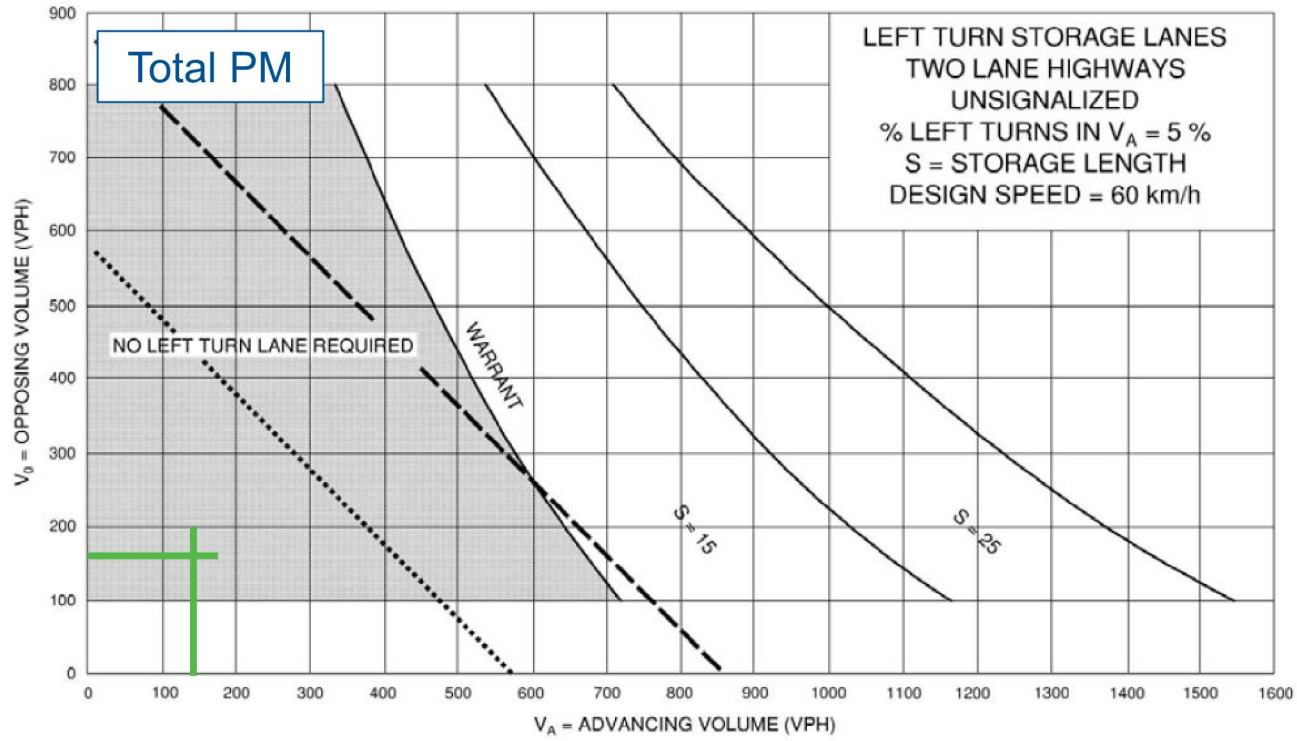
[6] Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020).





Westbound Left-Turn Lane Warrants
Borden Avenue & Driveway A





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Westbound Left-Turn Lane Warrants
Borden Avenue & Driveway B

5 Belmont Road and Borden Avenue

The eastbound approach at the intersection of Belmont Road and Borden Avenue is forecast to operate poor levels of service starting under background traffic conditions.

5.1 Signal Warrants

The intersection of Belmont Road and Borden Avenue has been assessed using the *Ontario Traffic Manual (OTM) Book 12 – Traffic Signals*[7] traffic signal justification for projected traffic volumes (Justification 7) to determine if a change in traffic control is warranted.

Based on the warrant analysis, traffic control signals are not warranted under background or total traffic conditions.

Appendix G contains the warrant analysis worksheets.

5.2 All-Way Stop Control Warrants

OTM Book 5 – Regulatory Signs[8] provides guidance on the use of regulatory traffic control signs and pavement markings, including warrants to determine where all-way stop control could be considered. All-way stop control warrants were assessed for the intersection of Belmont Road and Borden Avenue. Eight hours of data is not available for the background and total traffic forecasts; therefore, the warrant analysis was completed based on the AM and PM peak hour volumes. As per *OTM Book 5*, all-way stop control may be considered on collector roads and rural arterial roads where the following conditions are met:

- The total vehicle volume on all intersection approaches exceeds 375 vehicles per hour for each of the highest eight hours of the day;
- The combined vehicle and pedestrian volume on the minor street exceeds 150 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume; OR the combined vehicle and pedestrian volume on the minor street exceeds 120 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume, with an average delay to all minor street traffic (vehicles

[7] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2012).
[8] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 5: Regulatory Signs*, (Toronto: Queen's Printer for Ontario, 2021).

and pedestrians) of greater than 30 seconds for the entire eight hour period; and,

- The volume split does not exceed 70/30 (that is the minor street must not be less than 30% of the total volume entering the intersection) as measured over the entire eight-hour count period. Volume on the major street is defined as vehicles only. Volume on the minor street includes all vehicles plus any pedestrians wishing to cross the major roadway. For three-legged intersections a volume split of 75/25 is permissible.

The background and total traffic volumes meet the total approach volume threshold; however, the minor traffic volumes on Borden Avenue do not meet the minimum threshold during the AM peak hour under background traffic conditions and are less than 30% during both peak hours under both background and total traffic conditions. Therefore, all-way stop control would not be appropriate at Belmont Road and Borden Avenue.

6 Conclusions and Recommendations

6.1 Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is operating with acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 32 and 29 trips during the AM and PM peak hours, respectively.
- **Background Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is forecast to operate with acceptable levels of service, except for the eastbound approach which is forecast to operate with LOS F during the AM and PM peak hours. The moderate v/c ratio indicates that the delay is likely due to the high volume of through traffic on Belmont Road which limits the number of available gaps for side street (Borden Avenue) traffic.
- **Total Traffic Conditions:** The intersection of Belmont Road and Borden Avenue is forecast to operate with similar levels of service as under background traffic conditions. The site driveway intersections on Borden Avenue are forecast to operate with LOS A during the AM and PM peak hours.
- **Site Access:**
  - A clear line of sight is available in either direction along Borden Avenue.
  - Westbound left-turn lanes are not warranted on Borden Avenue at the proposed site driveways under total traffic conditions.
- **Belmont Road and Borden Avenue:** Traffic control signals and all-way stop control are not warranted under background or total traffic conditions. Given the increase in traffic, primarily through background growth and other approved developments in the area, the County should monitor operations at the intersection in the future as the area builds out.

6.2 Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval as proposed.

Appendix A

Pre-Study Consultation

Maddison Murch

From: Andrew Parker <aparker@ELGIN.ca>
Sent: January 14, 2025 10:01 AM
To: Alex Piggott; Maddison Murch
Cc: Geoff Brooks; Peter Dutchak; Rajan Philips; john; 'tao@lorron.com'
Subject: RE: (240755) Borden Ave, Belmont TIS Pre-Study Consultation
Attachments: 057925_REP_Belmont School Transportation Study Addendum_240305 (1).pdf

Maddison,

Please find attached Burnside TIS for Seventh Ave. and Belmont Road.

Andrew Parker, P. Eng.
Manager of Roads and Asset Management

519-631-1460 ext. 117 (Main Office)
226-374-5997 (Cell)
www.elgincounty.ca
450 Sunset Drive, St. Thomas, ON N5R 5V1

From: Alex Piggott <APiggott@centralelgin.org>
Sent: January 13, 2025 11:16 AM
To: 'mmurch@ptsl.com' <mmurch@ptsl.com>
Cc: Geoff Brooks <gbrooks@centralelgin.org>; Peter Dutchak <pdutchak@elgin.ca>; Rajan Philips <rphilips@ptsl.com>; Andrew Parker <aparker@ELGIN.ca>; john <john@spriet.ca>; 'tao@lorron.com' <tao@lorron.com>
Subject: FW: (240755) Borden Ave, Belmont TIS Pre-Study Consultation

Hi Maddison:

We looked in our file for a Traffic Impact Study for the most recent development on Borden Ave and did not see one. The County may have a copy of the TIS as Borden Ave and Belmont Road are both County Roads.

We are planning to replace a section of watermain on Borden Ave and have it forecasted for replacement in 2030. I am not sure if there would be any road works or improvements as part of this watermain replacement project as this is a County Road.

We are not aware of any other active site plan applications in this area.

Alex Piggott, C.E.T. CRS-S
Manager of Development and Compliance

From: Maddison Murch <mmurch@ptsl.com>
Sent: Friday, January 10, 2025 10:34 AM

To: Geoff Brooks <GBrooks@centralelgin.org>; pdutchak <pdutchak@elgin.ca>
Cc: Rajan Philips <rphilips@ptsl.com>; aparker@elgin.ca; John Spriet <john@spriet.ca>; Tao Langford <tao@lorron.com>
Subject: (240755) Borden Ave, Belmont TIS Pre-Study Consultation

Hi Peter and Geoff,

We have been retained to prepare a Transportation Impact Study (TIS) for the proposed industrial development on Borden Avenue in Belmont. The proposed development includes a 2,571 m^2 GFA office/warehouse building for a utility construction company. Access is proposed via two connections to Borden Avenue. A preliminary plan is attached.

Based on the above information and requirements, we are proposing the following TIS scope of work, for your review and approval:

- Weekday AM and PM peak hour analysis of adjacent roadways.
- Study Area Intersections:
    - Belmont Road and Borden Avenue; and
    - Two access connections to Borden Avenue.

  Counts will be collected in the coming weeks.
- Horizon Year: existing conditions (2025) and five years after development completion (2032).
- Background Growth Rate: 2.0% per annum. **Please confirm.**
- Background Developments: **Please confirm any other area developments and provide the TIS report or site statistics.**
- Future Road Improvements: **Please confirm.**
- Trip Generation: ITE Trip Generation Manual 11th Edition.
- Trip Distribution: Existing traffic patterns.
- Access Review: Sightlines at both access connections on Borden Ave.

Please let us know if you have any comments or questions.

Regards,

Maddison Murch, P.Eng.
Transportation Engineer

paradigm TRANSPORTATION SOLUTIONS LIMITED

Great Place To Work. Certified NOV 2023 - NOV 2024 CANADA

5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x205
m: 226.268.3697
e: mmurch@ptsl.com
w: www.ptsl.com

Paradigm is operating on a 4-day workweek. Our offices are closed Fridays.

Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

Maddison Murch

From: Andrew Parker <aparker@ELGIN.ca>
Sent: January 10, 2025 11:44 AM
To: Maddison Murch; Geoff Brooks; Peter Dutchak
Cc: Rajan Philips; john
Subject: RE: (240755) Borden Ave, Belmont TIS Pre-Study Consultation
Attachments: St Thomas Industrial Development Transportation Impact Assessment Nov 2023.pdf; # 74 North of #37.xlsx; #74 North of #52.xlsx

Good morning Maddison,

Background Growth Rate:

The County of Elgin is currently undertaking it's Transportation Master Plan which has the Phase 1 **Draft** Report prepared. Growth rate table is as such:

TRANSPORTATION MASTER PLAN
PHASE I UPDATE: NEEDS AND OPPORTUNITIES
Prepared for the Corporation of the County of Elgin

Exhibit 4.9: Projected Population Growth in Elgin County and Adjacent Municipalities

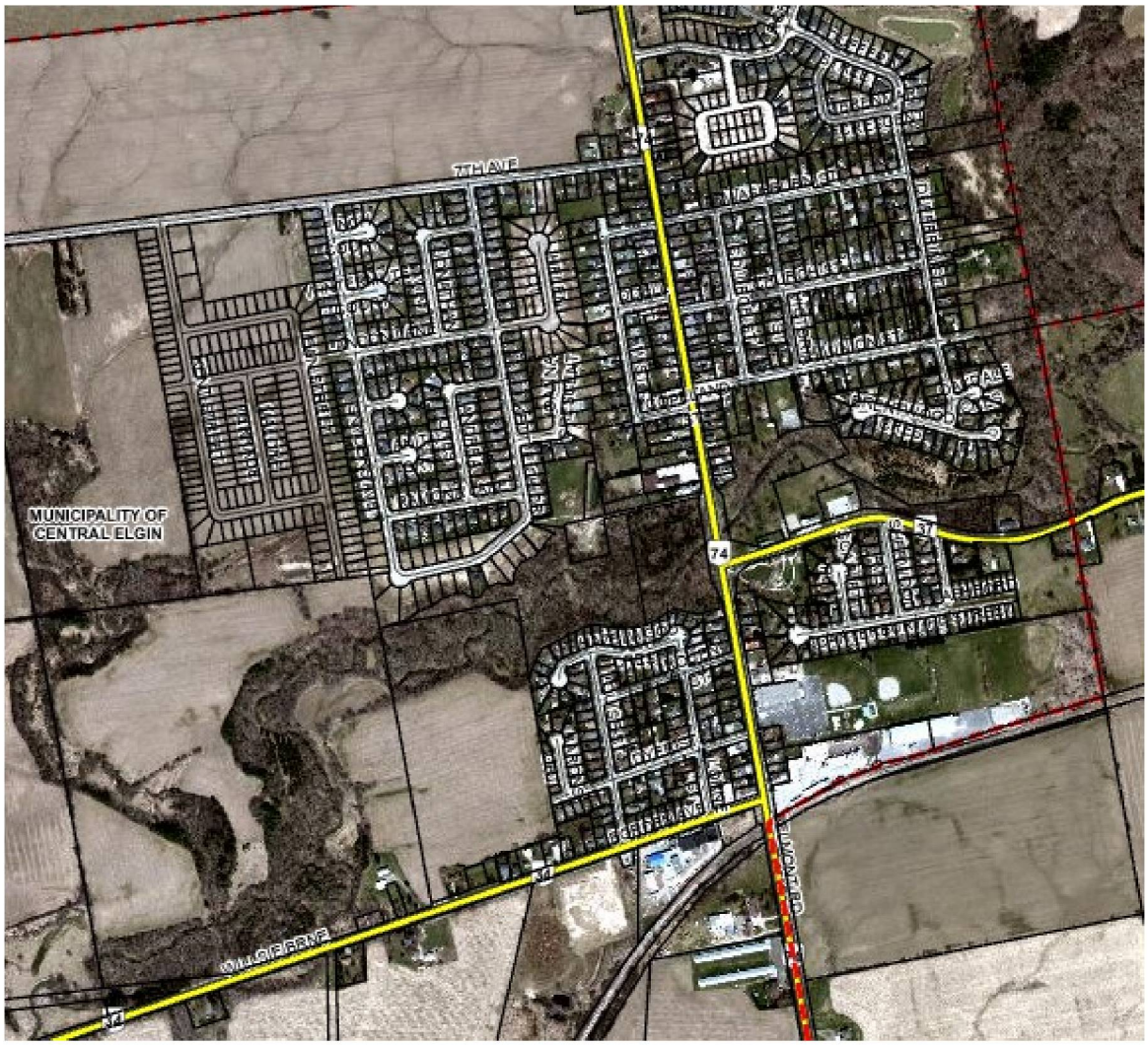
Geography / Census Division (CD)	2021 Census with Undercount	2024 Population	2034 Population	2044 Population	2054 Population
Municipality of West Elgin	5,170	5,212	5,342	5,476	5,596
Municipality of Dutton Dunwich	4,260	4,314	4,575	4,889	5,192
Township of Southwold	4,980	4,992	5,325	5,763	6,163
Municipality of Central Elgin	14,080	14,607	26,106	27,509	28,681
Township of Malahide	9,560	10,015	11,058	12,069	13,110
Town of Aylmer	7,910	8,212	8,989	10,009	11,098
Municipality of Bayham	7,290	7,344	7,711	8,203	8,720
Total Elgin County	**53,250**	**54,696**	**69,107**	**73,919**	**78,560**
City of St. Thomas	**44,000**	**46,705**	**62,943**	**73,708**	**82,001**
Elgin Census Division	**97,250**	**101,401**	**132,050**	**147, 627**	**160,561**
Chatham-Kent CD	106,632	113,134	119,729	126,740	135,415
Middlesex CD	514,191	592,902	692,135	802,969	918,862
Oxford CD	124,449	137,141	161,719	185,074	210,099
Haldimand-Norfolk CD	122,576	131,124	145,961	160,798	177,719

Note: Elgin CD includes both Elgin County and City of St. Thomas; Middlesex CD includes both City of London and Middle

Central Elgin may have more refined growth projections for the Municipality but there are several large developments in the works (albeit, not close to Belmont) which may significantly impact Central Elgin.

Background Developments:

Residential subdivision and public school located on Seventh Ave. Lot lines shown. TIS Addendum #1 completed by RJ Burnside March 2024.



PowerCo. Located in the City of St. Thomas is expected to have County wide implications with all N-S arterial roads experiencing increased traffic upon site opening tentatively scheduled for 2027. TIS completed by Arcadis Nov. 2023. PowerCo. Traffic is anticipated to utilize Belmont Road 5% of the time for passenger and truck traffic. I've included our counts from May 2024 to cross-reference for summer vs. winter volumes.

Future Road Improvements:

A completed TIS for the Belmont Public School recommended a PXO at the intersection of Seventh Ave. and Belmont Road. Due to anticipated turning movements a left hand turn lane is anticipated from NB Belmont Road to WB Seventh Ave. and from EB Seventh Ave. to NB Belmont Road. The County will be looking to signalize Seventh Ave. and Belmont Rd. for Sept. 2026 to coincide with the school opening.

Kindly let me know if you have any further questions,

Andrew Parker, P. Eng.
Manager of Roads and Asset Management

519-631-1460 ext. 117 (Main Office)

226-374-5997 (Cell)
www.elgincounty.ca
450 Sunset Drive, St. Thomas, ON N5R 5V1

From: Maddison Murch <mmurch@ptsl.com>
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- Access Review: Sightlines at both access connections on Borden Ave.

Please let us know if you have any comments or questions.

Regards,

Maddison Murch, P.Eng.
Transportation Engineer

5A-150 Pinebush Road, Cambridge ON N1R 8J8
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m: 226.268.3697
e: mmurch@ptsl.com
w: www.ptsl.com

Paradigm is operating on a 4-day workweek. Our offices are closed Fridays.

Appendix B

Existing Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Borden Avenue & Belmont Road
Site Code: 240755
Start Date: 01/16/2025

Turning Movement Data

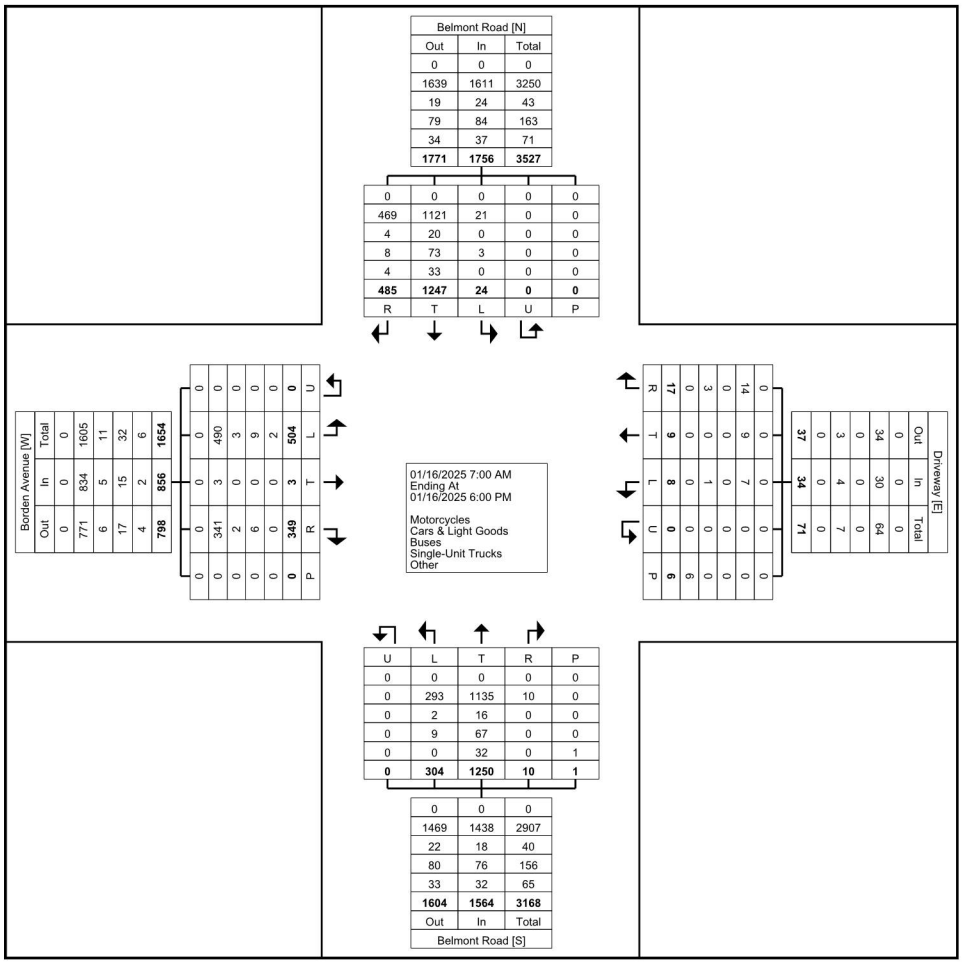
Start Time	Borden Avenue Eastbound						Driveway Westbound						Belmont Road Northbound						Belmont Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	20	0	11	0	0	31	0	0	0	0	0	0	14	50	0	0	0	64	0	17	22	0	0	39	134
7:15 AM	17	0	7	0	0	24	0	0	0	0	0	0	17	54	1	0	0	72	1	25	15	0	0	41	137
7:30 AM	26	0	10	0	0	36	0	0	0	0	0	0	22	54	0	0	0	76	2	27	16	0	0	45	157
7:45 AM	29	1	12	0	0	42	0	0	0	0	0	0	14	52	4	0	0	70	7	36	17	0	0	60	172
Hourly Total	92	1	40	0	0	133	0	0	0	0	0	0	67	210	5	0	0	282	10	105	70	0	0	185	600
8:00 AM	14	0	12	0	0	26	0	0	0	0	0	0	15	33	1	0	0	49	0	43	19	0	0	62	137
8:15 AM	19	0	7	0	0	26	1	0	0	0	0	1	10	48	1	0	0	59	0	35	12	0	0	47	133
8:30 AM	14	0	6	0	0	20	0	0	0	0	0	0	12	30	0	0	0	42	2	39	21	0	0	62	124
8:45 AM	17	0	9	0	0	26	0	0	0	0	0	0	12	32	0	0	0	44	0	38	21	0	0	59	129
Hourly Total	64	0	34	0	0	98	1	0	0	0	0	1	49	143	2	0	0	194	2	155	73	0	0	230	523
9:00 AM	15	0	10	0	0	25	0	0	2	0	0	2	8	51	0	0	0	59	1	22	11	0	0	34	120
9:15 AM	8	0	12	0	0	20	1	0	1	0	0	2	11	28	0	0	0	39	1	18	13	0	0	32	93
9:30 AM	12	0	7	0	0	19	1	1	0	0	0	2	10	33	0	0	0	43	1	11	14	0	0	26	90
9:45 AM	12	0	6	0	0	18	0	0	1	0	0	1	12	26	0	0	1	38	1	25	8	0	0	34	91
Hourly Total	47	0	35	0	0	82	2	1	4	0	0	7	41	138	0	0	1	179	4	76	46	0	0	126	394
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	11	0	7	0	0	18	0	0	0	0	0	0	7	25	0	0	0	32	1	27	11	0	0	39	89
11:45 AM	10	0	6	0	0	16	0	0	2	0	1	2	6	25	1	0	0	32	1	19	11	0	0	31	81
Hourly Total	21	0	13	0	0	34	0	0	2	0	1	2	13	50	1	0	0	64	2	46	22	0	0	70	170
12:00 PM	10	0	10	0	0	20	0	1	2	0	1	3	9	29	0	0	0	38	2	17	13	0	0	32	93
12:15 PM	15	0	15	0	0	30	0	0	1	0	0	1	12	33	0	0	0	45	2	22	14	0	0	38	114
12:30 PM	12	0	10	0	0	22	0	1	0	0	0	1	9	30	0	0	0	39	0	24	13	0	0	37	99
12:45 PM	8	0	7	0	0	15	1	1	0	0	0	2	3	29	0	0	0	32	1	27	9	0	0	37	86
Hourly Total	45	0	42	0	0	87	1	3	3	0	1	7	33	121	0	0	0	154	5	90	49	0	0	144	392
1:00 PM	7	1	6	0	0	14	0	0	0	0	0	0	5	29	0	0	0	34	0	26	9	0	0	35	83
1:15 PM	8	0	9	0	0	17	0	0	0	0	0	0	8	33	0	0	0	41	0	37	16	0	0	53	111
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	15	1	15	0	0	31	0	0	0	0	0	0	13	62	0	0	0	75	0	63	25	0	0	88	194
3:00 PM	16	0	7	0	0	23	0	0	0	0	0	0	4	28	1	0	0	33	0	41	15	0	0	56	112
3:15 PM	22	0	14	0	0	36	0	0	0	0	0	0	6	37	0	0	0	43	0	40	22	0	0	62	141
3:30 PM	17	0	18	0	0	35	0	0	0	0	0	0	8	49	0	0	0	57	0	45	16	0	0	61	153
3:45 PM	19	0	11	0	0	30	0	1	0	0	0	1	7	42	0	0	0	49	0	36	11	0	0	47	127
Hourly Total	74	0	50	0	0	124	0	1	0	0	0	1	25	156	1	0	0	182	0	162	64	0	0	226	533
4:00 PM	16	0	15	0	0	31	0	0	2	0	1	2	7	29	1	0	0	37	0	78	21	0	0	99	169
4:15 PM	18	0	14	0	0	32	1	0	0	0	0	1	6	80	0	0	0	86	0	77	17	0	0	94	213

4:30 PM	20	1	14	0	0	35	3	1	5	0	0	9	13	53	0	0	0	66	0	72	29	0	0	101	211
4:45 PM	21	0	20	0	0	41	0	0	0	0	0	0	11	58	0	0	0	69	1	76	16	0	0	93	203
Hourly Total	75	1	63	0	0	139	4	1	7	0	1	12	37	220	1	0	0	258	1	303	83	0	0	387	796
5:00 PM	15	0	22	0	0	37	0	1	0	0	0	1	3	44	0	0	0	47	0	73	19	0	0	92	177
5:15 PM	27	0	15	0	0	42	0	2	1	0	3	3	8	42	0	0	0	50	0	76	18	0	0	94	189
5:30 PM	13	0	7	0	0	20	0	0	0	0	0	0	8	43	0	0	0	51	0	56	9	0	0	65	136
5:45 PM	16	0	13	0	0	29	0	0	0	0	0	0	7	21	0	0	0	28	0	42	7	0	0	49	106
Hourly Total	71	0	57	0	0	128	0	3	1	0	3	4	26	150	0	0	0	176	0	247	53	0	0	300	608
Grand Total	504	3	349	0	0	856	8	9	17	0	6	34	304	1250	10	0	1	1564	24	1247	485	0	0	1756	4210
Approach %	58.9	0.4	40.8	0.0	-	-	23.5	26.5	50.0	0.0	-	-	19.4	79.9	0.6	0.0	-	-	1.4	71.0	27.6	0.0	-	-	-
Total %	12.0	0.1	8.3	0.0	-	20.3	0.2	0.2	0.4	0.0	-	0.8	7.2	29.7	0.2	0.0	-	37.1	0.6	29.6	11.5	0.0	-	41.7	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	490	3	341	0	-	834	7	9	14	0	-	30	293	1135	10	0	-	1438	21	1121	469	0	-	1611	3913
% Cars & Light Goods	97.2	100.0	97.7	-	-	97.4	87.5	100.0	82.4	-	-	88.2	96.4	90.8	100.0	-	-	91.9	87.5	89.9	96.7	-	-	91.7	92.9
Buses	3	0	2	0	-	5	0	0	0	0	-	0	2	16	0	0	-	18	0	20	4	0	-	24	47
% Buses	0.6	0.0	0.6	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.7	1.3	0.0	-	-	1.2	0.0	1.6	0.8	-	-	1.4	1.1
Single-Unit Trucks	9	0	6	0	-	15	1	0	3	0	-	4	9	67	0	0	-	76	3	73	8	0	-	84	179
% Single-Unit Trucks	1.8	0.0	1.7	-	-	1.8	12.5	0.0	17.6	-	-	11.8	3.0	5.4	0.0	-	-	4.9	12.5	5.9	1.6	-	-	4.8	4.3
Articulated Trucks	2	0	0	0	-	2	0	0	0	0	-	0	0	32	0	0	-	32	0	33	4	0	-	37	71
% Articulated Trucks	0.4	0.0	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	2.6	0.0	-	-	2.0	0.0	2.6	0.8	-	-	2.1	1.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	6	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Borden Avenue & Belmont Road
Site Code: 240755
Start Date: 01/16/2025



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Borden Avenue & Belmont Road
Site Code: 240755
Start Date: 01/16/2025

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Borden Avenue Eastbound						Driveway Westbound						Belmont Road Northbound						Belmont Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:15 AM	17	0	7	0	0	24	0	0	0	0	0	0	17	54	1	0	0	72	1	25	15	0	0	41	137
7:30 AM	26	0	10	0	0	36	0	0	0	0	0	0	22	54	0	0	0	76	2	27	16	0	0	45	157
7:45 AM	29	1	12	0	0	42	0	0	0	0	0	0	14	52	4	0	0	70	7	36	17	0	0	60	172
8:00 AM	14	0	12	0	0	26	0	0	0	0	0	0	15	33	1	0	0	49	0	43	19	0	0	62	137
Total	86	1	41	0	0	128	0	0	0	0	0	0	68	193	6	0	0	267	10	131	67	0	0	208	603
Approach %	67.2	0.8	32.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	25.5	72.3	2.2	0.0	-	-	4.8	63.0	32.2	0.0	-	-	-
Total %	14.3	0.2	6.8	0.0	-	21.2	0.0	0.0	0.0	0.0	-	0.0	11.3	32.0	1.0	0.0	-	44.3	1.7	21.7	11.1	0.0	-	34.5	-
PHF	0.741	0.250	0.854	0.000	-	0.762	0.000	0.000	0.000	0.000	-	0.000	0.773	0.894	0.375	0.000	-	0.878	0.357	0.762	0.882	0.000	-	0.839	0.876
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	82	1	40	0	-	123	0	0	0	0	-	0	66	186	6	0	-	258	9	110	66	0	-	185	566
% Cars & Light Goods	95.3	100.0	97.6	-	-	96.1	-	-	-	-	-	-	97.1	96.4	100.0	-	-	96.6	90.0	84.0	98.5	-	-	88.9	93.9
Buses	2	0	0	0	-	2	0	0	0	0	-	0	1	1	0	0	-	2	0	6	0	0	-	6	10
% Buses	2.3	0.0	0.0	-	-	1.6	-	-	-	-	-	-	1.5	0.5	0.0	-	-	0.7	0.0	4.6	0.0	-	-	2.9	1.7
Single-Unit Trucks	2	0	1	0	-	3	0	0	0	0	-	0	1	5	0	0	-	6	1	9	0	0	-	10	19
% Single-Unit Trucks	2.3	0.0	2.4	-	-	2.3	-	-	-	-	-	-	1.5	2.6	0.0	-	-	2.2	10.0	6.9	0.0	-	-	4.8	3.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	6	1	0	-	7	8
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	-	0.0	0.5	0.0	-	-	0.4	0.0	4.6	1.5	-	-	3.4	1.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

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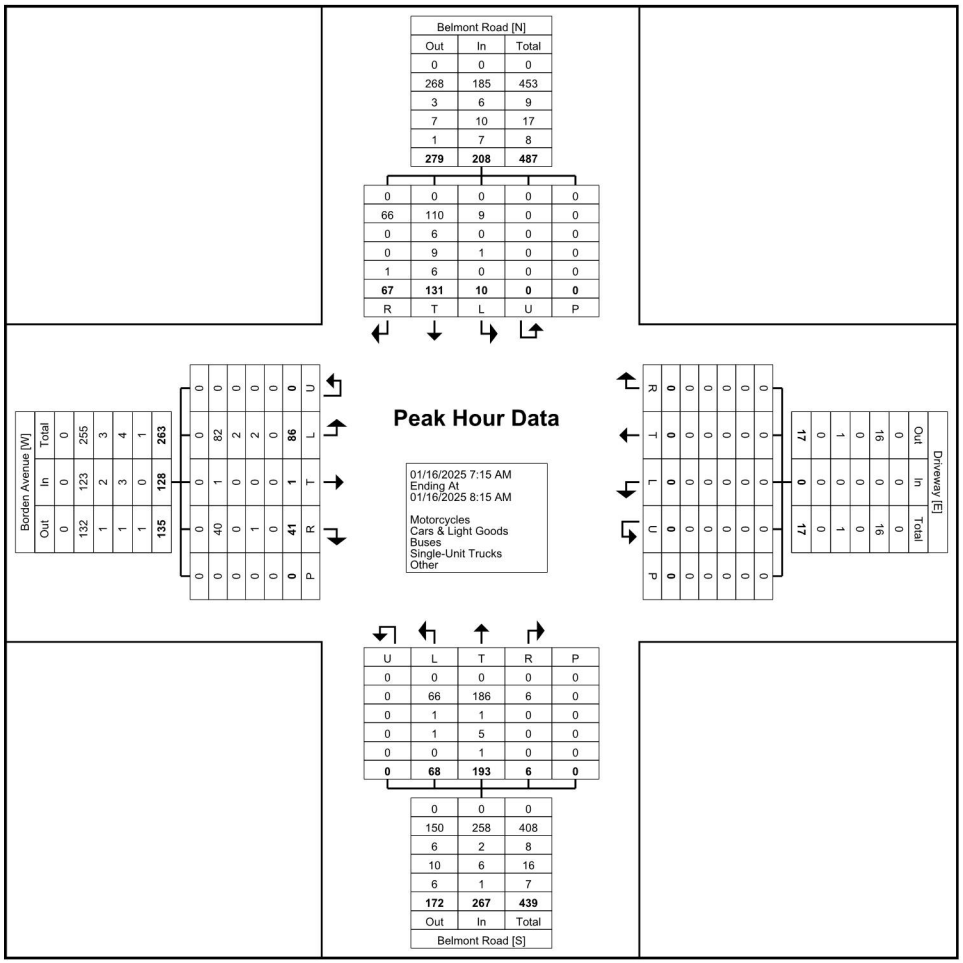
Start Date: 01/16/2025



Turning Movement Peak Hour Data Plot (7:15 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Borden Avenue & Belmont Road
Site Code: 240755
Start Date: 01/16/2025

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Borden Avenue Eastbound						Driveway Westbound						Belmont Road Northbound						Belmont Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	10	0	10	0	0	20	0	1	2	0	1	3	9	29	0	0	0	38	2	17	13	0	0	32	93
12:15 PM	15	0	15	0	0	30	0	0	1	0	0	1	12	33	0	0	0	45	2	22	14	0	0	38	114
12:30 PM	12	0	10	0	0	22	0	1	0	0	0	1	9	30	0	0	0	39	0	24	13	0	0	37	99
12:45 PM	8	0	7	0	0	15	1	1	0	0	0	2	3	29	0	0	0	32	1	27	9	0	0	37	86
Total	45	0	42	0	0	87	1	3	3	0	1	7	33	121	0	0	0	154	5	90	49	0	0	144	392
Approach %	51.7	0.0	48.3	0.0	-	-	14.3	42.9	42.9	0.0	-	-	21.4	78.6	0.0	0.0	-	-	3.5	62.5	34.0	0.0	-	-	-
Total %	11.5	0.0	10.7	0.0	-	22.2	0.3	0.8	0.8	0.0	-	1.8	8.4	30.9	0.0	0.0	-	39.3	1.3	23.0	12.5	0.0	-	36.7	-
PHF	0.750	0.000	0.700	0.000	-	0.725	0.250	0.750	0.375	0.000	-	0.583	0.688	0.917	0.000	0.000	-	0.856	0.625	0.833	0.875	0.000	-	0.947	0.860
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	44	0	42	0	-	86	1	3	2	0	-	6	31	106	0	0	-	137	4	83	47	0	-	134	363
% Cars & Light Goods	97.8	-	100.0	-	-	98.9	100.0	100.0	66.7	-	-	85.7	93.9	87.6	-	-	-	89.0	80.0	92.2	95.9	-	-	93.1	92.6
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	1	0	0	0	-	1	0	0	1	0	-	1	2	12	0	0	-	14	1	6	1	0	-	8	24
% Single-Unit Trucks	2.2	-	0.0	-	-	1.1	0.0	0.0	33.3	-	-	14.3	6.1	9.9	-	-	-	9.1	20.0	6.7	2.0	-	-	5.6	6.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	0	1	1	0	-	2	5
% Articulated Trucks	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.5	-	-	-	1.9	0.0	1.1	2.0	-	-	1.4	1.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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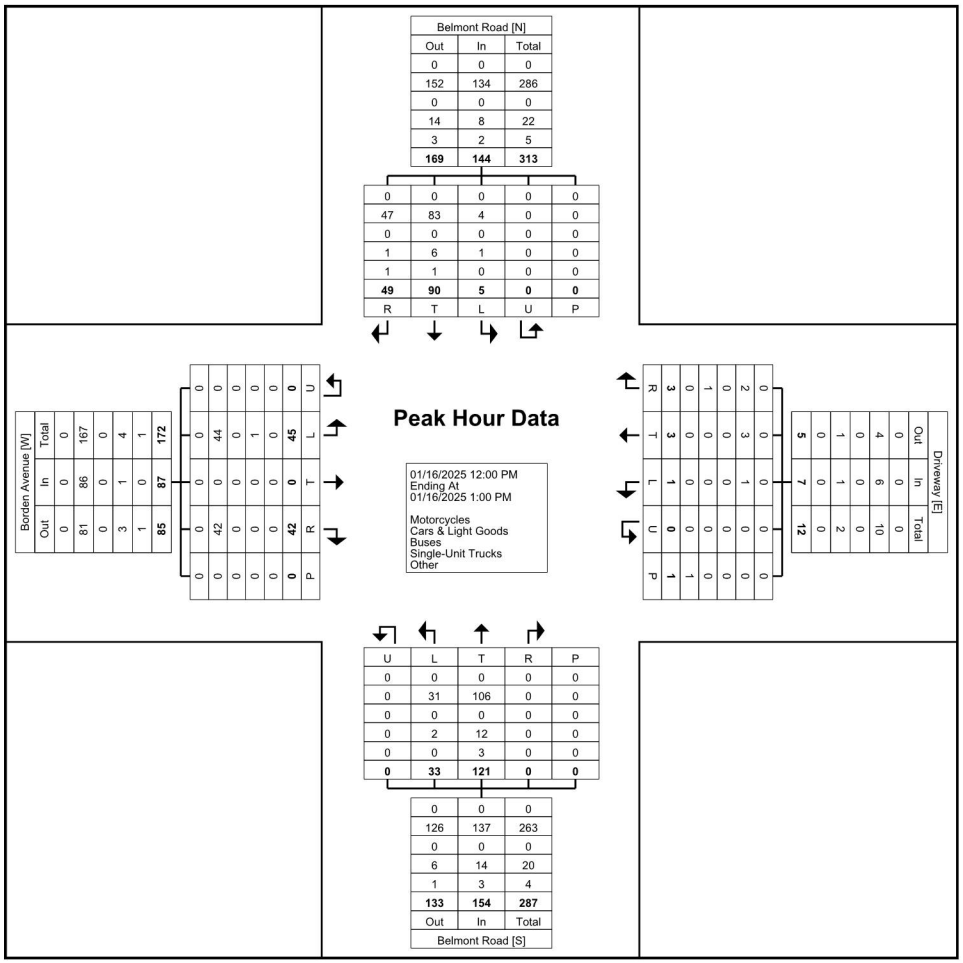

Turning Movement Peak Hour Data Plot (12:00 PM)

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Count Name: Borden Avenue & Belmont Road
Site Code: 240755
Start Date: 01/16/2025

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Borden Avenue Eastbound						Driveway Westbound						Belmont Road Northbound						Belmont Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:15 PM	18	0	14	0	0	32	1	0	0	0	0	1	6	80	0	0	0	86	0	77	17	0	0	94	213
4:30 PM	20	1	14	0	0	35	3	1	5	0	0	9	13	53	0	0	0	66	0	72	29	0	0	101	211
4:45 PM	21	0	20	0	0	41	0	0	0	0	0	0	11	58	0	0	0	69	1	76	16	0	0	93	203
5:00 PM	15	0	22	0	0	37	0	1	0	0	0	1	3	44	0	0	0	47	0	73	19	0	0	92	177
Total	74	1	70	0	0	145	4	2	5	0	0	11	33	235	0	0	0	268	1	298	81	0	0	380	804
Approach %	51.0	0.7	48.3	0.0	-	-	36.4	18.2	45.5	0.0	-	-	12.3	87.7	0.0	0.0	-	-	0.3	78.4	21.3	0.0	-	-	-
Total %	9.2	0.1	8.7	0.0	-	18.0	0.5	0.2	0.6	0.0	-	1.4	4.1	29.2	0.0	0.0	-	33.3	0.1	37.1	10.1	0.0	-	47.3	-
PHF	0.881	0.250	0.795	0.000	-	0.884	0.333	0.500	0.250	0.000	-	0.306	0.635	0.734	0.000	0.000	-	0.779	0.250	0.968	0.698	0.000	-	0.941	0.944
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	72	1	69	0	-	142	4	2	5	0	-	11	30	224	0	0	-	254	1	290	81	0	-	372	779
% Cars & Light Goods	97.3	100.0	98.6	-	-	97.9	100.0	100.0	100.0	-	-	100.0	90.9	95.3	-	-	-	94.8	100.0	97.3	100.0	-	-	97.9	96.9
Buses	0	0	0	0	-	0	0	0	0	0	-	0	1	4	0	0	-	5	0	2	0	0	-	2	7
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	3.0	1.7	-	-	-	1.9	0.0	0.7	0.0	-	-	0.5	0.9
Single-Unit Trucks	2	0	1	0	-	3	0	0	0	0	-	0	2	2	0	0	-	4	0	3	0	0	-	3	10
% Single-Unit Trucks	2.7	0.0	1.4	-	-	2.1	0.0	0.0	0.0	-	-	0.0	6.1	0.9	-	-	-	1.5	0.0	1.0	0.0	-	-	0.8	1.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	5	0	0	-	5	0	3	0	0	-	3	8
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.1	-	-	-	1.9	0.0	1.0	0.0	-	-	0.8	1.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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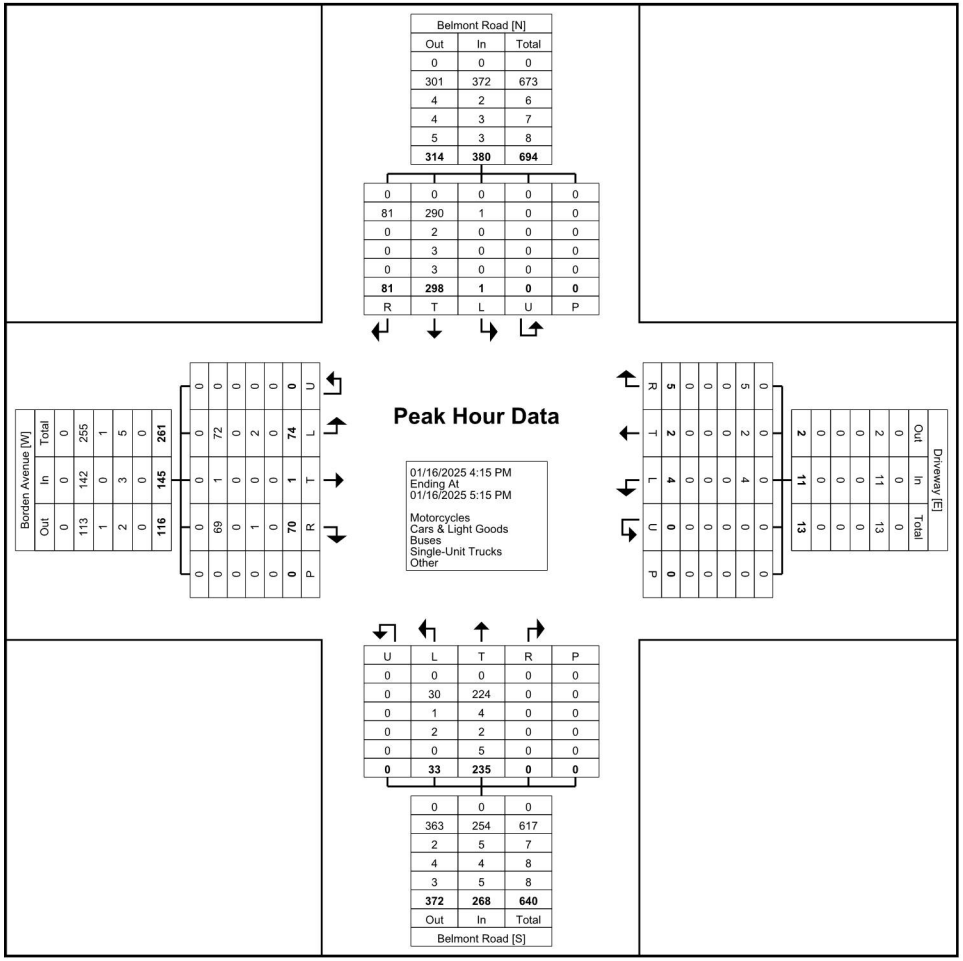


Turning Movement Peak Hour Data Plot (4:15 PM)

Appendix C

Existing Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	1	41	0	0	0	68	193	6	10	131	67
Future Volume (vph)	86	1	41	0	0	0	68	193	6	10	131	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956						0.997			0.956	
Flt Protected		0.968						0.987			0.998	
Satd. Flow (prot)	0	1691	0	0	1900	0	0	1804	0	0	1630	0
Flt Permitted		0.968						0.987			0.998	
Satd. Flow (perm)	0	1691	0	0	1900	0	0	1804	0	0	1630	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		550.5			84.3			116.3			105.9	
Travel Time (s)		39.6			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	3%	4%	0%	10%	16%	2%
Adj. Flow (vph)	93	1	45	0	0	0	74	210	7	11	142	73
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	139	0	0	0	0	0	291	0	0	226	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	86	1	41	0	0	0	68	193	6	10	131	67
Future Vol, veh/h	86	1	41	0	0	0	68	193	6	10	131	67
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	0	2	0	0	0	3	4	0	10	16	2
Mvmt Flow	93	1	45	0	0	0	74	210	7	11	142	73

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	558	565	179	526	598	213	215	0	0	216	0	0
Stage 1	201	201	-	361	361	-	-	-	-	-	-	-
Stage 2	358	364	-	165	237	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.5	6.22	7.1	6.5	6.2	4.13	-	-	4.2	-	-
Critical Hdwy Stg 1	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4	3.318	3.5	4	3.3	2.227	-	-	2.29	-	-
Pot Cap-1 Maneuver	436	437	864	466	419	832	1349	-	-	1307	-	-
Stage 1	794	739	-	662	629	-	-	-	-	-	-	-
Stage 2	654	627	-	842	713	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	405	406	864	409	389	832	1349	-	-	1307	-	-
Mov Cap-2 Maneuver	405	406	-	409	389	-	-	-	-	-	-	-
Stage 1	787	732	-	620	590	-	-	-	-	-	-	-
Stage 2	613	588	-	790	706	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	15.3	0	1.99	0.37
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	456	-	-	488	-	81	-	-
HCM Lane V/C Ratio	0.055	-	-	0.285	-	0.008	-	-
HCM Control Delay (s/veh)	7.8	0	-	15.3	0	7.8	0	-
HCM Lane LOS	A	A	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.2	-	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1	70	4	2	5	33	235	0	1	298	81
Future Volume (vph)	74	1	70	4	2	5	33	235	0	1	298	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.935			0.939						0.971	
Flt Protected		0.975			0.982			0.994				
Satd. Flow (prot)	0	1698	0	0	1752	0	0	1790	0	0	1802	0
Flt Permitted		0.975			0.982			0.994				
Satd. Flow (perm)	0	1698	0	0	1752	0	0	1790	0	0	1802	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		550.5			84.3			116.3			105.9	
Travel Time (s)		39.6			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	1%	0%	0%	0%	9%	5%	0%	0%	3%	0%
Adj. Flow (vph)	80	1	76	4	2	5	36	255	0	1	324	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	157	0	0	11	0	0	291	0	0	413	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	1	70	4	2	5	33	235	0	1	298	81
Future Vol, veh/h	74	1	70	4	2	5	33	235	0	1	298	81
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	0	1	0	0	0	9	5	0	0	3	0
Mvmt Flow	80	1	76	4	2	5	36	255	0	1	324	88

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	698	697	368	654	741	255	412	0	0	255	0	0
Stage 1	370	370	-	327	327	-	-	-	-	-	-	-
Stage 2	328	327	-	327	414	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.21	7.1	6.5	6.2	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.309	3.5	4	3.3	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	353	367	680	383	346	788	1110	-	-	1321	-	-
Stage 1	648	624	-	690	651	-	-	-	-	-	-	-
Stage 2	683	651	-	690	596	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	335	353	680	326	333	788	1110	-	-	1321	-	-
Mov Cap-2 Maneuver	335	353	-	326	333	-	-	-	-	-	-	-
Stage 1	647	623	-	664	627	-	-	-	-	-	-	-
Stage 2	650	627	-	611	596	-	-	-	-	-	-	-

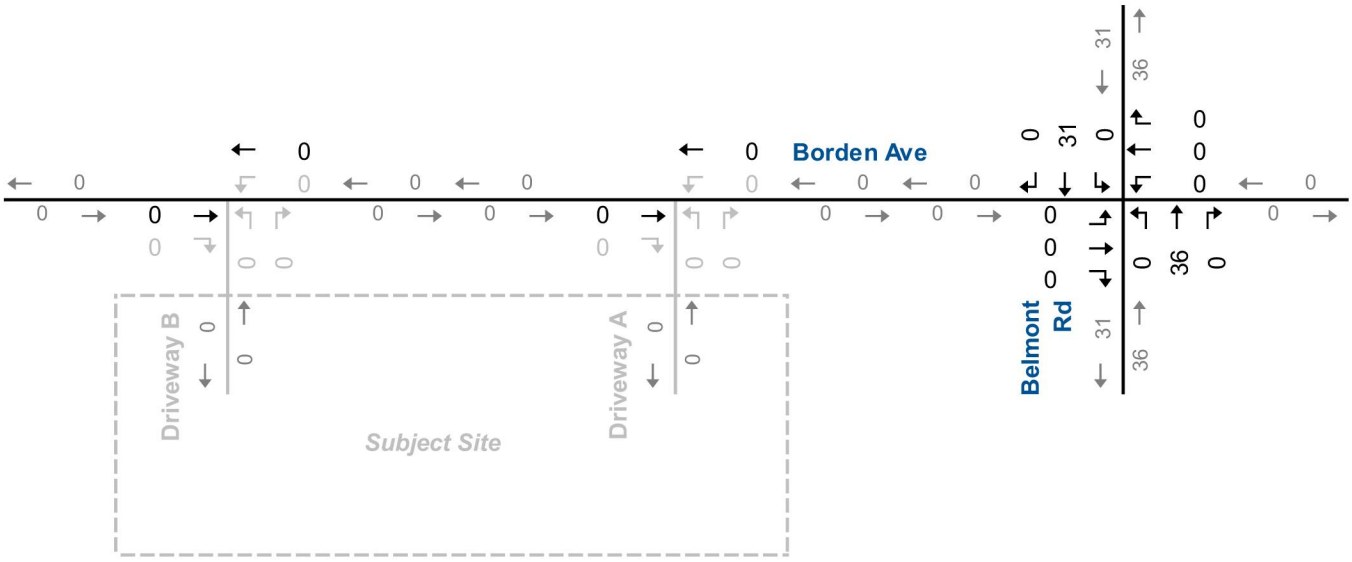
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	17.5	13.28	1.03	0.02
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	222	-	-	444	447	5	-	-
HCM Lane V/C Ratio	0.032	-	-	0.355	0.027	0.001	-	-
HCM Control Delay (s/veh)	8.4	0	-	17.5	13.3	7.7	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.6	0.1	0	-	-

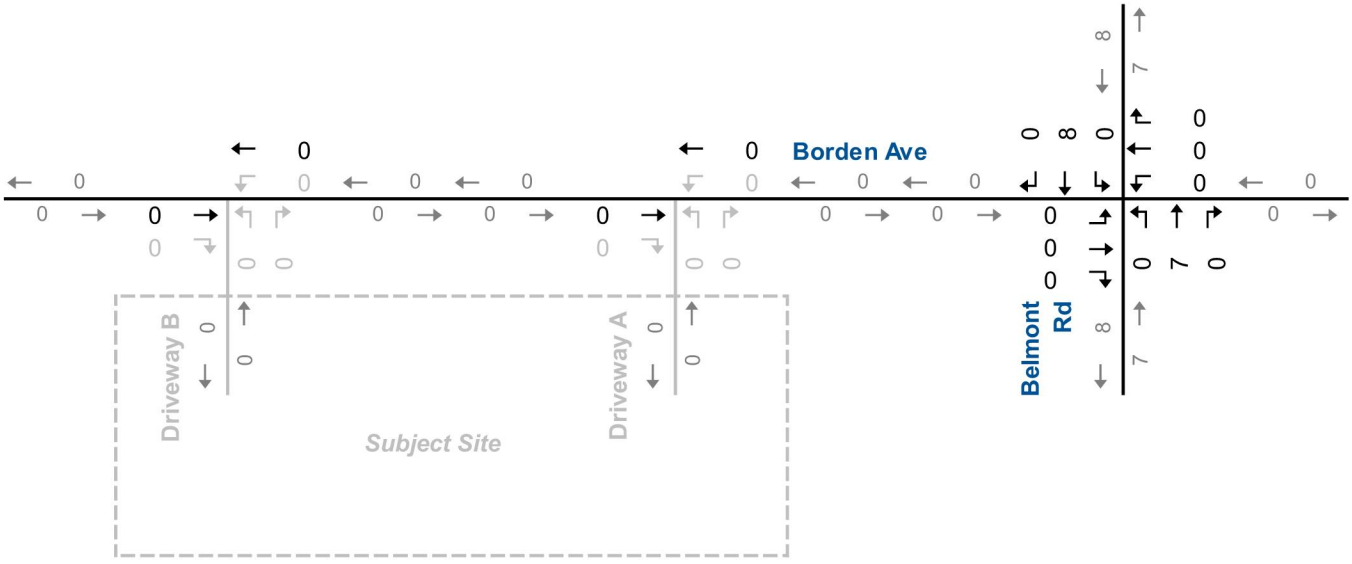
Appendix D

Other Area Development Traffic Volumes

AM Peak Hour



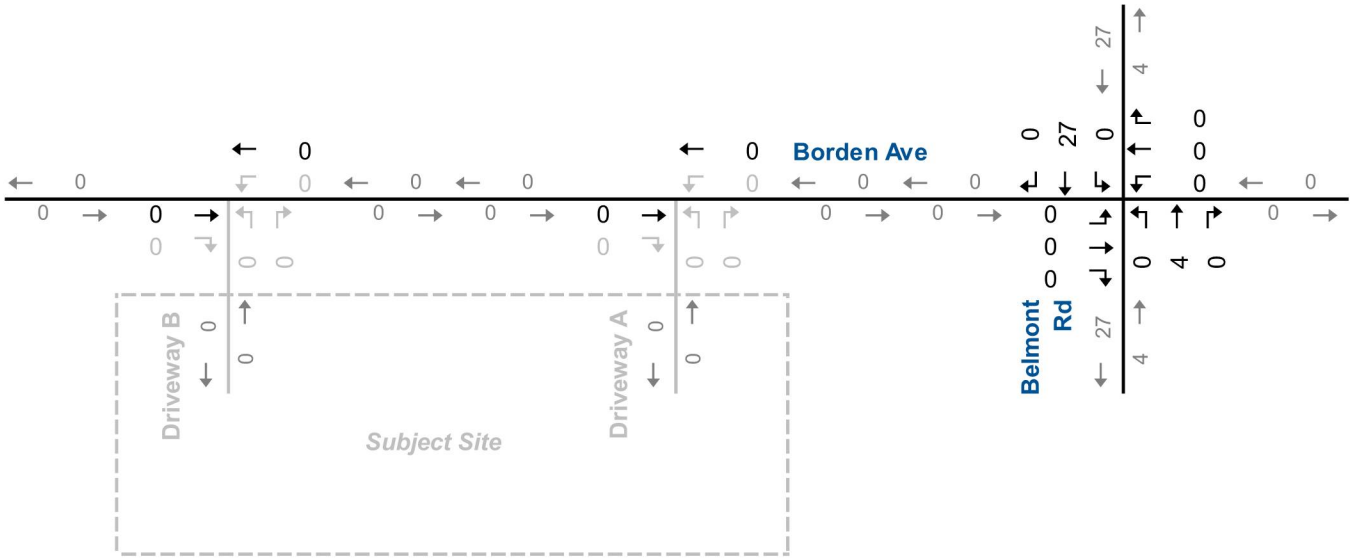
PM Peak Hour



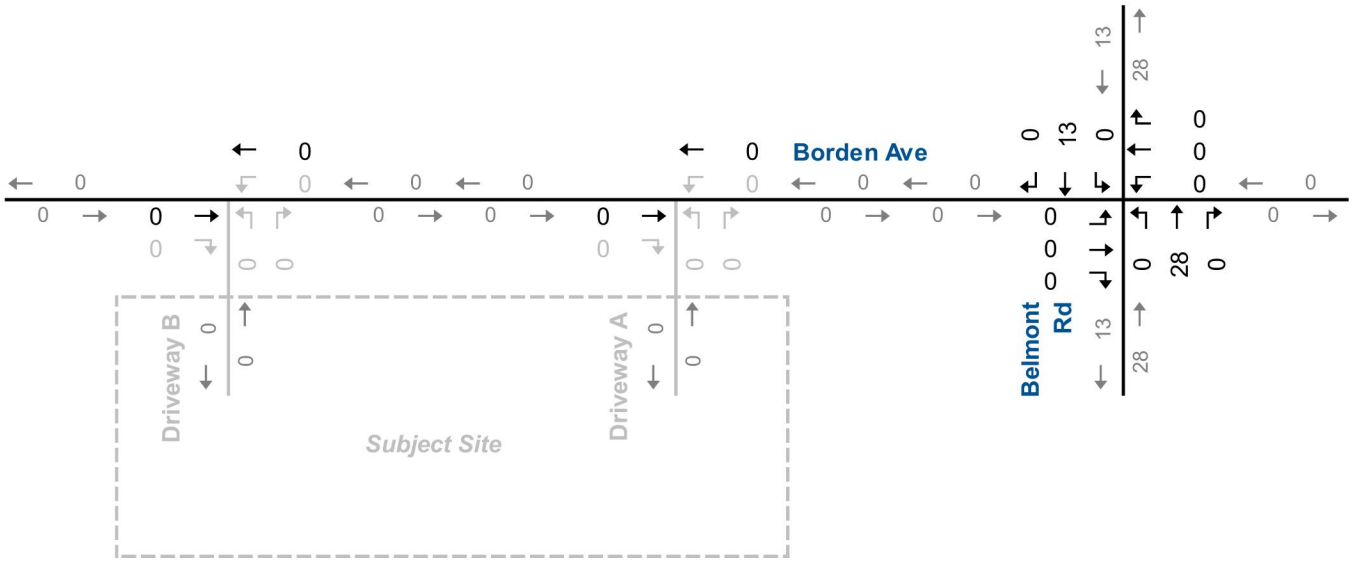
NTS

Other Area Development Traffic Volumes Belmont Elementary School

AM Peak Hour



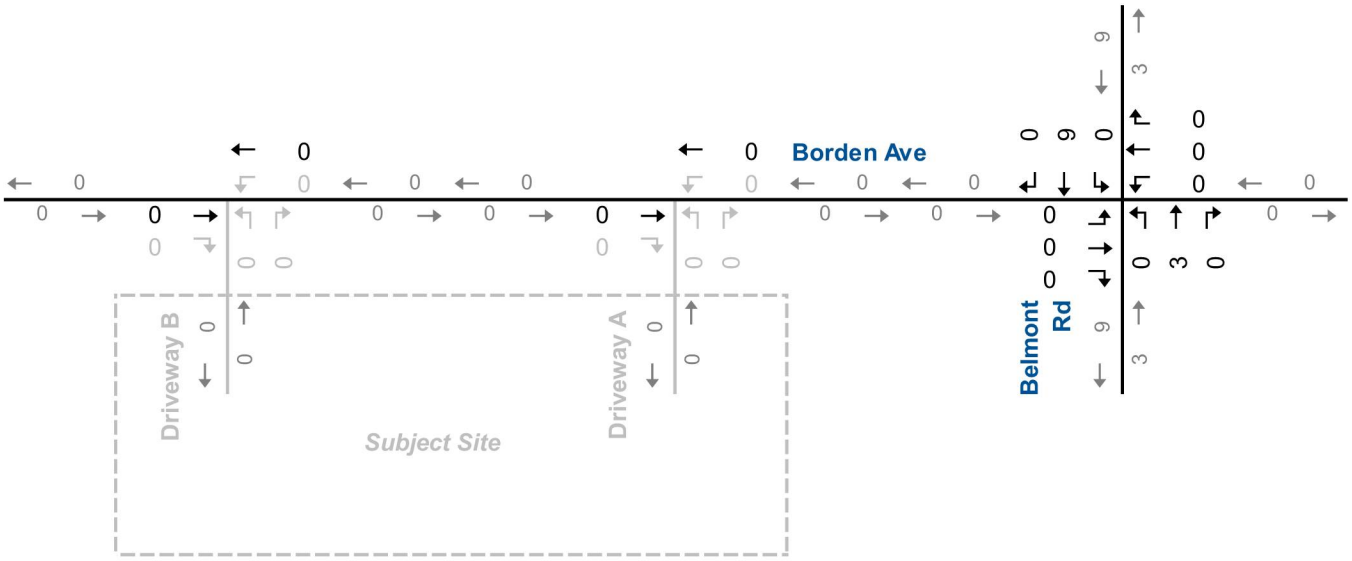
PM Peak Hour



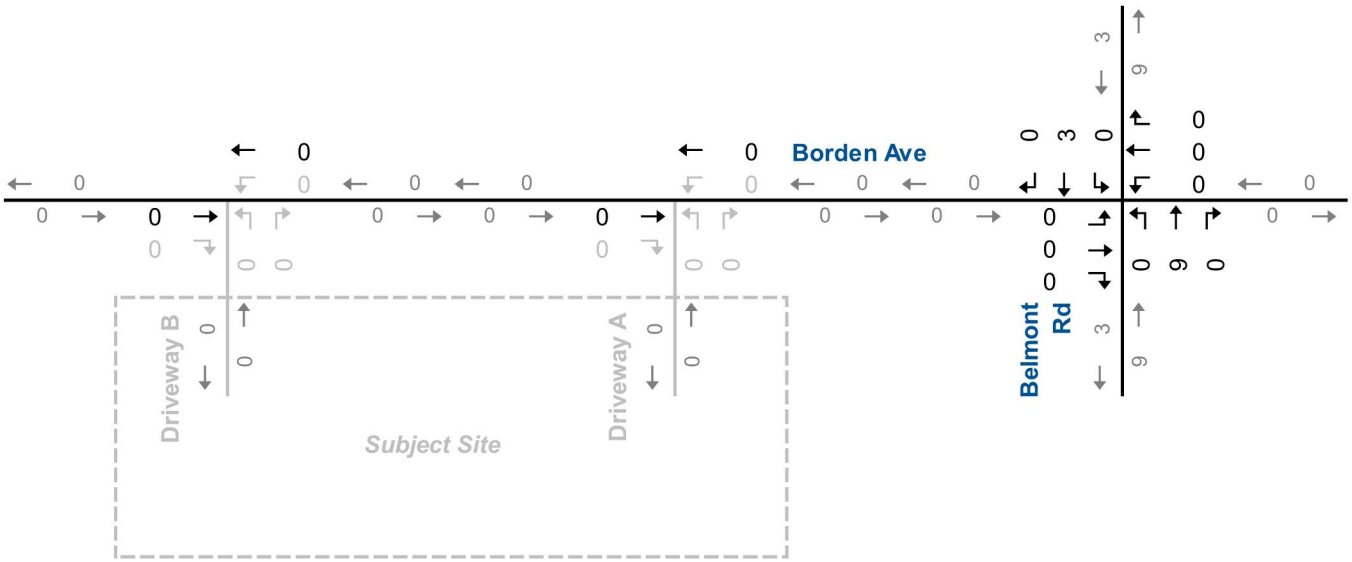
NTS

Other Area Development Traffic Volumes Craigholme Estates

AM Peak Hour



PM Peak Hour

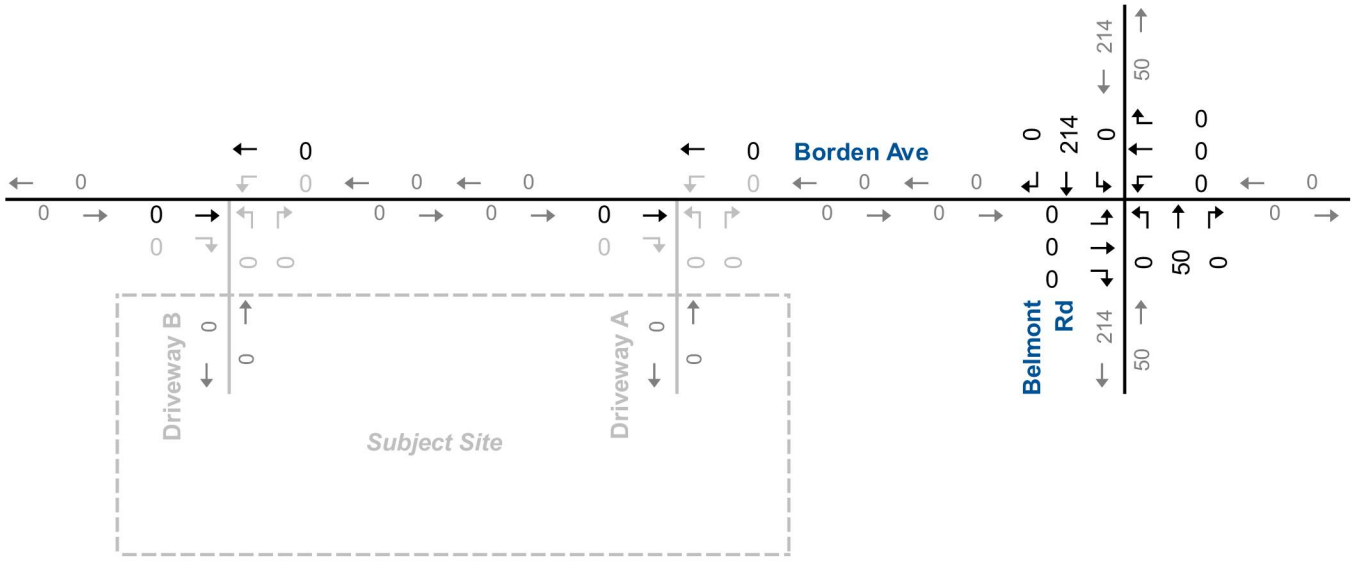


NTS

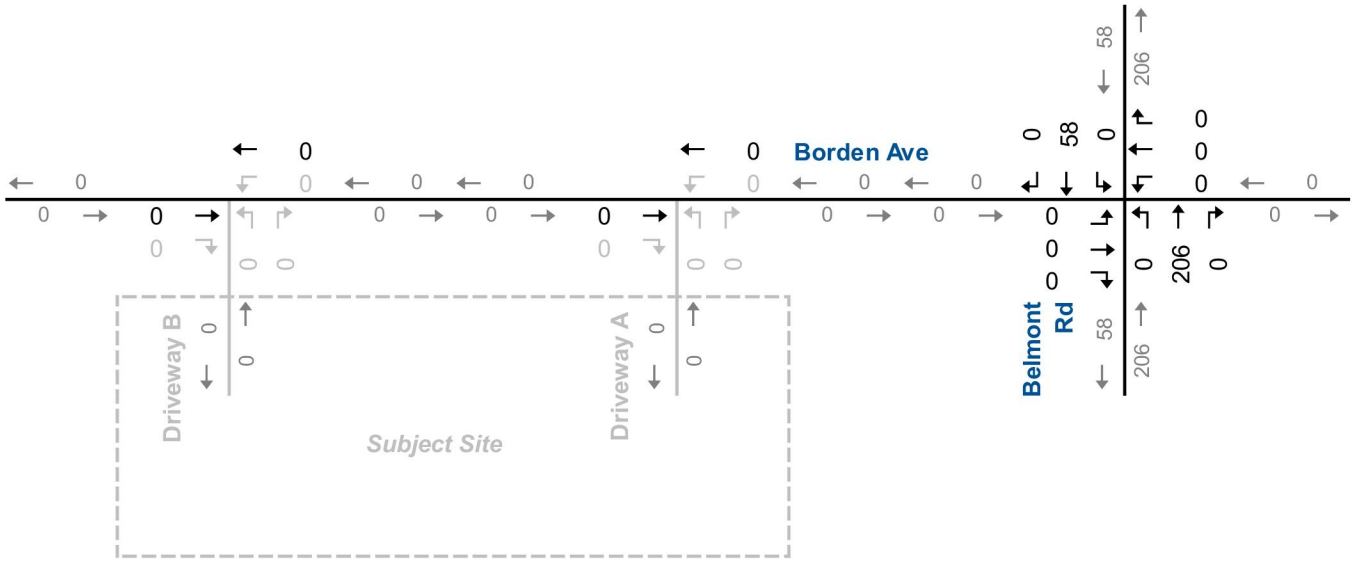
paradigm TRANSPORTATION SOLUTIONS LIMITED

Other Area Development Traffic Volumes PowerCo

AM Peak Hour



PM Peak Hour



NTS

Other Area Development Traffic Volumes St. Thomas Industrial Park

Appendix E

Background Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	1	47	0	0	0	78	315	7	11	431	77
Future Volume (vph)	99	1	47	0	0	0	78	315	7	11	431	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957						0.998			0.980	
Flt Protected		0.967						0.990			0.999	
Satd. Flow (prot)	0	1690	0	0	1900	0	0	1810	0	0	1635	0
Flt Permitted		0.967						0.990			0.999	
Satd. Flow (perm)	0	1690	0	0	1900	0	0	1810	0	0	1635	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		550.5			84.3			116.3			105.9	
Travel Time (s)		39.6			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	3%	4%	0%	10%	16%	2%
Adj. Flow (vph)	108	1	51	0	0	0	85	342	8	12	468	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	160	0	0	0	0	0	435	0	0	564	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	99	1	47	0	0	0	78	315	7	11	431	77
Future Vol, veh/h	99	1	47	0	0	0	78	315	7	11	431	77
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	0	2	0	0	0	3	4	0	10	16	2
Mvmt Flow	108	1	51	0	0	0	85	342	8	12	468	84

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1046	1054	510	1009	1092	346	552	0	0	350	0	0
Stage 1	534	534	-	516	516	-	-	-	-	-	-	-
Stage 2	512	520	-	493	576	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.5	6.22	7.1	6.5	6.2	4.13	-	-	4.2	-	-
Critical Hdwy Stg 1	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4	3.318	3.5	4	3.3	2.227	-	-	2.29	-	-
Pot Cap-1 Maneuver	204	228	563	221	216	701	1013	-	-	1166	-	-
Stage 1	524	528	-	546	538	-	-	-	-	-	-	-
Stage 2	539	536	-	562	505	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	180	201	563	176	191	701	1013	-	-	1166	-	-
Mov Cap-2 Maneuver	180	201	-	176	191	-	-	-	-	-	-	-
Stage 1	516	520	-	489	482	-	-	-	-	-	-	-
Stage 2	483	480	-	502	498	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	50.01	0	1.73	0.17
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	349	-	-	230	-	37	-	-
HCM Lane V/C Ratio	0.084	-	-	0.695	-	0.01	-	-
HCM Control Delay (s/veh)	8.9	0	-	50	0	8.1	0	-
HCM Lane LOS	A	A	-	F	A	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	4.5	-	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	1	80	5	2	6	38	520	0	1	424	93
Future Volume (vph)	85	1	80	5	2	6	38	520	0	1	424	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.935			0.932						0.976	
Flt Protected		0.975			0.982			0.997				
Satd. Flow (prot)	0	1698	0	0	1739	0	0	1799	0	0	1810	0
Flt Permitted		0.975			0.982			0.997				
Satd. Flow (perm)	0	1698	0	0	1739	0	0	1799	0	0	1810	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		550.5			84.3			116.3			105.9	
Travel Time (s)		39.6			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	1%	0%	0%	0%	9%	5%	0%	0%	3%	0%
Adj. Flow (vph)	92	1	87	5	2	7	41	565	0	1	461	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	180	0	0	14	0	0	606	0	0	563	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	77.9%	ICU Level of Service D	
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	1	80	5	2	6	38	520	0	1	424	93
Future Vol, veh/h	85	1	80	5	2	6	38	520	0	1	424	93
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	0	1	0	0	0	9	5	0	0	3	0
Mvmt Flow	92	1	87	5	2	7	41	565	0	1	461	101

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1163	1161	511	1111	1212	565	562	0	0	565	0	0
Stage 1	514	514	-	648	648	-	-	-	-	-	-	-
Stage 2	649	648	-	464	564	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.21	7.1	6.5	6.2	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.309	3.5	4	3.3	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	171	197	564	188	184	528	975	-	-	1017	-	-
Stage 1	542	539	-	463	469	-	-	-	-	-	-	-
Stage 2	457	469	-	582	512	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	156	184	564	148	172	528	975	-	-	1017	-	-
Mov Cap-2 Maneuver	156	184	-	148	172	-	-	-	-	-	-	-
Stage 1	541	538	-	434	440	-	-	-	-	-	-	-
Stage 2	421	440	-	491	511	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	54.5	21.75	0.6	0.02
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	123	-	-	240	229	3	-	-
HCM Lane V/C Ratio	0.042	-	-	0.751	0.062	0.001	-	-
HCM Control Delay (s/veh)	8.9	0	-	54.5	21.7	8.5	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	5.3	0.2	0	-	-

Appendix F

Total Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	1	49	0	0	0	86	315	7	11	431	90
Future Volume (vph)	102	1	49	0	0	0	86	315	7	11	431	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957						0.998			0.977	
Flt Protected		0.967						0.990			0.999	
Satd. Flow (prot)	0	1691	0	0	1900	0	0	1810	0	0	1634	0
Flt Permitted		0.967						0.990			0.999	
Satd. Flow (perm)	0	1691	0	0	1900	0	0	1810	0	0	1634	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		323.8			84.3			116.3			105.9	
Travel Time (s)		23.3			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	3%	4%	0%	10%	16%	2%
Adj. Flow (vph)	111	1	53	0	0	0	93	342	8	12	468	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	165	0	0	0	0	0	443	0	0	578	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	8.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	1	49	0	0	0	86	315	7	11	431	90
Future Vol, veh/h	102	1	49	0	0	0	86	315	7	11	431	90
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	0	2	0	0	0	3	4	0	10	16	2
Mvmt Flow	111	1	53	0	0	0	93	342	8	12	468	98

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1071	1078	517	1026	1123	346	566	0	0	350	0	0
Stage 1	541	541	-	533	533	-	-	-	-	-	-	-
Stage 2	529	537	-	493	590	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.5	6.22	7.1	6.5	6.2	4.13	-	-	4.2	-	-
Critical Hdwy Stg 1	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4	3.318	3.5	4	3.3	2.227	-	-	2.29	-	-
Pot Cap-1 Maneuver	196	220	558	215	207	701	1001	-	-	1166	-	-
Stage 1	520	524	-	534	528	-	-	-	-	-	-	-
Stage 2	528	526	-	562	498	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	171	192	558	168	180	701	1001	-	-	1166	-	-
Mov Cap-2 Maneuver	171	192	-	168	180	-	-	-	-	-	-	-
Stage 1	512	516	-	472	467	-	-	-	-	-	-	-
Stage 2	466	465	-	499	490	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	8.45	0	1.89	0.17
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	378	-	-	220	-	36	-	-
HCM Lane V/C Ratio	0.093	-	-	0.751	-	0.01	-	-
HCM Control Delay (s/veh)	9	0	-	58.5	0	8.1	0	-
HCM Lane LOS	A	A	-	F	A	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	5.2	-	0	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	148	4	15	161	1	4
Future Volume (vph)	148	4	15	161	1	4
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	0.997				0.892	
Flt Protected				0.996	0.990	
Satd. Flow (prot)	1822	0	0	1855	1645	0
Flt Permitted				0.996	0.990	
Satd. Flow (perm)	1822	0	0	1855	1645	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	86.3			323.8	76.4	
Travel Time (s)	6.2			23.3	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%
Adj. Flow (vph)	161	4	16	175	1	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	165	0	0	191	5	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	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	148	4	15	161	1	4
Future Vol, veh/h	148	4	15	161	1	4
Conflicting Peds, #/hr	0	0	0	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	4	2	2	2	2	2
Mvmt Flow	161	4	16	175	1	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	165	0	371	163
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	208	-
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	-	-	1413	-	630	882
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	827	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1413	-	622	882
Mov Cap-2 Maneuver	-	-	-	-	622	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	817	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.65	9.45
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	814	-	-	153	-
HCM Lane V/C Ratio	0.007	-	-	0.012	-
HCM Control Delay (s/veh)	9.5	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	151	1	6	156	0	1
Future Volume (vph)	151	1	6	156	0	1
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	0.999				0.865	
Flt Protected				0.998		
Satd. Flow (prot)	1825	0	0	1859	1611	0
Flt Permitted				0.998		
Satd. Flow (perm)	1825	0	0	1859	1611	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.4			86.3	71.0	
Travel Time (s)	10.1			6.2	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%
Adj. Flow (vph)	164	1	7	170	0	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	165	0	0	177	1	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	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	151	1	6	156	0	1
Future Vol, veh/h	151	1	6	156	0	1
Conflicting Peds, #/hr	0	0	0	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	4	2	2	2	2	2
Mvmt Flow	164	1	7	170	0	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	165	0	347	165
Stage 1	-	-	-	-	165	-
Stage 2	-	-	-	-	183	-
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	-	-	1413	-	650	880
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1413	-	646	880
Mov Cap-2 Maneuver	-	-	-	-	646	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	844	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.28	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	880	-	-	67	-
HCM Lane V/C Ratio	0.001	-	-	0.005	-
HCM Control Delay (s/veh)	9.1	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	1	87	5	2	6	40	520	0	1	424	96
Future Volume (vph)	96	1	87	5	2	6	40	520	0	1	424	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.932						0.975	
Flt Protected		0.975			0.982			0.996				
Satd. Flow (prot)	0	1699	0	0	1739	0	0	1797	0	0	1808	0
Flt Permitted		0.975			0.982			0.996				
Satd. Flow (perm)	0	1699	0	0	1739	0	0	1797	0	0	1808	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		323.8			84.3			116.3			105.9	
Travel Time (s)		23.3			6.1			8.4			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	1%	0%	0%	0%	9%	5%	0%	0%	3%	0%
Adj. Flow (vph)	104	1	95	5	2	7	43	565	0	1	461	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	200	0	0	14	0	0	608	0	0	566	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	81.2%	ICU Level of Service D	
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	10.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	96	1	87	5	2	6	40	520	0	1	424	96
Future Vol, veh/h	96	1	87	5	2	6	40	520	0	1	424	96
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	0	1	0	0	0	9	5	0	0	3	0
Mvmt Flow	104	1	95	5	2	7	43	565	0	1	461	104

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1168	1167	513	1116	1220	565	565	0	0	565	0	0
Stage 1	515	515	-	652	652	-	-	-	-	-	-	-
Stage 2	653	652	-	464	567	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.21	7.1	6.5	6.2	4.19	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.309	3.5	4	3.3	2.281	-	-	2.2	-	-
Pot Cap-1 Maneuver	169	195	563	187	182	528	973	-	-	1017	-	-
Stage 1	541	538	-	460	467	-	-	-	-	-	-	-
Stage 2	454	467	-	582	510	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	154	182	563	144	170	528	973	-	-	1017	-	-
Mov Cap-2 Maneuver	154	182	-	144	170	-	-	-	-	-	-	-
Stage 1	540	537	-	430	437	-	-	-	-	-	-	-
Stage 2	417	437	-	483	509	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	70.19	22.09	0.63	0.02
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	129	-	-	235	225	3	-	-
HCM Lane V/C Ratio	0.045	-	-	0.85	0.063	0.001	-	-
HCM Control Delay (s/veh)	8.9	0	-	70.2	22.1	8.5	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	6.7	0.2	0	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	171	1	4	134	4	13
Future Volume (vph)	171	1	4	134	4	13
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	0.999				0.895	
Flt Protected				0.999	0.989	
Satd. Flow (prot)	1861	0	0	1843	1649	0
Flt Permitted				0.999	0.989	
Satd. Flow (perm)	1861	0	0	1843	1649	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	86.3			323.8	76.4	
Travel Time (s)	6.2			23.3	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	186	1	4	146	4	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	0	150	18	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	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.3%	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	171	1	4	134	4	13
Future Vol, veh/h	171	1	4	134	4	13
Conflicting Peds, #/hr	0	0	0	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	3	2	2
Mvmt Flow	186	1	4	146	4	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	187	0	341	186
Stage 1	-	-	-	-	186	-
Stage 2	-	-	-	-	154	-
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	-	-	1387	-	655	856
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1387	-	653	856
Mov Cap-2 Maneuver	-	-	-	-	653	-
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	871	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.22	9.62
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	797	-	-	52	-
HCM Lane V/C Ratio	0.023	-	-	0.003	-
HCM Control Delay (s/veh)	9.6	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	167	0	1	137	1	5
Future Volume (vph)	167	0	1	137	1	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
Frt					0.887	
Flt Protected					0.992	
Satd. Flow (prot)	1863	0	0	1863	1639	0
Flt Permitted					0.992	
Satd. Flow (perm)	1863	0	0	1863	1639	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.4			86.3	71.0	
Travel Time (s)	10.1			6.2	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	0	1	149	1	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	0	0	150	6	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	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	167	0	1	137	1	5
Future Vol, veh/h	167	0	1	137	1	5
Conflicting Peds, #/hr	0	0	0	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	182	0	1	149	1	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	182	0	333	182
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	151	-
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	-	-	1394	-	662	861
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	877	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1394	-	662	861
Mov Cap-2 Maneuver	-	-	-	-	662	-
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	876	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.05	9.43
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	820	-	-	13	-
HCM Lane V/C Ratio	0.008	-	-	0.001	-
HCM Control Delay (s/veh)	9.4	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Appendix G

Signal Warrants

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2032 Background
Region/City/Township: Elgin/Central Elgin

Major Street: Belmont Road
Minor Street: Borden Avenue

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street						
	Belmont Road						Borden Avenue						
	Northbound			Southbound			Eastbound			Westbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	78	315	7	11	431	77	99	1	47	0	0	0	
PM Peak Hour	38	520	0	1	424	93	85	1	80	5	2	6	
verage Hourly Volum	29	209	2	3	214	43	46	1	32	1	1	2	0

Warrant	AHV
1A - All	580
1B - Minor	82
2A - Major	499
2B - Cross	48

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	580
					% Fulfilled	80.6%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	82
					% Fulfilled	47.9%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	499
					% Fulfilled	69.3%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	48
					% Fulfilled	63.7%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2032 Total
Region/City/Township: Elgin/Central Elgin

Major Street: Belmont Road
Minor Street: Borden Avenue

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street						
	Belmont Road						Borden Avenue						
	Northbound			Southbound			Eastbound			Westbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	86	315	7	11	431	91	103	1	49	0	0	0	
PM Peak Hour	40	520	0	1	424	97	97	1	87	5	2	6	
verage Hourly Volum	32	209	2	3	214	47	50	1	34	1	1	2	0

Warrant	AHV
1A - All	594
1B - Minor	88
2A - Major	506
2B - Cross	52

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	594
					% Fulfilled	82.4%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	88
					% Fulfilled	51.6%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	506
					% Fulfilled	70.2%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	52
					% Fulfilled	69.0%