



7450 Middlebrook Road Elora Transportation Impact Study

Paradigm Transportation Solutions Limited

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7450 Middlebrook Road Transportation Impact Study



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Executive Summary

Content

Melinda and Tim Croft retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) to request permit the use of an existing barn for a seasonal special events venue that would host special events located in Elora, Ontario.

Development Concept

The property owner is proposing to request permission for an on-farm diversified use, to permit the use of an existing barn for a seasonal special events venue that would host special events from May through October with potential for one special event in November. It is anticipated that the centre will hold around 2 events per week from Friday to Sunday with some minor workshop events during the week for 20-30 people. The parking is available for 43 vehicles and the building is designed for maximum occupancy of 150 people. Vehicle access is proposed via the existing single all-moves driveway on Middlebrook Road.

Conclusions

The main conclusions of this study are as follows:

- ▶ **Existing Traffic Operations:** The analyses indicate that all intersections within the study area are currently operating adequately;
- ▶ **Development Generated Traffic:** The site is expected to generate a total of 48 peak hour trips;
- ▶ **Background Traffic Operations:** All intersections within the study area are forecast to operate without problem movements by the 2028 Background horizon;
- ▶ **Total Traffic Operations:** All intersections within the study area are forecast to operate without problem movements by the 2028 Total horizon;
- ▶ **Left-turn Lanes:** A northbound left-turn lane is warranted by 2028 background traffic regardless of whether the development is built; and
- ▶ **Sight Distance:** To achieve adequate sight distance to the east from the site driveway, some trees may be required to be removed along the Middlebrook Road.



Recommendations

Consideration should be given to the removal of some trees on the north side of Middlebrook Road to achieve adequate sight distance to the east from the site driveway.



Contents

- 1 Introduction 1**
- 1.1 Overview 1
- 1.2 Purpose and Scope 1
- 2 Existing Conditions 3**
- 2.1 Existing Roads 3
- 2.2 Transit Service..... 3
- 2.3 Active Transportation 3
- 2.4 Traffic Volumes 3
- 2.5 Base Year Traffic Operations 6
- 3 Development Concept 8**
- 3.1 Development Description 8
- 3.2 Site Traffic Generation 10
- 3.3 Trip Distribution and Assignment..... 10
- 4 Evaluation of Future Traffic Conditions..... 12**
- 4.1 Background Traffic Forecasts..... 12
- 4.1.1 Background Growth..... 12
- 4.1.2 Other Area Development..... 12
- 4.2 **2023 Horizon** 12
- 4.2.1 2023 Background Traffic Operations 12
- 4.2.2 2023 Total Traffic Operations 15
- 4.3 **2028 Horizon** 18
- 4.3.1 2028 Background Traffic Operations 18
- 4.3.2 2028 Total Traffic Operations 21
- 5 Remedial Measures..... 24**
- 5.1 Left-turn Lane Requirements 24
- 5.2 Sight Distance Assessment 24
- 6 Conclusions and Recommendations 29**
- 6.1 Conclusions 29
- 6.2 Recommendations 29

Appendices

- Appendix A Existing Turning Movement Count Data
- Appendix B Existing Traffic Operations Reports
- Appendix C 2023 Background Traffic Operations Reports
- Appendix D 2023 Total Traffic Operations Reports
- Appendix E 2028 Background Traffic Operations Reports
- Appendix F 2028 Total Traffic Operations Reports



Figures

Figure 1.1	Site Location	2
Figure 2.1:	Existing Lane Configurations	4
Figure 2.2:	Existing Traffic Volumes	5
Figure 3.1:	Development Concept Plan	9
Figure 3.2:	Site Generated Traffic Volumes.....	11
Figure 4.1:	2023 Background Traffic Volumes	13
Figure 4.2:	2023 Total Traffic Volumes	16
Figure 4.3:	2028 Background Traffic Volumes	19
Figure 4.4:	2028 Total Traffic Volumes	22
Figure 5.1:	Left-turn Lane Warrant Nomograph for Wellington Road 7 & Middlebrook Road	26
Figure 5.2:	Left-turn Lane Warrant Nomograph for Middlebrook Road & Site Access	27
Figure 5.3:	Sight Distance	28

Tables

Table 2.1:	Existing Traffic Operations Summary	7
Table 3.1:	Trip Generation	10
Table 3.2:	Trip Distribution	10
Table 4.1:	2023 Background Traffic Operations	14
Table 4.2:	2023 Total Traffic Operations	17
Table 4.3:	2028 Background Traffic Operations	20
Table 4.4:	2028 Total Traffic Operations	23



1 Introduction

1.1 Overview

Melinda and Tim Croft retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) to request permit the use of an existing barn for a seasonal special events venue that would host special events located in Elora, Ontario.

Figure 1.1 illustrates the location of the development.

1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impacts resulting from the proposed development. The scope of the study, developed in consultation with Township of Centre Wellington via e-mail in August 2021, includes:

- ▶ Documentation of current traffic and site conditions in the vicinity of the development;
- ▶ Estimation of the background traffic growth in the area;
- ▶ Estimation of development site traffic;
- ▶ Assignment of the development traffic to the subject road network;
- ▶ Traffic forecasts for buildout year of assumed full buildout (2023), and five years from full buildout (2028);
- ▶ Identification of any operational or safety concerns and any mitigation measures that may be required to improve operations; and
- ▶ The study area intersection includes:
 - Middlebrook Road and Wellington Road 7; and
 - Middlebrook Road and Site Access.





 Subject Site  Study Area Intersections



2 Existing Conditions

This section documents current traffic conditions, operational deficiencies and constraints experienced by the public travelling at the intersections within the study area. The operational deficiencies and constraints identified at this stage will be fundamental to the process of defining the required remedial measures.

2.1 Existing Roads

The main roadways within the study area are described as follows:

- ▶ **Middlebrook Road** is an east-west two-lane local road with assumed speed limit of 80 km/h which reduces to 50 km/h at the intersection of Middlebrook Road and Wellington Road 7.
- ▶ **David Street West** is an east-west two-lane local road with posted speed limit of 50 km/h.
- ▶ **Wellington Road 7** is a north-south 2-lane county road with posted speed limit of 50 km/h.

Figure 2.1 illustrates the existing lane configurations and traffic control at the proposed study area intersections.

2.2 Transit Service

No transit services are provided near the subject site.

2.3 Active Transportation

There are no sidewalks or dedicated cycling facilities on Middlebrook Road near the subject site.

2.4 Traffic Volumes

Figure 2.2 displays the existing weekday PM and Saturday peak hour turning movement traffic volumes collected by Paradigm in June 2022.

Appendix A contains the detailed traffic counts for the study area intersection.



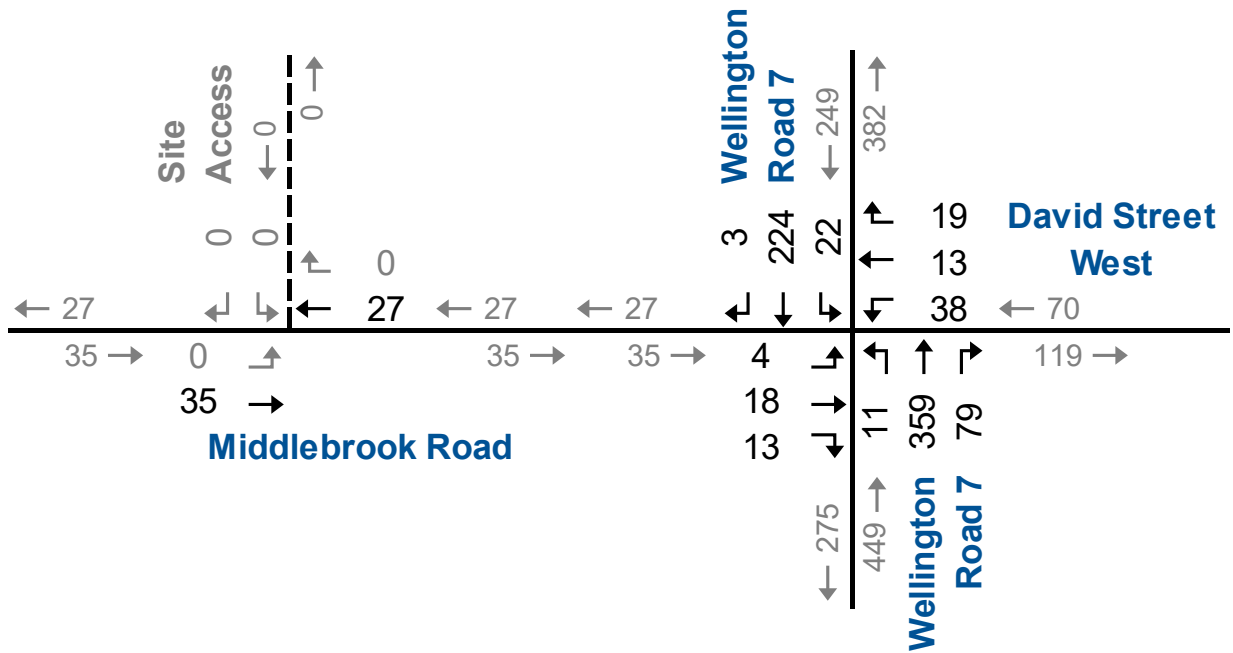


Subject Site
 Study Area Intersections

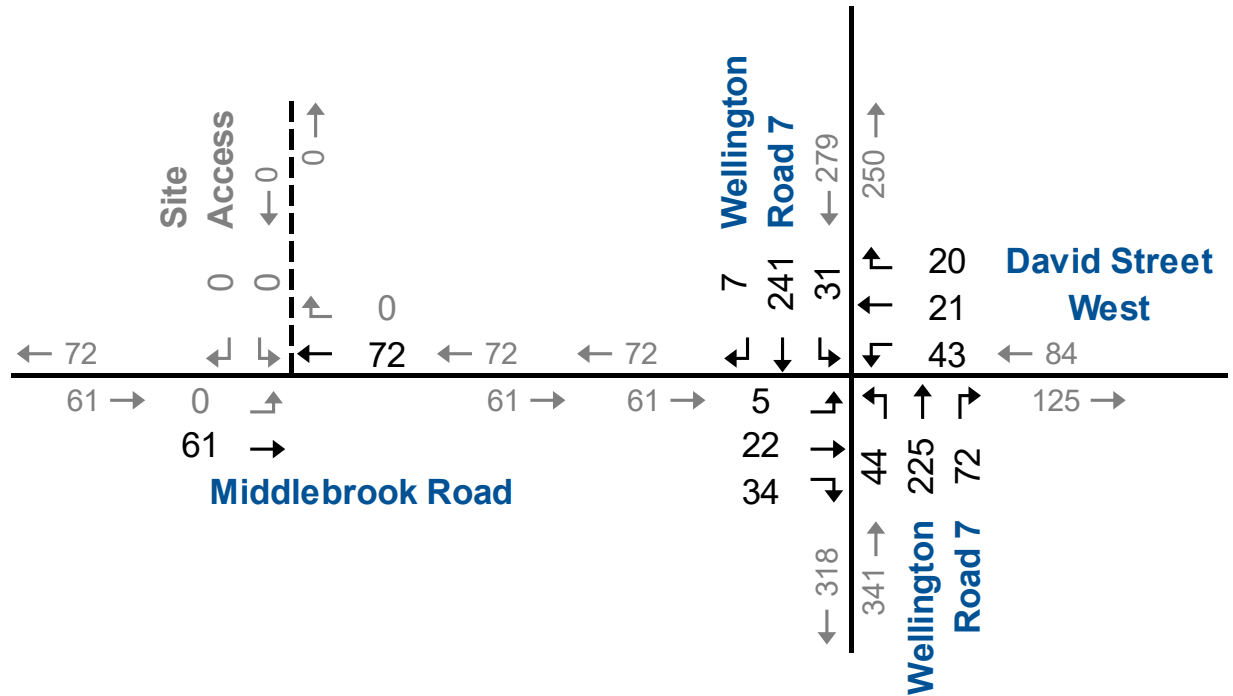


Existing Lane Configuration

PM Peak Hour



SAT Peak Hour



Existing Traffic Volumes

2.5 Base Year Traffic Operations

Intersection level of service (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 the 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 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.

The operations of intersections in the study area were evaluated with the existing turning movement volumes using Synchro11.

The intersection analysis considered two separate measures of performance:

- ▶ the volume to capacity ratio for each intersection; and
- ▶ the LOS for each turning movement (LOS is based on the average control delay per vehicle).

Table 2.1 summarizes the existing intersection operations. The entries in the table indicating the AM and PM peak hour level of service (LOS), volume to capacity ratios (V/C), and 95th percentile queues experienced. The analyses indicate that all intersections and individual movements within the study area are operating well.

Appendix B contains the detailed Synchro 11 reports.



TABLE 2.1: EXISTING TRAFFIC OPERATIONS SUMMARY

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< 15 < 2	B 15 > >	> > > >	B 15 15 15	< < < <	C 18 > 6	> > > >	C 18 18 18	A 8 0 0	A 0 0 0	A 0 0 0	A 0 0 0	A 8 0 1	A 0 0 0	A 0 0 0	A 1 1 1	
SAT Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< 14 < 4	B 14 > >	> > > >	B 14 14 14	< < < <	C 19 > 8	> > > >	C 19 19 19	A 8 0 1	A 0 0 0	A 0 0 0	A 0 0 0	A 8 0 1	A 0 0 0	A 0 0 0	A 1 1 1	

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



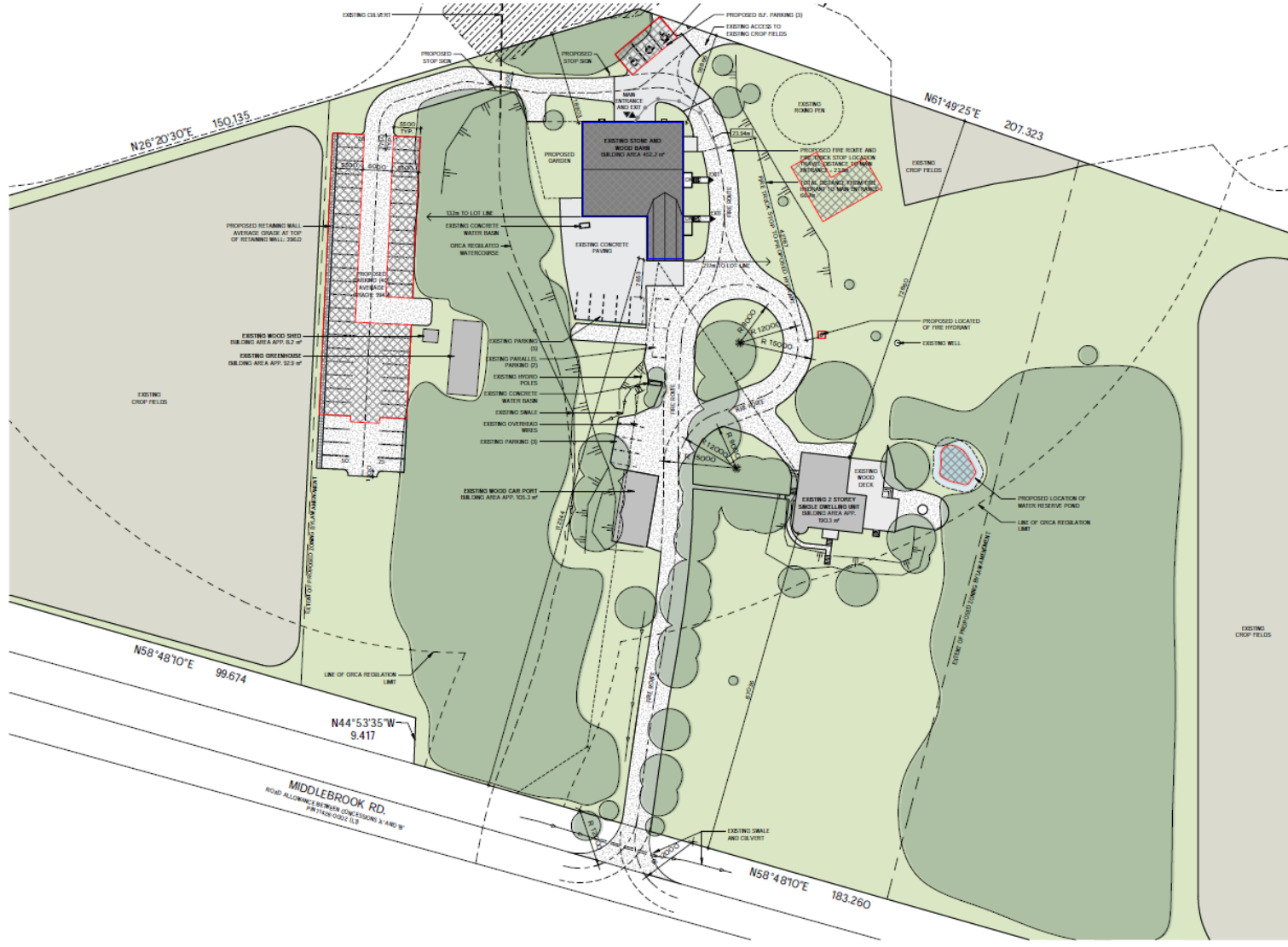
3 Development Concept

3.1 Development Description

The property owner is proposing to request permission for an on-farm diversified use, to permit the use of an existing barn for a seasonal special events venue that would host special events from May through October with potential for one special event in November. It is anticipated that the centre will hold around 2 events per week from Friday to Sunday with some minor workshop events during the week for 20-30 people. The parking is available for 43 vehicles and the building is designed for maximum occupancy of 150 people. Vehicle access is proposed via the existing single all-moves driveway on Middlebrook Road.

Figure 3.1 illustrates the development concept plan.





Development Concept Plan

Figure 3.1

3.2 Site Traffic Generation

A trip generation study for a venue of similar size (a wedding venue in Erin, Ontario) by Paradigm in 2018¹. It was found that an event with 145 guests generated 46 vehicles during the Saturday peak hour, which is a trip generation rate of 0.32 trips per guest. The maximum capacity for an event is 150 guests. Therefore, the trip generation for a maximum capacity event is forecast to be 48 trips. **Table 3.1** summarizes the site trip generation.

TABLE 3.1: TRIP GENERATION

Land Use	Units	Peak Hour			
		Rate	In	Out	Total
Wedding Venue	150 Guests	0.32	43	5	48
<i>Total</i>			43	5	48

Figure 3.2 illustrates the maximum capacity event using the observed in/out split and trip distribution.

3.3 Trip Distribution and Assignment

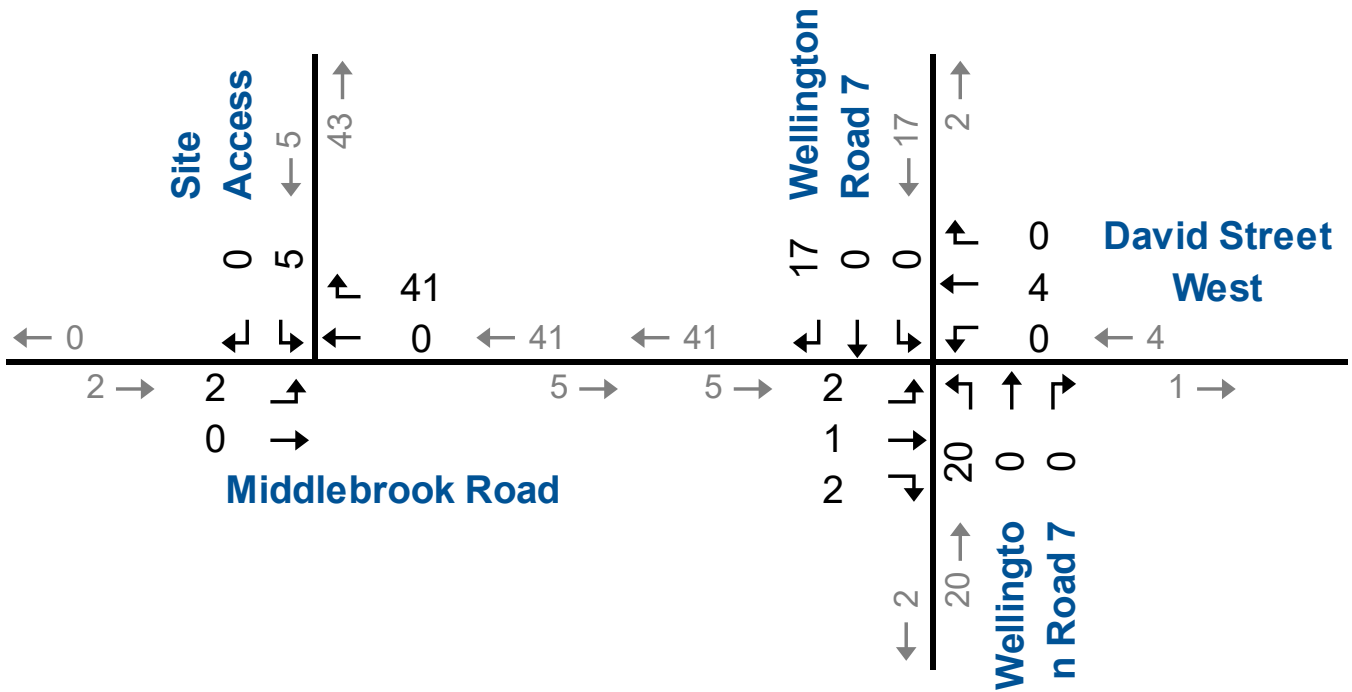
The trip distribution was based on existing travel patterns of the surrounding streets.

TABLE 3.2: TRIP DISTRIBUTION

Direction	Distribution
East via David Street West	10%
West via Middlebrook Road	5%
North via Wellington Road 7	40%
South via Wellington Road 7	45%
<i>Total</i>	100%

¹ Erin Estates Weddings Transportation Impact Study, Paradigm Transportation Solutions Limited, October 2018.





Site Generated Traffic Volumes

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic volumes and analyses for the full buildout horizon and five years from full buildout. The future traffic volumes near the development will consist of increased non-site traffic volumes (background traffic), traffic generated by other developments, and the traffic forecast to be generated by the proposed development.

4.1 Background Traffic Forecasts

4.1.1 Background Growth

The non-site traffic increase is the generalized traffic growth in Elora. In pre-study consultation, the Wellington County staff confirmed a growth rate of 2% per annum, which was applied to the existing traffic volumes to forecast horizon years.

4.1.2 Other Area Development

No other area developments that would directly impact traffic volumes in the study area were identified by Township of Centre Wellington staff.

4.2 2023 Horizon

4.2.1 2023 Background Traffic Operations

Figure 4.1 illustrates the background traffic volumes during PM and Saturday peak hours.

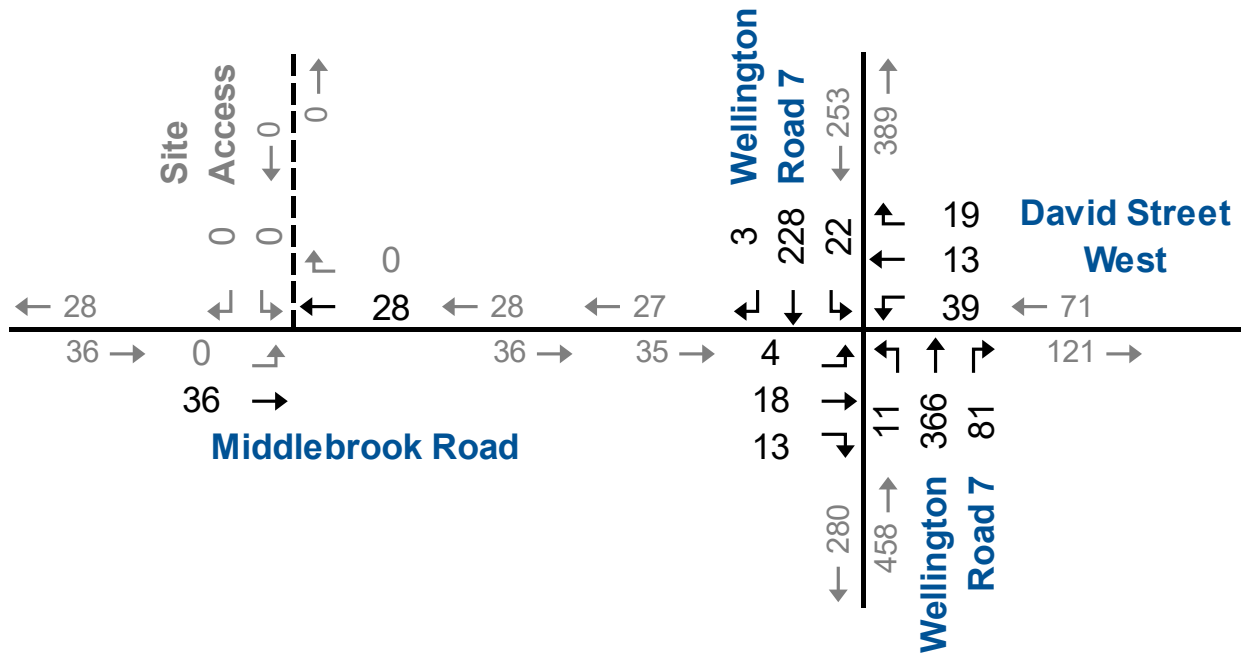
The 2023 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions. **Table 4.1** summarizes the results of the 2023 background traffic operations.

The analyses indicate that all intersections and individual movements within the study area are operating without any critical movements.

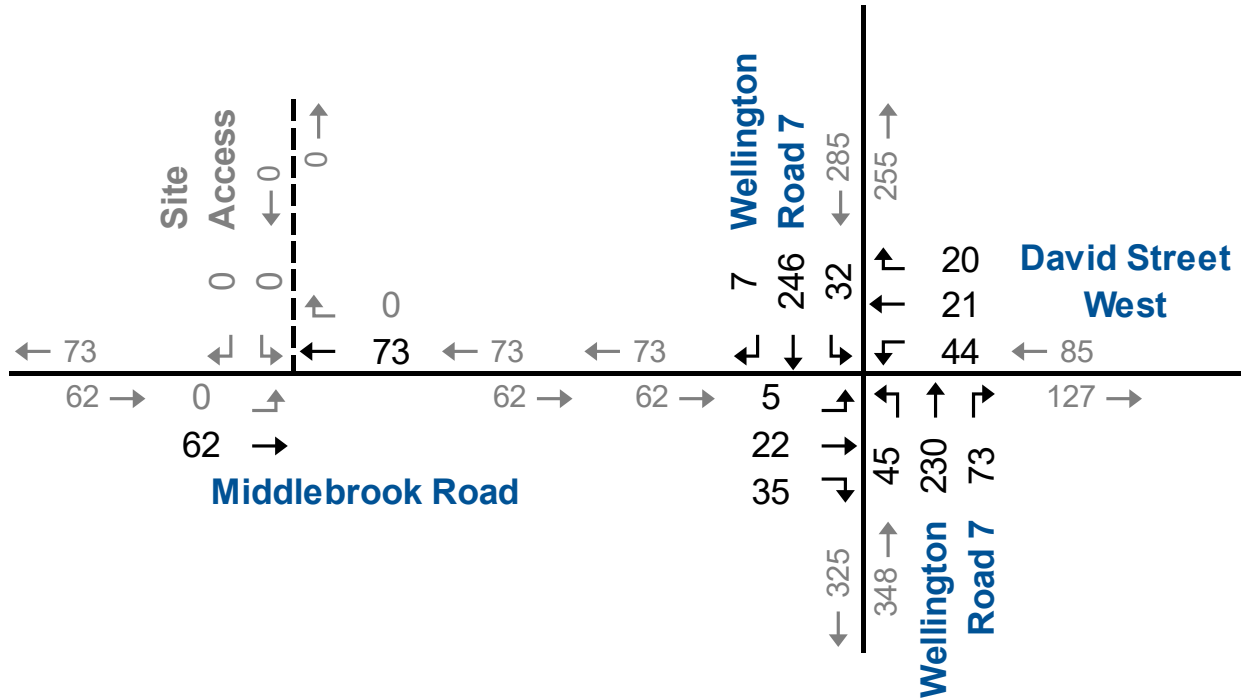
Appendix C contains the supporting detailed Synchro 11 reports.



PM Peak Hour



SAT Peak Hour



2023 Background Traffic Volumes

TABLE 4.1: 2023 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	C 15 0.10 2	> > > >	C 15 15 15	< < < <	C 19 0.23 7	> > > >	C 19 19 19	A 8 0.01 0	A 0 0.00 0	A 0 0.00 0	A 0 0.00 0	A 8 0.02 1	A 0 0.00 0	A 0 0.00 0	A 1 1 1	
SAT Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	B 14 0.15 4	> > > >	B 14 14 14	< < < <	C 20 0.28 8	> > > >	C 20 20 20	A 8 0.04 1	A 0 0.00 0	A 0 0.00 0	A 1 0.03 1	A 8 0.00 0	A 0 0.00 0	A 0 0.00 0	A 1 1 1	

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



4.2.2 2023 Total Traffic Operations

Figure 4.2 illustrates the total traffic volumes during PM and Saturday peak hours.

The total traffic volumes are determined by summation of background traffic volumes and site generated traffic site volumes.

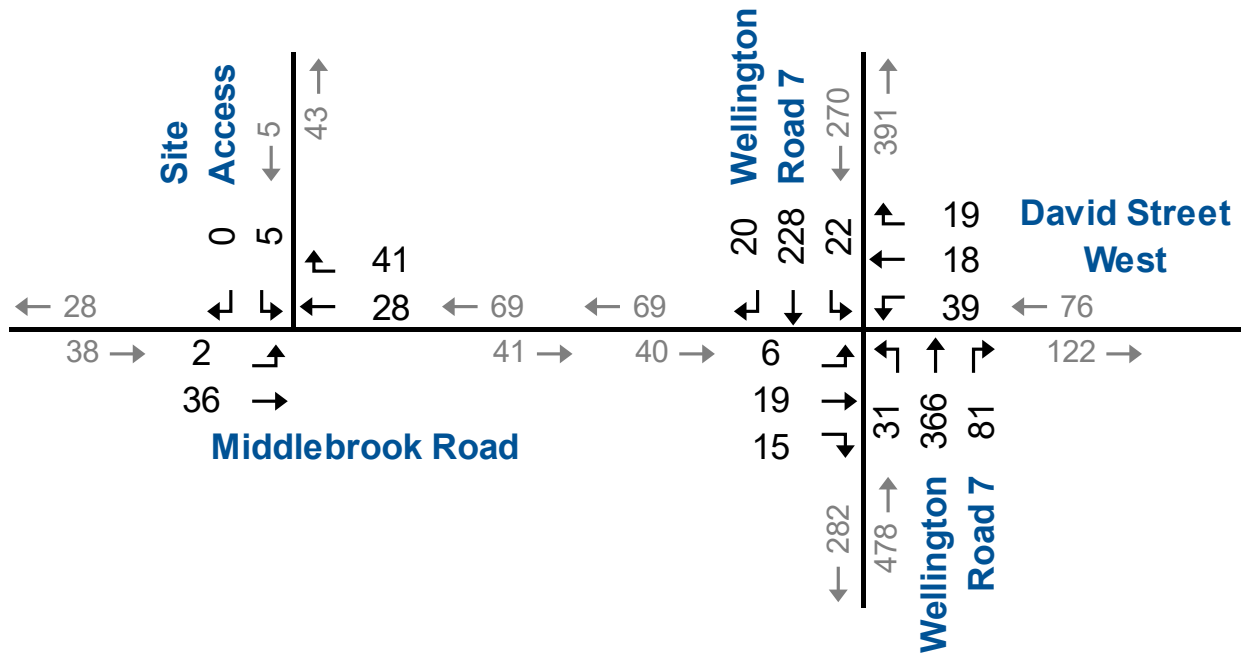
The 2023 total traffic volumes have been analyzed using the same methodology as under existing condition and background condition. **Table 4.2** summarizes the results of the 2027 total traffic operations.

The analyses indicate that all intersections and individual movements within the study area are operating without any critical movements.

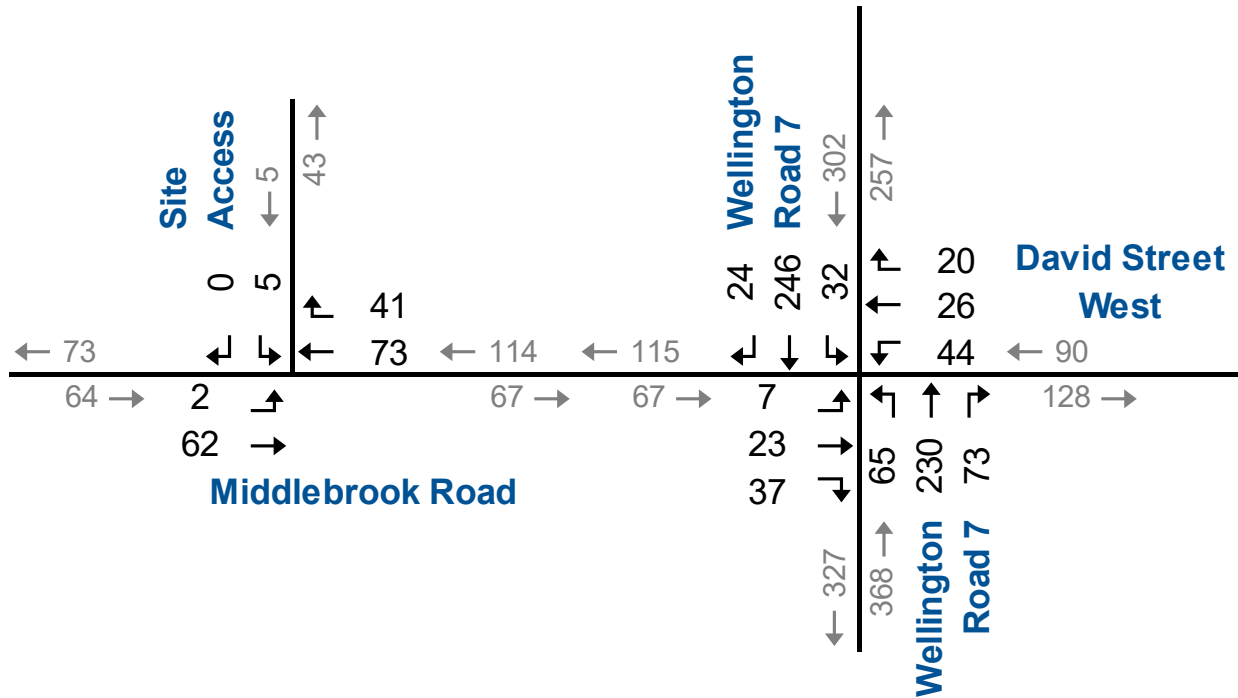
Appendix D contains the supporting detailed Synchro 11 reports.



PM Peak Hour



SAT Peak Hour



2023 Total Traffic Volumes

TABLE 4.2: 2023 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	C 18 0.14 4	> > > >	C 18	< < < <	C 19 0.24 7	> > > >	C 19	A 8 0.03 1	A 0 0.00 0	A 0 0.00 0	A 0	A 9 0.03 1	A 0 0.00 0	A 0 0.00 0	A 1	
	Middlebrook Road & Site Access	TWSC	LOS Delay V/C Q	A 7 0.00 0	A 0 0.00 0		A 0	A 0 0.00 0	A 0 0.00 0		A 0					A 0		> > > >	A 0	
SAT Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	C 15 0.17 4	> > > >	C 15	< < < <	C 22 0.32 10	> > > >	C 22	A 8 0.06 2	A 0 0.00 0	A 0 0.00 0	A 1	A 8 0.03 1	A 0 0.00 0	A 0 0.00 0	A 1	
	Middlebrook Road & Site Access	TWSC	LOS Delay V/C Q	A 7 0.00 0	A 0 0.00 0		A 0	A 0 0.00 0	A 0 0.00 0		A 0					A 9		> > > >	A 9	

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4.3 2028 Horizon

4.3.1 2028 Background Traffic Operations

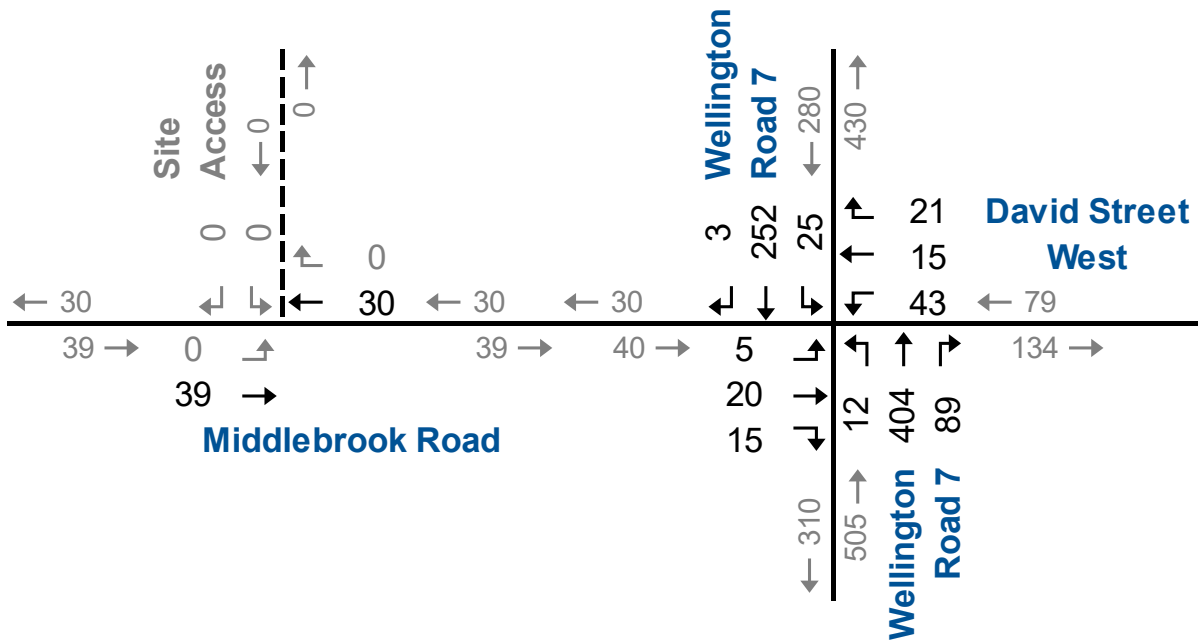
The 2028 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions. **Table 4.3** summarizes the results of the 2028 background traffic operations.

The analyses indicate that all intersections and individual movements within the study area are operating without any critical movements.

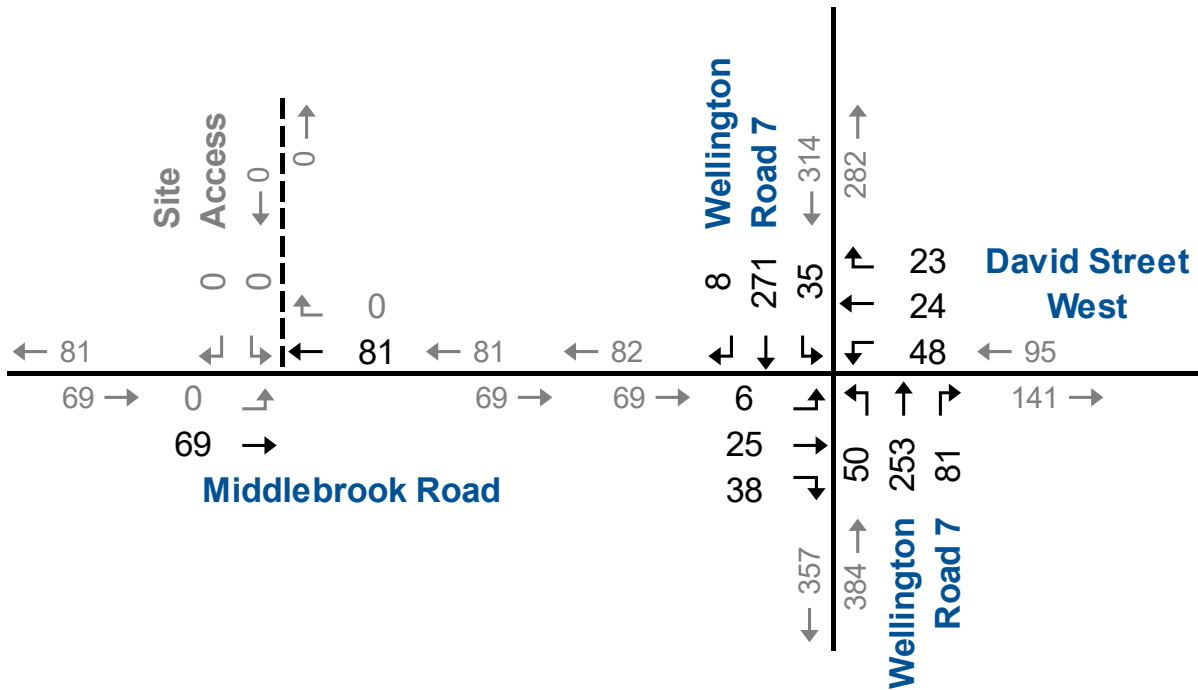
Appendix E contains the supporting detailed Synchro 11 reports.



PM Peak Hour



SAT Peak Hour



2028 Background Traffic Volumes

TABLE 4.3: 2028 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																			
				Eastbound				Westbound				Northbound				Southbound				Overall			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach				
PM Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< 17 < 3	C > 0.12 > 3	> > > >	C 17	< < < <	C > > > >	> > > >	C 22	< < < <	C > > > >	> > > >	A 8 0 0	A 0 0 0	A 0 0 0	A A 0 A	A 9 0 1	A 0 0 0	A 0 0 0	A A A A	A 1
SAT Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< 16 < 5	C > 0.18 > 5	> > > >	C 16	< < < <	C > > > >	> > > >	C 24	< < < <	C > > > >	> > > >	A 8 0 1	A 0 0 0	A 0 0 0	A A 0 A	A 8 0 1	A 0 0 0	A 0 0 0	A A A A	A 1

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4.2.2 2028 Total Traffic Operations

The total traffic volumes are determined by summation of background traffic volumes and site generated traffic site volumes.

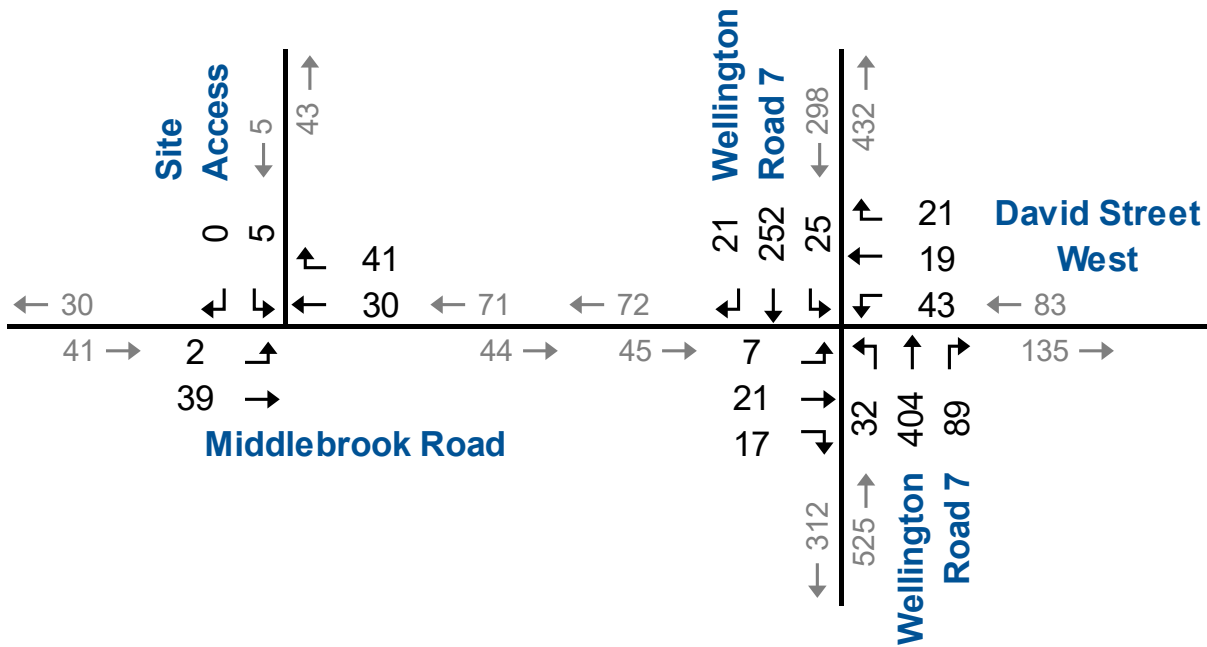
The 2028 total traffic volumes have been analyzed using the same methodology as under existing condition and background condition. **Table 4.4** summarizes the results of the 2027 total traffic operations.

The analyses indicate that all intersections and individual movements within the study area are operating without any critical movements.

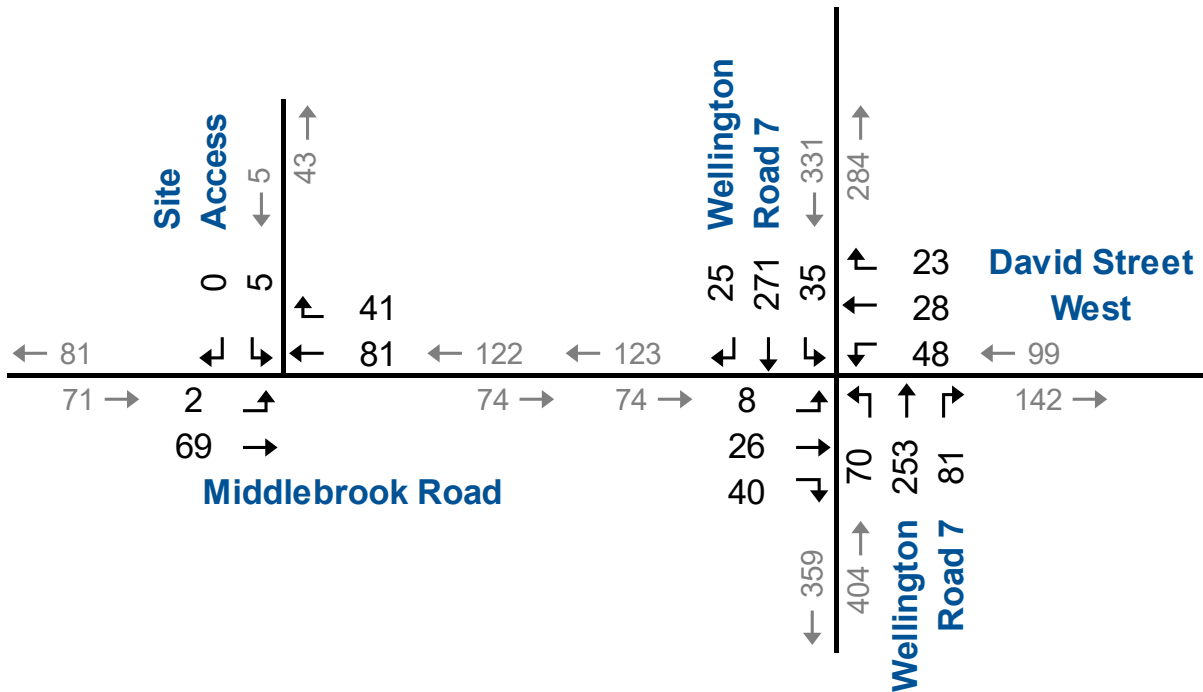
Appendix F contains the supporting detailed Synchro 11 reports.



PM Peak Hour



SAT Peak Hour



2028 Total Traffic Volumes

TABLE 4.4: 2028 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	C 18 0.15 4	> > > >	C 18 C	< < < <	C 25 0.33 10	> > > >	C 25 C	A 8 0.03 1	A 0 0.00 0	A 0 0.00 0	A 0 0.00 0	A 9 0.03 1	A 0 0.00 0	A 0 0.00 0	A 1 A	
	Middlebrook Road & Site Access	TWSC	LOS Delay V/C Q	A 7 0.00 0	A 0 0.00 0	> > > >	A 0 A	< < < <	A 0 0.00 0	> > > >	A 0 0.00 0					A 9 0.01 0	> > > >	A 9 A		
SAT Peak Hour	Wellington Road 7 & Middlebrook Road/David Street West	TWSC	LOS Delay V/C Q	< < < <	C 17 0.21 6	> > > >	C 17 C	< < < <	D 27 0.41 14	> > > >	D 27 D	A 8 0.06 2	A 0 0.00 0	A 0 0.00 0	A 1 A	A 8 0.03 1	A 0 0.00 0	A 0 0.00 0	A 1 A	
	Middlebrook Road & Site Access	TWSC	LOS Delay V/C Q	A 8 0.00 0	A 0 0.00 0	> > > >	A 0 A	< < < <	A 0 0.00 0	> > > >	A 0 0.00 0					A 10 0.01 0	> > > >	A 10 A		

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 </> - Shared with through movement



5 Remedial Measures

The level of service conditions outlined in **Chapter 4** has not identified any areas of concern based on delay.

The following sections discuss the remedial measures necessary to accommodate the future build-out of the subject site.

5.1 Left-turn Lane Requirements

The need for left-turn lanes were assessed using MTO procedures detailed in the MTO Supplement to the TAC Geometric Design Guide ("TAC Guide")² at the following locations:

- ▶ westbound on Middlebrook Road at the site access; and
- ▶ northbound on Wellington Road 7 at Middlebrook Road / David Street West.

The analysis shows that a northbound left-turn lane is warranted on Wellington Road 19 at Middlebrook Road at the 2028 background horizon. This warrant is forecast without the addition of the site generated traffic.

A left-turn lane is not forecast to be warranted at the site driveway on Middlebrook Road.

5.2 Sight Distance Assessment

The required sight distance for the proposed driveway has been assessed based on the methodology outlined TAC Guide. The sight distance requirements for the proposed driveway locations were determined based on a design speed of 100 km/h, 20 km/h above the assumed speed limit on Middlebrook Road. For the purpose of this analysis, sightlines at the driveways were measured the TAC intersection requirements for a left and right-turn from a stop-controlled intersection, which is 210 metres for a left-turn and 185 metres for a right-turn. As well, safe stopping distance was also assessed from the middle on the westbound lane where the requirement is 185 metres.

Paradigm staff completed a site visit in July 2022 to measure the sight distance from and to the driveway location. Sightlines were measured assuming standard driver eye and object height.

² Ontario Ministry of Transportation. 2017. *Ministry of Transportation of Ontario Design Supplement for Transportation Association of Canada's Geometric Design Guide for Canadian Roads*. June 2017.



Intersection Sight Distance

Intersection sight distance represents a vehicle exiting the site. The driver's eye location is taken as 5 metres back from the curb line.

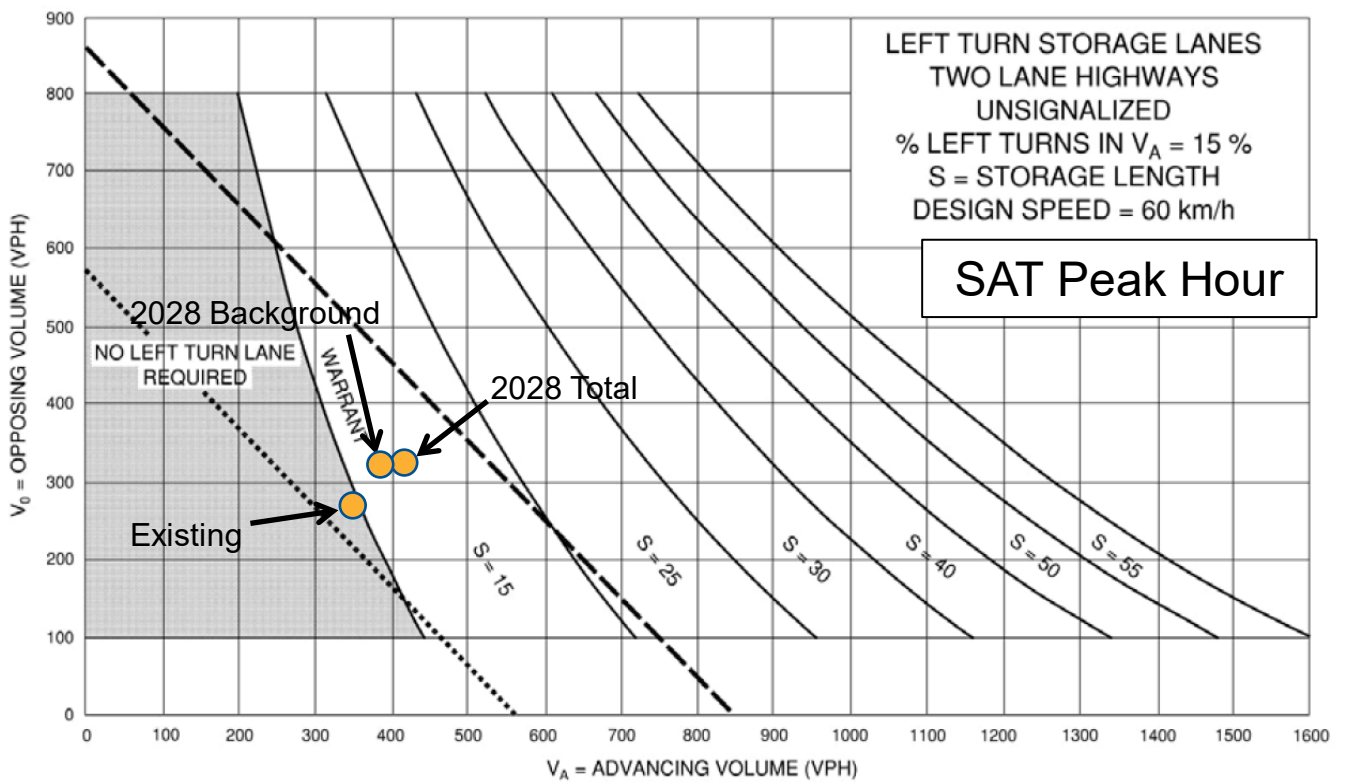
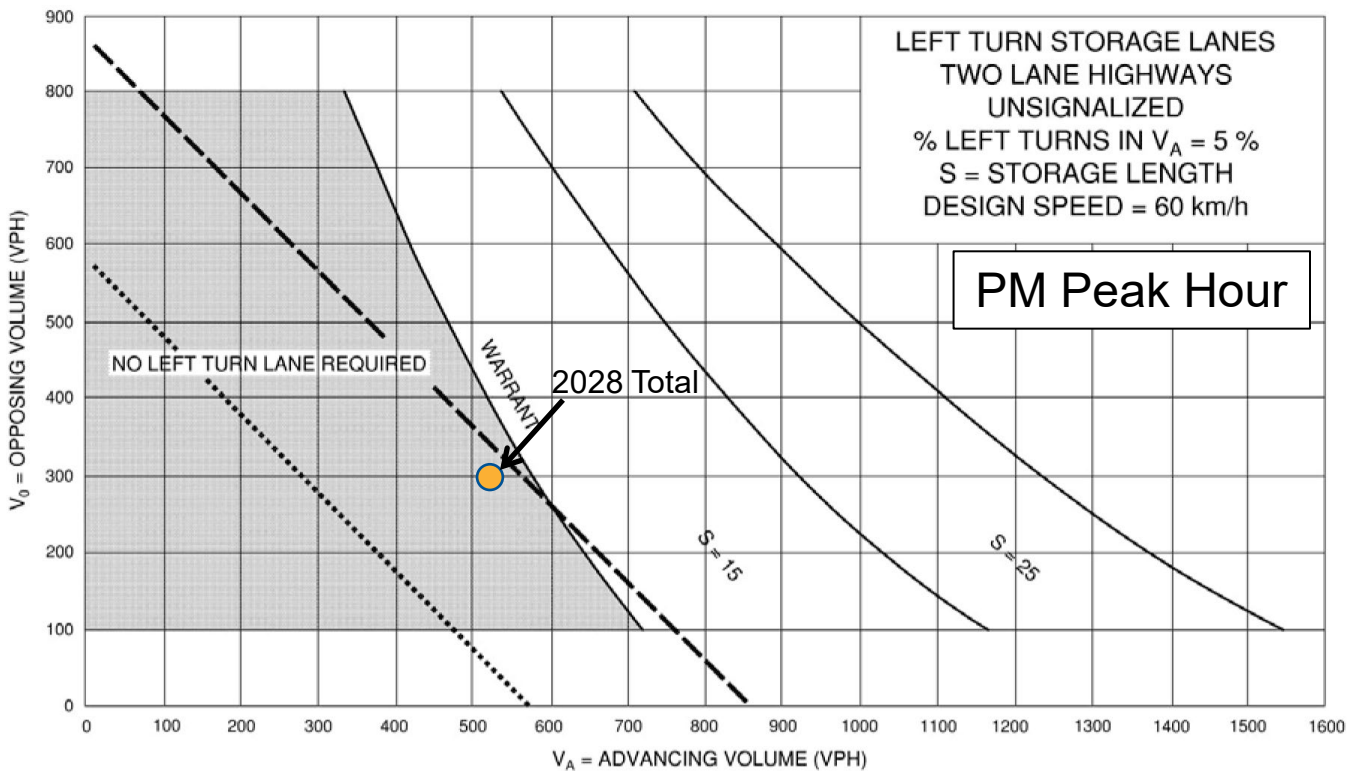
- ▶ For vehicles turning left exiting the site, there is sufficient sight distance to the west.
- ▶ For vehicles turning right exiting the site, sight distance is obscured by trees along the roadway restricting sight distance to 144 metres (less than the minimum 185 metres).

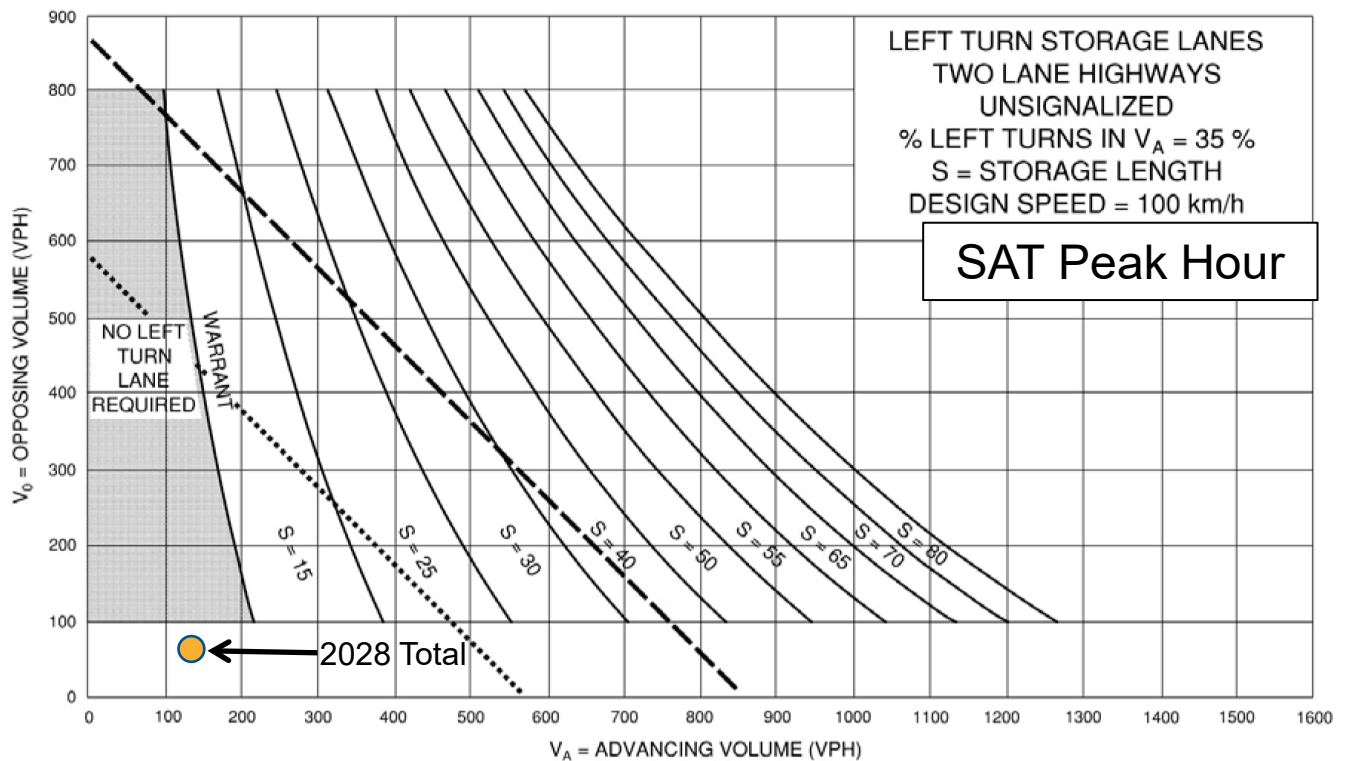
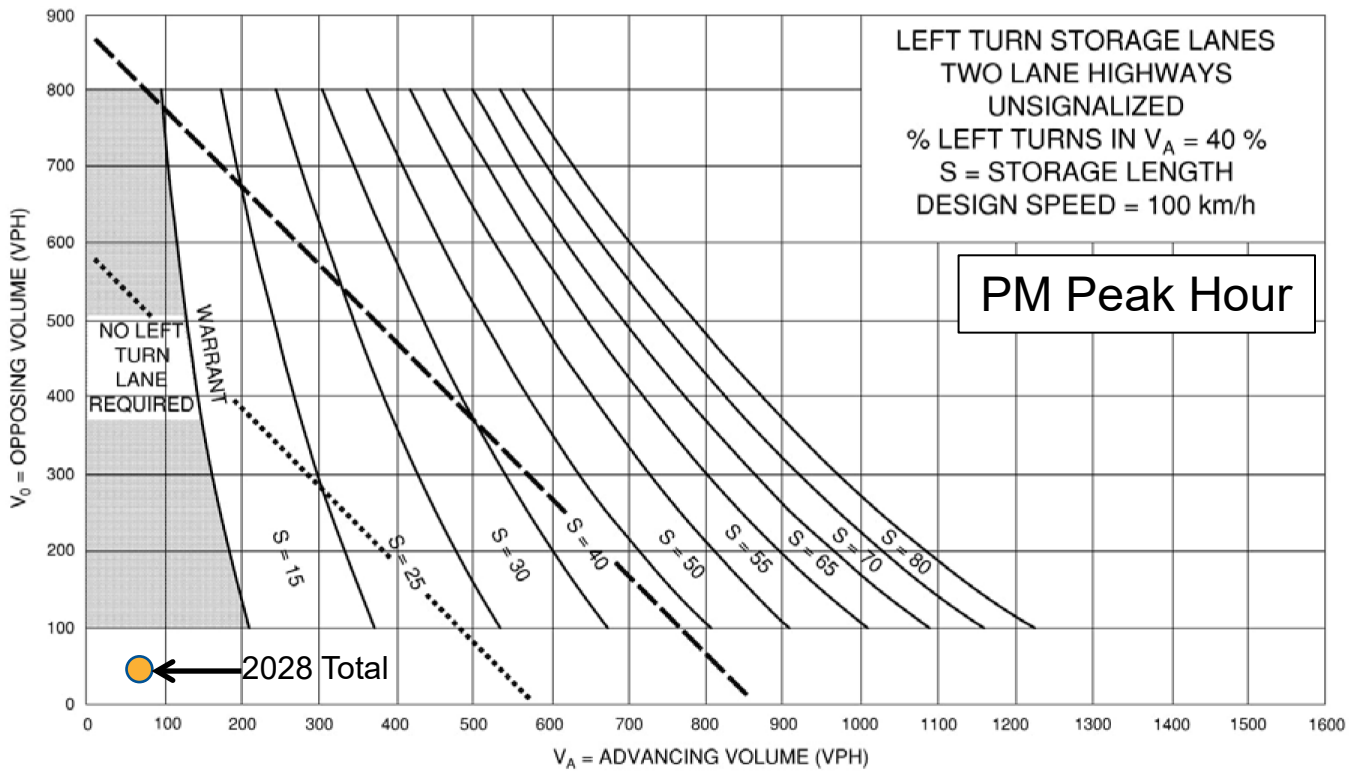
Most vehicles are expected to be turning left towards Wellington Road 7 and therefore have sufficient sight distance. However, for vehicles turning right, the sight distance is restricted by trees along the roadway. It may not be possible to move the driveway further to the west due to the location of a creek. Vehicles may be required to pull further ahead than the 5 metres back from the curb line to see an adequate distance, as they would do presently as it is an existing driveway. To reach the required 185 metres of sight distance, some trees may be required to be removed as shown in **Figure 5.3**.

Stopping Sight Distance

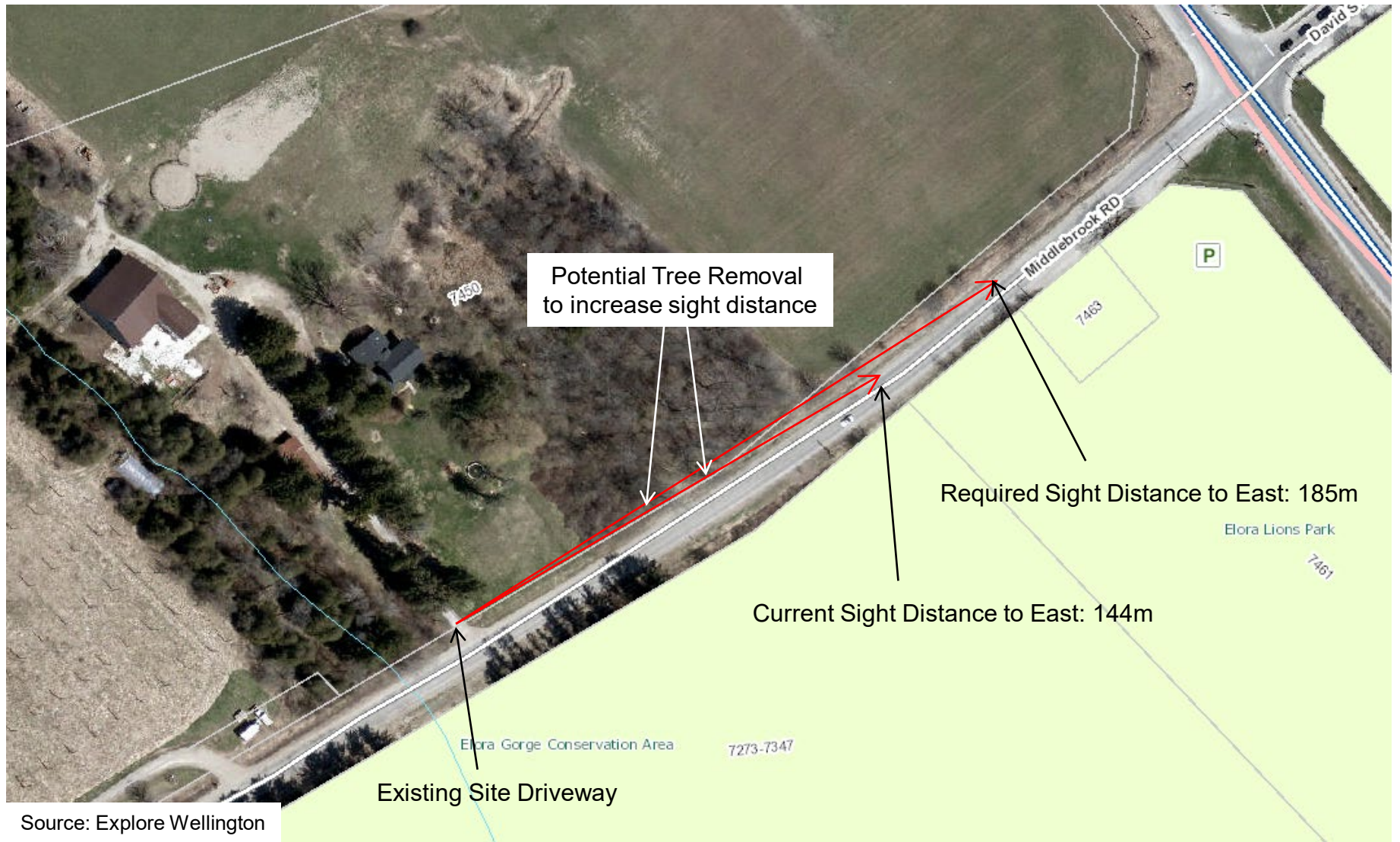
Stopping Sight Distance represents a vehicle on the main road looking towards the site driveway able to see an obstruction (e.g., stopped vehicle) on the road. The driver's eye location is taken to be in the centre of the travel lane.







Left-turn Nomograph Middlebrook Road & Site Access



Sight Distance

6 Conclusions and Recommendations

6.1 Conclusions

The main conclusions of this study are as follows:

- ▶ **Existing Traffic Operations:** The analyses indicate that all intersections within the study area are currently operating adequately;
- ▶ **Development Generated Traffic:** The site is expected to generate a total of 48 peak hour trips;
- ▶ **Background Traffic Operations:** All intersections within the study area are forecast to operate without problem movements by the 2028 Background horizon;
- ▶ **Total Traffic Operations:** All intersections within the study area are forecast to operate without problem movements by the 2028 Total horizon;
- ▶ **Left-turn Lanes:** A northbound left-turn lane is warranted by 2028 background traffic regardless of whether the development is built; and
- ▶ **Sight Distance:** To achieve adequate sight distance to the east from the site driveway, some trees may be required to be removed along the Middlebrook Road.

6.2 Recommendations

Consideration should be given to the removal of some trees on the north side of Middlebrook Road to achieve adequate sight distance to the east from the site driveway.



Appendix A

Existing Turning Movement Count Data





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Wellington Road 7 & Middlebrook
Road - Saturday
Site Code: 210482
Start Date: 06/11/2022
Page No: 1

Turning Movement Data

Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 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	
11:00 AM	1	6	16	0	0	23	9	9	6	0	0	24	8	65	22	0	2	95	6	56	1	0	0	63	205
11:15 AM	1	3	4	0	0	8	10	6	1	0	0	17	9	58	22	0	2	89	6	58	2	0	0	66	180
11:30 AM	2	7	10	0	0	19	14	2	5	0	0	21	3	46	14	0	0	63	11	64	2	0	0	77	180
11:45 AM	1	6	4	0	0	11	10	4	8	0	0	22	24	56	14	0	0	94	8	63	2	0	0	73	200
Hourly Total	5	22	34	0	0	61	43	21	20	0	0	84	44	225	72	0	4	341	31	241	7	0	0	279	765
12:00 PM	3	5	5	0	0	13	15	3	3	0	0	21	4	72	17	0	0	93	10	51	1	0	0	62	189
12:15 PM	1	7	10	0	0	18	13	5	6	0	1	24	5	49	19	0	1	73	12	45	1	0	0	58	173
12:30 PM	1	4	7	0	0	12	11	4	3	0	0	18	9	58	16	0	0	83	5	60	0	0	0	65	178
12:45 PM	2	5	5	0	0	12	13	3	6	0	0	22	4	57	28	0	0	89	5	63	2	0	0	70	193
Hourly Total	7	21	27	0	0	55	52	15	18	0	1	85	22	236	80	0	1	338	32	219	4	0	0	255	733
1:00 PM	1	8	4	0	0	13	20	7	5	0	0	32	9	49	15	1	0	74	5	45	0	0	0	50	169
1:15 PM	1	1	4	0	0	6	11	8	5	0	0	24	4	49	15	0	0	68	0	49	0	0	0	49	147
1:30 PM	1	14	6	0	0	21	13	6	10	0	0	29	3	50	12	0	0	65	3	56	1	0	0	60	175
1:45 PM	2	7	5	0	0	14	16	12	7	0	0	35	3	51	11	0	4	65	8	56	1	0	0	65	179
Hourly Total	5	30	19	0	0	54	60	33	27	0	0	120	19	199	53	1	4	272	16	206	2	0	0	224	670
2:00 PM	0	9	5	0	0	14	12	8	1	0	0	21	1	48	17	0	0	66	5	40	4	0	0	49	150
2:15 PM	0	4	6	0	0	10	15	8	6	0	0	29	3	51	28	0	0	82	5	53	1	0	0	59	180
2:30 PM	0	3	3	0	0	6	22	3	2	0	0	27	4	48	13	0	0	65	7	58	3	0	0	68	166
2:45 PM	2	5	5	0	0	12	17	2	8	0	0	27	11	55	11	0	0	77	5	45	0	0	2	50	166
Hourly Total	2	21	19	0	0	42	66	21	17	0	0	104	19	202	69	0	0	290	22	196	8	0	2	226	662
Grand Total	19	94	99	0	0	212	221	90	82	0	1	393	104	862	274	1	9	1241	101	862	21	0	2	984	2830
Approach %	9.0	44.3	46.7	0.0	-	-	56.2	22.9	20.9	0.0	-	-	8.4	69.5	22.1	0.1	-	-	10.3	87.6	2.1	0.0	-	-	-
Total %	0.7	3.3	3.5	0.0	-	7.5	7.8	3.2	2.9	0.0	-	13.9	3.7	30.5	9.7	0.0	-	43.9	3.6	30.5	0.7	0.0	-	34.8	-
Motorcycles	1	3	12	0	-	16	2	2	0	0	-	4	7	13	2	0	-	22	0	24	0	0	-	24	66
% Motorcycles	5.3	3.2	12.1	-	-	7.5	0.9	2.2	0.0	-	-	1.0	6.7	1.5	0.7	0.0	-	1.8	0.0	2.8	0.0	-	-	2.4	2.3
Cars & Light Goods	16	77	81	0	-	174	217	77	80	0	-	374	79	837	262	1	-	1179	100	818	20	0	-	938	2665
% Cars & Light Goods	84.2	81.9	81.8	-	-	82.1	98.2	85.6	97.6	-	-	95.2	76.0	97.1	95.6	100.0	-	95.0	99.0	94.9	95.2	-	-	95.3	94.2
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	0.0	-	-	0.0	0.0
Single-Unit Trucks	1	0	0	0	-	1	1	0	1	0	-	2	1	7	3	0	-	11	1	8	0	0	-	9	23
% Single-Unit Trucks	5.3	0.0	0.0	-	-	0.5	0.5	0.0	1.2	-	-	0.5	1.0	0.8	1.1	0.0	-	0.9	1.0	0.9	0.0	-	-	0.9	0.8
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	5	0	0	-	5	0	11	0	0	-	11	16
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.6	0.0	0.0	-	0.4	0.0	1.3	0.0	-	-	1.1	0.6

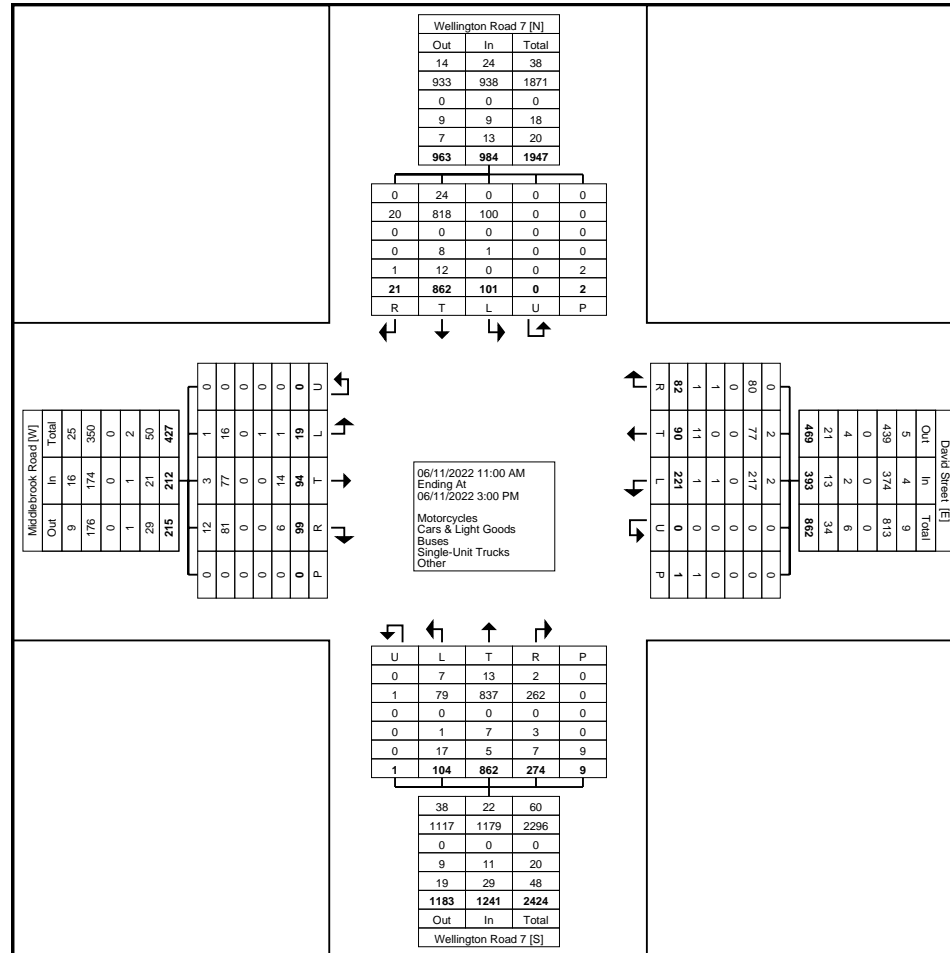
Bicycles on Road	1	14	6	0	-	21	1	11	1	0	-	13	17	0	7	0	-	24	0	1	1	0	-	2	60
% Bicycles on Road	5.3	14.9	6.1	-	-	9.9	0.5	12.2	1.2	-	-	3.3	16.3	0.0	2.6	0.0	-	1.9	0.0	0.1	4.8	-	-	0.2	2.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	11.1	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	88.9	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Wellington Road 7 & Middlebrook Road - Saturday
Site Code: 210482
Start Date: 06/11/2022
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Wellington Road 7 & Middlebrook
Road - Saturday
Site Code: 210482
Start Date: 06/11/2022
Page No: 4

Turning Movement Peak Hour Data (11:00 AM)

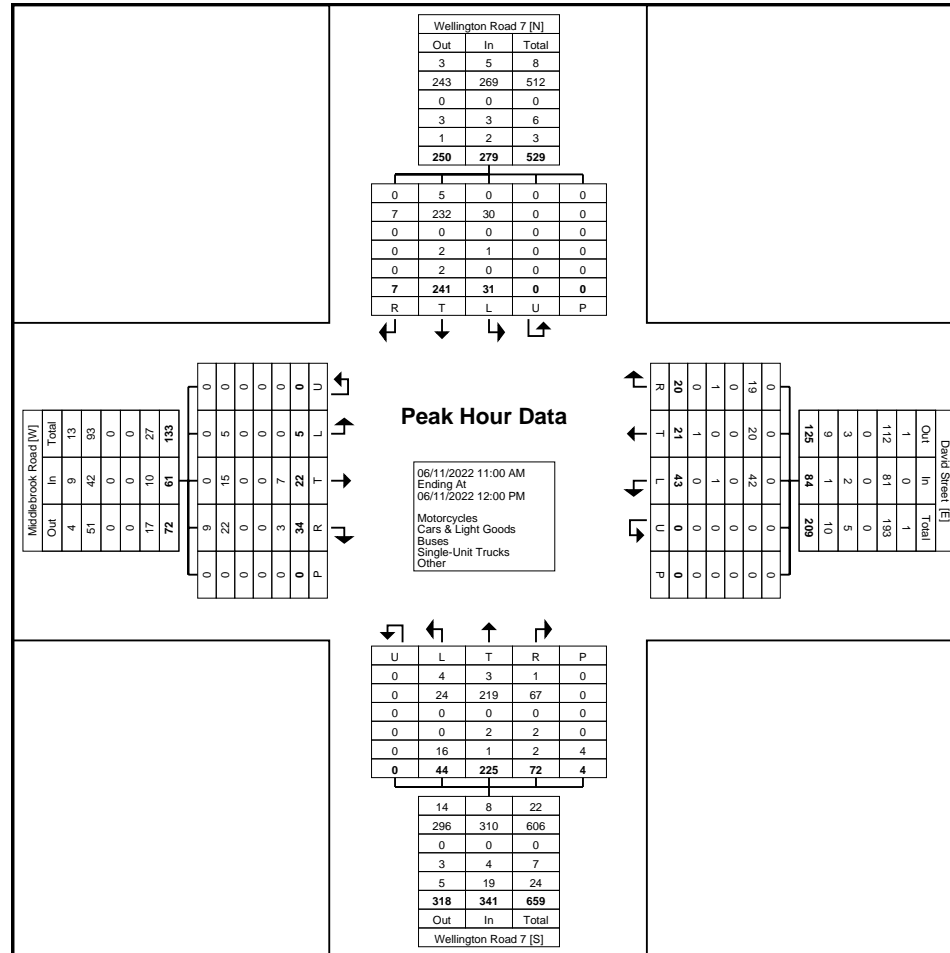
Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
11:00 AM	1	6	16	0	0	23	9	9	6	0	0	24	8	65	22	0	2	95	6	56	1	0	0	63	205
11:15 AM	1	3	4	0	0	8	10	6	1	0	0	17	9	58	22	0	2	89	6	58	2	0	0	66	180
11:30 AM	2	7	10	0	0	19	14	2	5	0	0	21	3	46	14	0	0	63	11	64	2	0	0	77	180
11:45 AM	1	6	4	0	0	11	10	4	8	0	0	22	24	56	14	0	0	94	8	63	2	0	0	73	200
Total	5	22	34	0	0	61	43	21	20	0	0	84	44	225	72	0	4	341	31	241	7	0	0	279	765
Approach %	8.2	36.1	55.7	0.0	-	-	51.2	25.0	23.8	0.0	-	-	12.9	66.0	21.1	0.0	-	-	11.1	86.4	2.5	0.0	-	-	-
Total %	0.7	2.9	4.4	0.0	-	8.0	5.6	2.7	2.6	0.0	-	11.0	5.8	29.4	9.4	0.0	-	44.6	4.1	31.5	0.9	0.0	-	36.5	-
PHF	0.625	0.786	0.531	0.000	-	0.663	0.768	0.583	0.625	0.000	-	0.875	0.458	0.865	0.818	0.000	-	0.897	0.705	0.941	0.875	0.000	-	0.906	0.933
Motorcycles	0	0	9	0	-	9	0	0	0	0	-	0	4	3	1	0	-	8	0	5	0	0	-	5	22
% Motorcycles	0.0	0.0	26.5	-	-	14.8	0.0	0.0	0.0	-	-	0.0	9.1	1.3	1.4	-	-	2.3	0.0	2.1	0.0	-	-	1.8	2.9
Cars & Light Goods	5	15	22	0	-	42	42	20	19	0	-	81	24	219	67	0	-	310	30	232	7	0	-	269	702
% Cars & Light Goods	100.0	68.2	64.7	-	-	68.9	97.7	95.2	95.0	-	-	96.4	54.5	97.3	93.1	-	-	90.9	96.8	96.3	100.0	-	-	96.4	91.8
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	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	0	-	0	1	0	1	0	-	2	0	2	2	0	-	4	1	2	0	0	-	3	9
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	2.3	0.0	5.0	-	-	2.4	0.0	0.9	2.8	-	-	1.2	3.2	0.8	0.0	-	-	1.1	1.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	2	0	0	-	2	3
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.8	0.0	-	-	0.7	0.4
Bicycles on Road	0	7	3	0	-	10	0	1	0	0	-	1	16	0	2	0	-	18	0	0	0	0	-	0	29
% Bicycles on Road	0.0	31.8	8.8	-	-	16.4	0.0	4.8	0.0	-	-	1.2	36.4	0.0	2.8	-	-	5.3	0.0	0.0	0.0	-	-	0.0	3.8
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Wellington Road 7 & Middlebrook
Road - Saturday
Site Code: 210482
Start Date: 06/11/2022
Page No: 5



Turning Movement Peak Hour Data Plot (11:00 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts.com

Count Name: Wellington Road 7 & Middlebrook
Road - Weekday
Site Code: 210482
Start Date: 06/08/2022
Page No: 1

Turning Movement Data

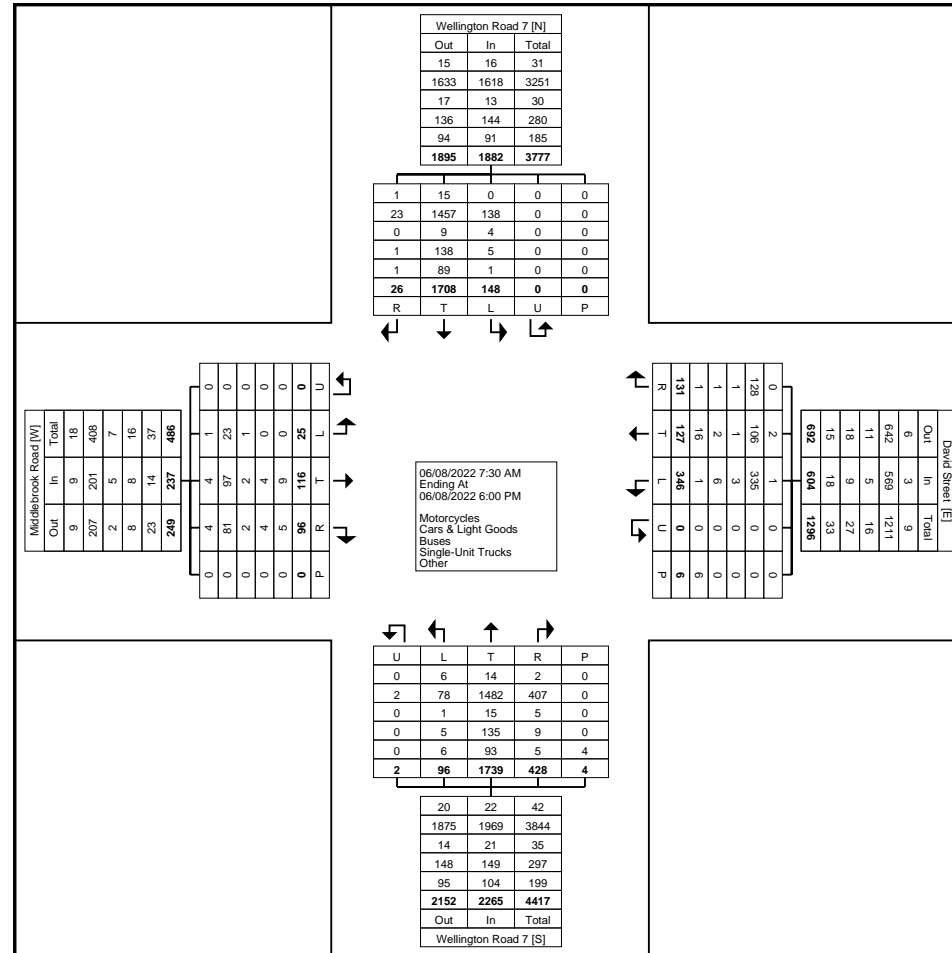
Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	0	3	5	0	0	8	17	2	1	0	1	20	0	42	7	0	0	49	1	71	0	0	0	72	149
7:45 AM	0	2	1	0	0	3	17	2	0	0	0	19	1	47	9	0	0	57	5	62	3	0	0	70	149
Hourly Total	0	5	6	0	0	11	34	4	1	0	1	39	1	89	16	0	0	106	6	133	3	0	0	142	298
8:00 AM	3	0	3	0	0	6	22	4	4	0	1	30	1	40	7	0	0	48	6	52	0	0	0	58	142
8:15 AM	0	4	1	0	0	5	23	4	2	0	0	29	1	40	11	0	0	52	6	51	0	0	0	57	143
8:30 AM	1	0	2	0	0	3	15	3	4	0	0	22	4	38	12	0	0	54	6	60	1	0	0	67	146
8:45 AM	1	3	3	0	0	7	6	3	1	0	0	10	3	35	15	0	0	53	7	51	0	0	0	58	128
Hourly Total	5	7	9	0	0	21	66	14	11	0	1	91	9	153	45	0	0	207	25	214	1	0	0	240	559
9:00 AM	0	3	4	0	0	7	8	10	1	0	0	19	2	28	10	0	2	40	4	56	0	0	0	60	126
9:15 AM	0	0	3	0	0	3	4	2	4	0	0	10	3	50	14	0	0	67	5	54	0	0	0	59	139
9:30 AM	0	4	5	0	0	9	9	2	3	0	0	14	1	27	10	0	0	38	4	58	2	0	0	64	125
9:45 AM	0	4	1	0	0	5	10	6	5	0	1	21	2	33	8	0	0	43	7	58	1	0	0	66	135
Hourly Total	0	11	13	0	0	24	31	20	13	0	1	64	8	138	42	0	2	188	20	226	3	0	0	249	525
10:00 AM	1	3	0	0	0	4	7	2	2	0	0	11	3	57	5	0	0	65	2	41	1	0	0	44	124
10:15 AM	0	4	3	0	0	7	11	5	4	0	0	20	2	35	13	0	0	50	4	50	3	0	0	57	134
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	1	7	3	0	0	11	18	7	6	0	0	31	5	92	18	0	0	115	6	91	4	0	0	101	258
12:00 PM	1	4	2	0	0	7	7	3	4	0	0	14	2	59	11	0	0	72	3	60	1	0	0	64	157
12:15 PM	0	6	9	0	0	15	12	7	5	0	0	24	3	43	7	0	0	53	5	38	1	0	0	44	136
12:30 PM	0	4	4	0	0	8	6	5	5	0	0	16	7	46	10	1	0	64	3	38	2	0	0	43	131
12:45 PM	1	5	2	0	0	8	3	3	2	0	0	8	3	43	10	0	0	56	5	57	1	0	0	63	135
Hourly Total	2	19	17	0	0	38	28	18	16	0	0	62	15	191	38	1	0	245	16	193	5	0	0	214	559
1:00 PM	0	2	1	0	0	3	8	5	9	0	0	22	6	42	12	0	0	60	4	34	0	0	0	38	123
1:15 PM	1	3	1	0	0	5	11	3	5	0	0	19	4	39	7	1	0	51	1	42	2	0	0	45	120
1:30 PM	0	5	4	0	0	9	9	3	5	0	0	17	4	41	9	0	0	54	5	60	0	0	0	65	145
1:45 PM	2	4	7	0	0	13	15	3	2	0	0	20	4	44	8	0	0	56	2	50	1	0	0	53	142
Hourly Total	3	14	13	0	0	30	43	14	21	0	0	78	18	166	36	1	0	221	12	186	3	0	0	201	530
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	2	4	0	0	7	7	1	3	0	2	11	3	62	17	0	0	82	5	50	1	0	0	56	156
3:15 PM	4	2	1	0	0	7	11	4	4	0	0	19	0	67	14	0	0	81	3	53	0	0	0	56	163
3:30 PM	0	3	1	0	0	4	15	7	12	0	0	34	4	78	13	0	0	95	8	48	0	0	0	56	189
3:45 PM	1	5	1	0	0	7	17	6	6	0	0	29	5	75	27	0	0	107	9	57	1	0	0	67	210
Hourly Total	6	12	7	0	0	25	50	18	25	0	2	93	12	282	71	0	0	365	25	208	2	0	0	235	718
4:00 PM	1	3	3	0	0	7	10	3	8	0	0	21	3	91	22	0	0	116	5	48	0	0	0	53	197
4:15 PM	1	3	1	0	0	5	10	10	3	0	0	23	2	70	19	0	0	91	3	47	0	0	0	50	169



Paradigm Transportation Solutions Limited
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Count Name: Wellington Road 7 & Middlebrook Road - Weekday
Site Code: 210482
Start Date: 06/08/2022
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Wellington Road 7 & Middlebrook
Road - Weekday
Site Code: 210482
Start Date: 06/08/2022
Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 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	
7:30 AM	0	3	5	0	0	8	17	2	1	0	1	20	0	42	7	0	0	49	1	71	0	0	0	72	149
7:45 AM	0	2	1	0	0	3	17	2	0	0	0	19	1	47	9	0	0	57	5	62	3	0	0	70	149
8:00 AM	3	0	3	0	0	6	22	4	4	0	1	30	1	40	7	0	0	48	6	52	0	0	0	58	142
8:15 AM	0	4	1	0	0	5	23	4	2	0	0	29	1	40	11	0	0	52	6	51	0	0	0	57	143
Total	3	9	10	0	0	22	79	12	7	0	2	98	3	169	34	0	0	206	18	236	3	0	0	257	583
Approach %	13.6	40.9	45.5	0.0	-	-	80.6	12.2	7.1	0.0	-	-	1.5	82.0	16.5	0.0	-	-	7.0	91.8	1.2	0.0	-	-	-
Total %	0.5	1.5	1.7	0.0	-	3.8	13.6	2.1	1.2	0.0	-	16.8	0.5	29.0	5.8	0.0	-	35.3	3.1	40.5	0.5	0.0	-	44.1	-
PHF	0.250	0.563	0.500	0.000	-	0.688	0.859	0.750	0.438	0.000	-	0.817	0.750	0.899	0.773	0.000	-	0.904	0.750	0.831	0.250	0.000	-	0.892	0.978
Motorcycles	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	0	3	0	0	-	3	4
% Motorcycles	0.0	0.0	0.0	-	-	0.0	1.3	0.0	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.0	1.3	0.0	-	-	1.2	0.7
Cars & Light Goods	2	8	9	0	-	19	76	11	7	0	-	94	3	137	33	0	-	173	14	200	3	0	-	217	503
% Cars & Light Goods	66.7	88.9	90.0	-	-	86.4	96.2	91.7	100.0	-	-	95.9	100.0	81.1	97.1	-	-	84.0	77.8	84.7	100.0	-	-	84.4	86.3
Buses	1	0	1	0	-	2	2	0	0	0	-	2	0	1	0	0	-	1	2	5	0	0	-	7	12
% Buses	33.3	0.0	10.0	-	-	9.1	2.5	0.0	0.0	-	-	2.0	0.0	0.6	0.0	-	-	0.5	11.1	2.1	0.0	-	-	2.7	2.1
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	22	1	0	-	23	2	14	0	0	-	16	39
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	13.0	2.9	-	-	11.2	11.1	5.9	0.0	-	-	6.2	6.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	9	0	0	-	9	0	14	0	0	-	14	23
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	5.3	0.0	-	-	4.4	0.0	5.9	0.0	-	-	5.4	3.9
Bicycles on Road	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	11.1	0.0	-	-	4.5	0.0	8.3	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Wellington Road 7 & Middlebrook
Road - Weekday
Site Code: 210482
Start Date: 06/08/2022
Page No: 6

Turning Movement Peak Hour Data (12:00 PM)

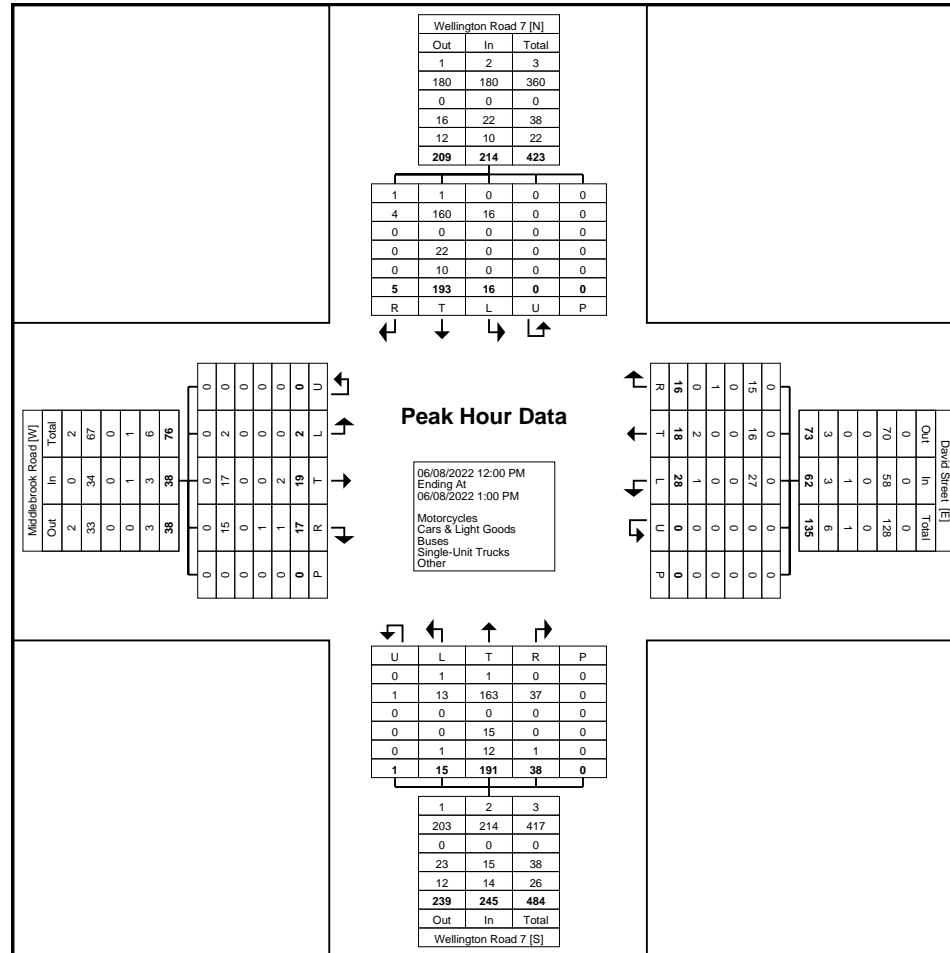
Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	1	4	2	0	0	7	7	3	4	0	0	14	2	59	11	0	0	72	3	60	1	0	0	64	157
12:15 PM	0	6	9	0	0	15	12	7	5	0	0	24	3	43	7	0	0	53	5	38	1	0	0	44	136
12:30 PM	0	4	4	0	0	8	6	5	5	0	0	16	7	46	10	1	0	64	3	38	2	0	0	43	131
12:45 PM	1	5	2	0	0	8	3	3	2	0	0	8	3	43	10	0	0	56	5	57	1	0	0	63	135
Total	2	19	17	0	0	38	28	18	16	0	0	62	15	191	38	1	0	245	16	193	5	0	0	214	559
Approach %	5.3	50.0	44.7	0.0	-	-	45.2	29.0	25.8	0.0	-	-	6.1	78.0	15.5	0.4	-	-	7.5	90.2	2.3	0.0	-	-	-
Total %	0.4	3.4	3.0	0.0	-	6.8	5.0	3.2	2.9	0.0	-	11.1	2.7	34.2	6.8	0.2	-	43.8	2.9	34.5	0.9	0.0	-	38.3	-
PHF	0.500	0.792	0.472	0.000	-	0.633	0.583	0.643	0.800	0.000	-	0.646	0.536	0.809	0.864	0.250	-	0.851	0.800	0.804	0.625	0.000	-	0.836	0.890
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	1	1	0	0	-	2	0	1	1	0	-	2	4
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	6.7	0.5	0.0	0.0	-	0.8	0.0	0.5	20.0	-	-	0.9	0.7
Cars & Light Goods	2	17	15	0	-	34	27	16	15	0	-	58	13	163	37	1	-	214	16	160	4	0	-	180	486
% Cars & Light Goods	100.0	89.5	88.2	-	-	89.5	96.4	88.9	93.8	-	-	93.5	86.7	85.3	97.4	100.0	-	87.3	100.0	82.9	80.0	-	-	84.1	86.9
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	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	1	0	-	1	0	0	1	0	-	1	0	15	0	0	-	15	0	22	0	0	-	22	39
% Single-Unit Trucks	0.0	0.0	5.9	-	-	2.6	0.0	0.0	6.3	-	-	1.6	0.0	7.9	0.0	0.0	-	6.1	0.0	11.4	0.0	-	-	10.3	7.0
Articulated Trucks	0	0	1	0	-	1	1	0	0	0	-	1	1	12	0	0	-	13	0	10	0	0	-	10	25
% Articulated Trucks	0.0	0.0	5.9	-	-	2.6	3.6	0.0	0.0	-	-	1.6	6.7	6.3	0.0	0.0	-	5.3	0.0	5.2	0.0	-	-	4.7	4.5
Bicycles on Road	0	2	0	0	-	2	0	2	0	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	5
% Bicycles on Road	0.0	10.5	0.0	-	-	5.3	0.0	11.1	0.0	-	-	3.2	0.0	0.0	2.6	0.0	-	0.4	0.0	0.0	0.0	-	-	0.0	0.9
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Start Date: 06/08/2022
Page No: 7



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



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Page No: 8

Turning Movement Peak Hour Data (4:30 PM)

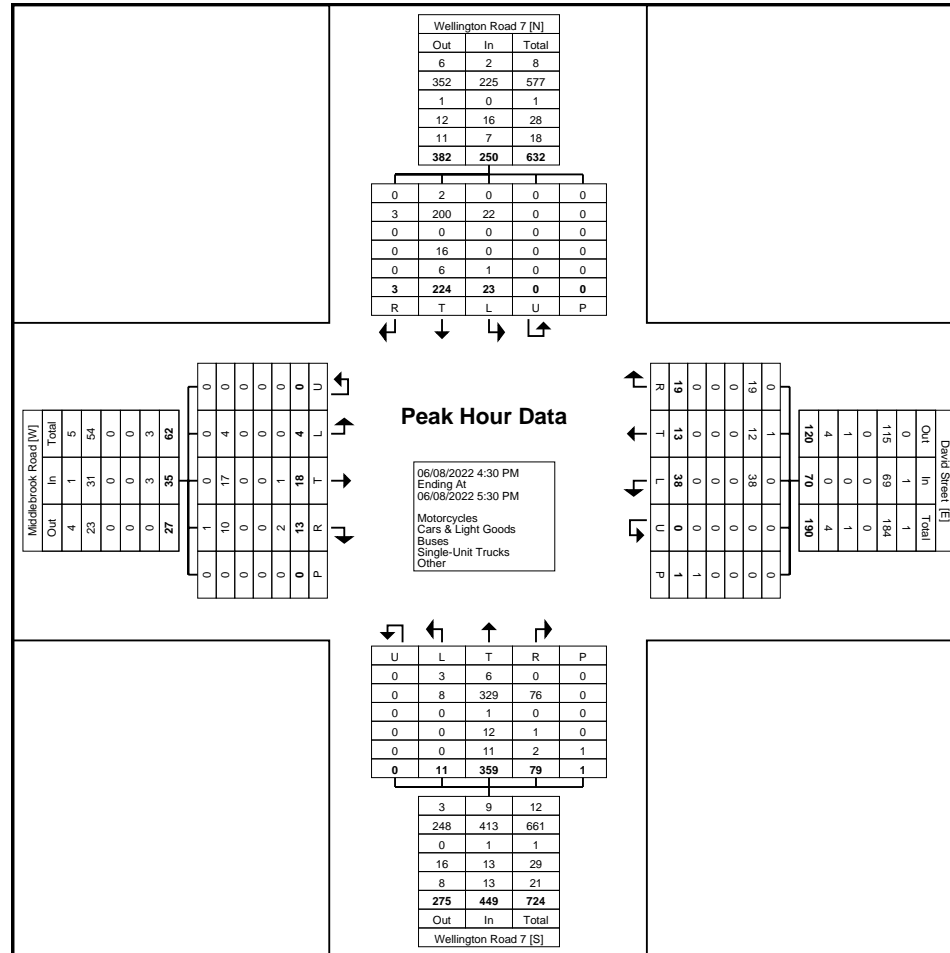
Start Time	Middlebrook Road Eastbound						David Street Westbound						Wellington Road 7 Northbound						Wellington Road 7 Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	1	2	1	0	0	4	13	2	5	0	0	20	0	100	26	0	0	126	6	39	0	0	0	45	195
4:45 PM	1	7	5	0	0	13	10	4	7	0	0	21	2	97	20	0	0	119	7	55	0	0	0	62	215
5:00 PM	2	6	3	0	0	11	9	4	5	0	1	18	6	88	18	0	0	112	5	59	2	0	0	66	207
5:15 PM	0	3	4	0	0	7	6	3	2	0	0	11	3	74	15	0	1	92	5	71	1	0	0	77	187
Total	4	18	13	0	0	35	38	13	19	0	1	70	11	359	79	0	1	449	23	224	3	0	0	250	804
Approach %	11.4	51.4	37.1	0.0	-	-	54.3	18.6	27.1	0.0	-	-	2.4	80.0	17.6	0.0	-	-	9.2	89.6	1.2	0.0	-	-	-
Total %	0.5	2.2	1.6	0.0	-	4.4	4.7	1.6	2.4	0.0	-	8.7	1.4	44.7	9.8	0.0	-	55.8	2.9	27.9	0.4	0.0	-	31.1	-
PHF	0.500	0.643	0.650	0.000	-	0.673	0.731	0.813	0.679	0.000	-	0.833	0.458	0.898	0.760	0.000	-	0.891	0.821	0.789	0.375	0.000	-	0.812	0.935
Motorcycles	0	0	1	0	-	1	0	1	0	0	-	1	3	6	0	0	-	9	0	2	0	0	-	2	13
% Motorcycles	0.0	0.0	7.7	-	-	2.9	0.0	7.7	0.0	-	-	1.4	27.3	1.7	0.0	-	-	2.0	0.0	0.9	0.0	-	-	0.8	1.6
Cars & Light Goods	4	17	10	0	-	31	38	12	19	0	-	69	8	329	76	0	-	413	22	200	3	0	-	225	738
% Cars & Light Goods	100.0	94.4	76.9	-	-	88.6	100.0	92.3	100.0	-	-	98.6	72.7	91.6	96.2	-	-	92.0	95.7	89.3	100.0	-	-	90.0	91.8
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.1
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	12	1	0	-	13	0	16	0	0	-	16	29
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	3.3	1.3	-	-	2.9	0.0	7.1	0.0	-	-	6.4	3.6
Articulated Trucks	0	0	1	0	-	1	0	0	0	0	-	0	0	10	0	0	-	10	1	6	0	0	-	7	18
% Articulated Trucks	0.0	0.0	7.7	-	-	2.9	0.0	0.0	0.0	-	-	0.0	0.0	2.8	0.0	-	-	2.2	4.3	2.7	0.0	-	-	2.8	2.2
Bicycles on Road	0	1	1	0	-	2	0	0	0	0	-	0	0	1	2	0	-	3	0	0	0	0	-	0	5
% Bicycles on Road	0.0	5.6	7.7	-	-	5.7	0.0	0.0	0.0	-	-	0.0	0.0	0.3	2.5	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-



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Start Date: 06/08/2022
Page No: 9



Turning Movement Peak Hour Data Plot (4:30 PM)

Appendix B

Existing Traffic Operations Reports



Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
Existing PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	35	27	0	0	0
Future Volume (vph)	0	35	27	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit						
Fit Protected						
Satd. Flow (prot)	0	1845	1900	0	1900	0
Fit Permitted						
Satd. Flow (perm)	0	1845	1900	0	1900	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	38	29	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	38	29	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	6.7%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
Existing PM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	0	35	27	0	0	0
Future Vol, veh/h	0	35	27	0	0	0
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, %	0	3	0	0	0	0
Mvmt Flow	0	38	29	0	0	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	29	0	67
Stage 1	-	-	29
Stage 2	-	-	38
Critical Hdwy	4.1	-	6.2
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1597	-	943
Stage 1	-	-	999
Stage 2	-	-	990
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1597	-	943
Mov Cap-2 Maneuver	-	-	943
Stage 1	-	-	999
Stage 2	-	-	990

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1597	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West Existing SAT Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	22	34	43	21	20	44	225	72	31	241	20
Future Volume (vph)	5	22	34	43	21	20	44	225	72	31	241	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.924			0.968			0.972			0.991	
Fit Protected		0.996			0.975			0.994			0.995	
Satd. Flow (prot)	0	1749	0	0	1754	0	0	1812	0	0	1837	0
Fit Permitted		0.996			0.975			0.994			0.995	
Satd. Flow (perm)	0	1749	0	0	1754	0	0	1812	0	0	1837	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	1%	3%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	24	37	47	23	22	48	245	78	34	262	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	66	0	0	92	0	0	371	0	0	318	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.3%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West Existing SAT Peak Hour

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	22	34	43	21	20	44	225	72	31	241	20
Future Vol, veh/h	5	22	34	43	21	20	44	225	72	31	241	20
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, %	0	0	0	2	0	5	0	1	3	3	2	0
Mvmt Flow	5	24	37	47	23	22	48	245	78	34	262	22

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	744	760	273	752
Stage 1	341	341	-	380
Stage 2	403	419	-	372
Critical Hdwy	7.1	6.5	6.2	7.12
Critical Hdwy Stg 1	6.1	5.5	-	6.12
Critical Hdwy Stg 2	6.1	5.5	-	6.12
Follow-up Hdwy	3.5	4	3.3	3.518
Pot Cap-1 Maneuver	333	338	771	327
Stage 1	678	642	-	642
Stage 2	628	593	-	648
Platoon blocked, %				
Mov Cap-1 Maneuver	288	312	771	276
Mov Cap-2 Maneuver	288	312	-	276
Stage 1	647	621	-	612
Stage 2	559	566	-	574

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	19.4	1	0.9
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1290	-	-	462	340	1231	-	-
HCM Lane V/C Ratio	0.037	-	-	0.144	0.269	0.027	-	-
HCM Control Delay (s)	7.9	0	-	14.1	19.4	8	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	1.1	0.1	-	-

Appendix C

2023 Background Traffic Operations Reports



Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Background PM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	36	28	0	0	0
Future Volume (vph)	0	36	28	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit						
Fit Protected						
Satd. Flow (prot)	0	1845	1900	0	1900	0
Fit Permitted						
Satd. Flow (perm)	0	1845	1900	0	1900	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	39	30	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	39	30	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	6.7%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Background PM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	0	36	28	0	0	0
Future Vol, veh/h	0	36	28	0	0	0
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, %	0	3	0	0	0	0
Mvmt Flow	0	39	30	0	0	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	30	0	69
Stage 1	-	-	30
Stage 2	-	-	39
Critical Hdwy	4.1	-	6.2
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.3
Pot Cap-1 Maneuver	1596	-	1050
Stage 1	-	-	998
Stage 2	-	-	989
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1596	-	1050
Mov Cap-2 Maneuver	-	-	941
Stage 1	-	-	998
Stage 2	-	-	989

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1596	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2023 Background SAT Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	22	35	44	21	20	45	230	73	32	246	7
Future Volume (vph)	5	22	35	44	21	20	45	230	73	32	246	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.923			0.968			0.972			0.997	
Fit Protected		0.996			0.975			0.994			0.994	
Satd. Flow (prot)	0	1747	0	0	1754	0	0	1812	0	0	1845	0
Fit Permitted		0.996			0.975			0.994			0.994	
Satd. Flow (perm)	0	1747	0	0	1754	0	0	1812	0	0	1845	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	1%	3%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	24	38	48	23	22	49	250	79	35	267	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	0	0	93	0	0	378	0	0	310	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.5%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2023 Background SAT Peak Hour

Intersection												
Int Delay, s/veh	4.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	22	35	44	21	20	45	230	73	32	246	7
Future Vol, veh/h	5	22	35	44	21	20	45	230	73	32	246	7
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, %	0	0	0	2	0	5	0	1	3	3	2	0
Mvmt Flow	5	24	38	48	23	22	49	250	79	35	267	8

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	751	768	271	760
Stage 1	341	341	-	388
Stage 2	410	427	-	372
Critical Hdwy	7.1	6.5	6.2	7.12
Critical Hdwy Stg 1	6.1	5.5	-	6.12
Critical Hdwy Stg 2	6.1	5.5	-	6.12
Follow-up Hdwy	3.5	4	3.3	3.518
Pot Cap-1 Maneuver	330	334	773	323
Stage 1	678	642	-	636
Stage 2	623	589	-	648
Platoon blocked, %				
Mov Cap-1 Maneuver	285	308	773	272
Mov Cap-2 Maneuver	285	308	-	272
Stage 1	646	620	-	606
Stage 2	554	561	-	572

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	19.8	1	0.9
HCM LOS	B	C		


Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1300	-	-	462	335	1225	-	-
HCM Lane V/C Ratio	0.038	-	-	0.146	0.276	0.028	-	-
HCM Control Delay (s)	7.9	0	-	14.1	19.8	8	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	1.1	0.1	-	-

Appendix D

2023 Total Traffic Operations Reports



Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2023 Total PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	6	19	15	19	18	39	32	404	89	25	252	21
Future Volume (vph)	6	19	15	19	18	39	32	404	89	25	252	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.951			0.932			0.977			0.990	
Fit Protected		0.992			0.988			0.997			0.996	
Satd. Flow (prot)	0	1742	0	0	1750	0	0	1766	0	0	1721	0
Fit Permitted		0.992			0.988			0.997			0.996	
Satd. Flow (perm)	0	1742	0	0	1750	0	0	1766	0	0	1721	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	0%	6%	1%	5%	10%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	7	21	16	21	20	42	35	439	97	27	274	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	83	0	0	571	0	0	324	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	48.5%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2023 Total PM Peak Hour

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	19	15	19	18	39	32	404	89	25	252	21
Future Vol, veh/h	6	19	15	19	18	39	32	404	89	25	252	21
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, %	0	0	8	0	0	0	0	6	1	5	10	0
Mvmt Flow	7	21	16	21	20	42	35	439	97	27	274	23

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	929	946	286	916
Stage 1	340	340	-	558
Stage 2	589	606	-	358
Critical Hdwy	7.1	6.5	6.28	7.1
Critical Hdwy Stg 1	6.1	5.5	-	6.1
Critical Hdwy Stg 2	6.1	5.5	-	6.1
Follow-up Hdwy	3.5	4	3.372	3.5
Pot Cap-1 Maneuver	250	264	739	255
Stage 1	679	643	-	518
Stage 2	498	490	-	664
Platoon blocked, %				
Mov Cap-1 Maneuver	207	245	739	221
Mov Cap-2 Maneuver	207	245	-	221
Stage 1	652	622	-	497
Stage 2	426	470	-	608

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.3	18.9	0.5	0.7
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1276	-	-	315	341	1017	-	-
HCM Lane V/C Ratio	0.027	-	-	0.138	0.242	0.027	-	-
HCM Control Delay (s)	7.9	0	-	18.3	18.9	8.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.9	0.1	-	-

Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Total PM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	36	28	41	0	0
Future Volume (vph)	2	36	28	41	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit			0.919			
Fit Protected		0.998				
Satd. Flow (prot)	0	1844	1746	0	1900	0
Fit Permitted		0.998				
Satd. Flow (perm)	0	1844	1746	0	1900	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	2	39	30	45	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	41	75	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	7.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Total PM Peak Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	36	28	41	0	0
Future Vol, veh/h	2	36	28	41	0	0
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, %	0	3	0	0	0	0
Mvmt Flow	2	39	30	45	0	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	75	0	96
Stage 1	-	-	53
Stage 2	-	-	43
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1537	-	908
Stage 1	-	-	975
Stage 2	-	-	985
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1537	-	907
Mov Cap-2 Maneuver	-	-	907
Stage 1	-	-	974
Stage 2	-	-	985

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1537	-	-	-	-
HCM Lane V/C Ratio	0.001	-	-	-	-
HCM Control Delay (s)	7.3	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings

(210482) 7450 Middlebrook Road

1: Wellington Road 7 & Middlebrook Road/David Street West

2023 Total SAT Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	23	37	44	26	20	65	230	73	32	246	24
Future Volume (vph)	7	23	37	44	26	20	65	230	73	32	246	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.926			0.970			0.973			0.989	
Fit Protected		0.995			0.976			0.991			0.995	
Satd. Flow (prot)	0	1751	0	0	1762	0	0	1810	0	0	1834	0
Fit Permitted		0.995			0.976			0.991			0.995	
Satd. Flow (perm)	0	1751	0	0	1762	0	0	1810	0	0	1834	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	1%	3%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	8	25	40	48	28	22	71	250	79	35	267	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	73	0	0	98	0	0	400	0	0	328	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	50.4%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC

(210482) 7450 Middlebrook Road

1: Wellington Road 7 & Middlebrook Road/David Street West

2023 Total SAT Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Intersection	4.6											
Int Delay, s/veh	4.6											
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	23	37	44	26	20	65	230	73	32	246	24
Future Vol, veh/h	7	23	37	44	26	20	65	230	73	32	246	24
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, %	0	0	0	2	0	5	0	1	3	3	2	0
Mvmt Flow	8	25	40	48	28	22	71	250	79	35	267	26

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	807	821	280	815
Stage 1	350	350	-	432
Stage 2	457	471	-	383
Critical Hdwy	7.1	6.5	6.2	7.12
Critical Hdwy Stg 1	6.1	5.5	-	6.12
Critical Hdwy Stg 2	6.1	5.5	-	6.12
Follow-up Hdwy	3.5	4	3.3	3.518
Pot Cap-1 Maneuver	302	312	764	296
Stage 1	671	636	-	602
Stage 2	587	563	-	640
Platoon blocked, %				
Mov Cap-1 Maneuver	251	280	764	242
Mov Cap-2 Maneuver	251	280	-	242
Stage 1	625	614	-	560
Stage 2	503	524	-	562

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.3	22.5	1.4	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1280	-	-	423	302	1225	-	-
HCM Lane V/C Ratio	0.055	-	-	0.172	0.324	0.028	-	-
HCM Control Delay (s)	8	0	-	15.3	22.5	8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	1.4	0.1	-	-

Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Total SAT Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	62	73	41	5	0
Future Volume (vph)	2	62	73	41	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit		0.951				
Fit Protected		0.999			0.950	
Satd. Flow (prot)	0	1898	1807	0	1805	0
Fit Permitted		0.999			0.950	
Satd. Flow (perm)	0	1898	1807	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	2	67	79	45	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	69	124	0	5	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	16.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2023 Total SAT Peak Hour

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	62	73	41	5	0
Future Vol, veh/h	2	62	73	41	5	0
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, %	0	0	0	0	0	0
Mvmt Flow	2	67	79	45	5	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	124	0	173
Stage 1	-	-	102
Stage 2	-	-	71
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1475	-	822
Stage 1	-	-	927
Stage 2	-	-	957
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1475	-	821
Mov Cap-2 Maneuver	-	-	821
Stage 1	-	-	926
Stage 2	-	-	957

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1475	-	-	-	821
HCM Lane V/C Ratio	0.001	-	-	-	0.007
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix E

2028 Background Traffic Operations Reports



Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Background PM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	0	39	30	0	0	0
Future Volume (vph)	0	39	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit						
Fit Protected						
Satd. Flow (prot)	0	1845	1900	0	1900	0
Fit Permitted						
Satd. Flow (perm)	0	1845	1900	0	1900	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	42	33	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	42	33	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	6.7%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Background PM Peak Hour


Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	0	39	30	0	0	0
Future Vol, veh/h	0	39	30	0	0	0
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, %	0	3	0	0	0	0
Mvmt Flow	0	42	33	0	0	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	33	0	75
Stage 1	-	-	33
Stage 2	-	-	42
Critical Hdwy	4.1	-	6.2
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.3
Pot Cap-1 Maneuver	1592	-	933
Stage 1	-	-	995
Stage 2	-	-	986
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1592	-	933
Mov Cap-2 Maneuver	-	-	933
Stage 1	-	-	995
Stage 2	-	-	986

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1592	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Background SAT Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	6	25	38	48	24	23	50	253	81	35	271	8
Future Volume (vph)	6	25	38	48	24	23	50	253	81	35	271	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.926			0.967			0.972			0.996	
Fit Protected		0.995			0.975			0.994			0.994	
Satd. Flow (prot)	0	1751	0	0	1752	0	0	1812	0	0	1843	0
Fit Permitted		0.995			0.975			0.994			0.994	
Satd. Flow (perm)	0	1751	0	0	1752	0	0	1812	0	0	1843	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	1%	3%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	7	27	41	52	26	25	54	275	88	38	295	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	0	0	103	0	0	417	0	0	342	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.9%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Background SAT Peak Hour

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	25	38	48	24	23	50	253	81	35	271	8
Future Vol, veh/h	6	25	38	48	24	23	50	253	81	35	271	8
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, %	0	0	0	2	0	5	0	1	3	3	2	0
Mvmt Flow	7	27	41	52	26	25	54	275	88	38	295	9

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	829	847	300	837
Stage 1	376	376	-	427
Stage 2	453	471	-	410
Critical Hdwy	7.1	6.5	6.2	7.12
Critical Hdwy Stg 1	6.1	5.5	-	6.12
Critical Hdwy Stg 2	6.1	5.5	-	6.12
Follow-up Hdwy	3.5	4	3.3	3.518
Pot Cap-1 Maneuver	292	301	744	286
Stage 1	649	620	-	606
Stage 2	590	563	-	619
Platoon blocked, %				
Mov Cap-1 Maneuver	244	274	744	233
Mov Cap-2 Maneuver	244	274	-	233
Stage 1	614	596	-	573
Stage 2	513	533	-	537

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.6	23.6	1	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1268	-	-	413	295	1190	-	-
HCM Lane V/C Ratio	0.043	-	-	0.182	0.35	0.032	-	-
HCM Control Delay (s)	8	0	-	15.6	23.6	8.1	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	1.5	0.1	-	-

Appendix F

2028 Total Traffic Operations Reports



Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Total PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	21	17	43	19	21	32	404	89	25	252	21
Future Volume (vph)	7	21	17	43	19	21	32	404	89	25	252	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.950			0.966			0.977			0.990	
Fit Protected		0.992			0.975			0.997			0.996	
Satd. Flow (prot)	0	1791	0	0	1790	0	0	1766	0	0	1721	0
Fit Permitted		0.992			0.975			0.997			0.996	
Satd. Flow (perm)	0	1791	0	0	1790	0	0	1766	0	0	1721	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	6%	1%	5%	10%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	8	23	18	47	21	23	35	439	97	27	274	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	49	0	0	91	0	0	571	0	0	324	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	52.7%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Total PM Peak Hour

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	21	17	43	19	21	32	404	89	25	252	21
Future Vol, veh/h	7	21	17	43	19	21	32	404	89	25	252	21
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, %	0	0	0	0	0	0	0	6	1	5	10	0
Mvmt Flow	8	23	18	47	21	23	35	439	97	27	274	23

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	920	946	286	918
Stage 1	340	340	-	558
Stage 2	580	606	-	360
Critical Hdwy	7.1	6.5	6.2	7.1
Critical Hdwy Stg 1	6.1	5.5	-	6.1
Critical Hdwy Stg 2	6.1	5.5	-	6.1
Follow-up Hdwy	3.5	4	3.3	3.5
Pot Cap-1 Maneuver	254	264	758	254
Stage 1	679	643	-	518
Stage 2	504	490	-	662
Platoon blocked, %				
Mov Cap-1 Maneuver	217	245	758	218
Mov Cap-2 Maneuver	217	245	-	218
Stage 1	652	622	-	497
Stage 2	445	470	-	602

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.2	24.9	0.5	0.7
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1276	-	-	321	270	1017	-	-
HCM Lane V/C Ratio	0.027	-	-	0.152	0.334	0.027	-	-
HCM Control Delay (s)	7.9	0	-	18.2	24.9	8.6	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	1.4	0.1	-	-

Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Total PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	39	30	41	5	0
Future Volume (vph)	2	39	30	41	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit		0.922				
Fit Protected		0.998			0.950	
Satd. Flow (prot)	0	1843	1752	0	1805	0
Fit Permitted		0.998			0.950	
Satd. Flow (perm)	0	1843	1752	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	2	42	33	45	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	44	78	0	5	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	14.1%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Total PM Peak Hour

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	39	30	41	5	0
Future Vol, veh/h	2	39	30	41	5	0
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, %	0	3	0	0	0	0
Mvmt Flow	2	42	33	45	5	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	78	0	102
Stage 1	-	-	56
Stage 2	-	-	46
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1533	-	901
Stage 1	-	-	972
Stage 2	-	-	982
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1533	-	900
Mov Cap-2 Maneuver	-	-	900
Stage 1	-	-	971
Stage 2	-	-	982

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1533	-	-	-	900
HCM Lane V/C Ratio	0.001	-	-	-	0.006
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lanes, Volumes, Timings (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Total SAT Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	8	26	40	48	28	23	70	253	81	35	271	25
Future Volume (vph)	8	26	40	48	28	23	70	253	81	35	271	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
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
Ped Bike Factor												
Fit		0.927			0.968			0.973			0.990	
Fit Protected		0.994			0.976			0.991			0.995	
Satd. Flow (prot)	0	1751	0	0	1757	0	0	1810	0	0	1836	0
Fit Permitted		0.994			0.976			0.991			0.995	
Satd. Flow (perm)	0	1751	0	0	1757	0	0	1810	0	0	1836	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		283.4			246.6			361.8			281.3	
Travel Time (s)		20.4			17.8			26.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	1%	3%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	9	28	43	52	30	25	76	275	88	38	295	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	80	0	0	107	0	0	439	0	0	360	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	53.8%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC (210482) 7450 Middlebrook Road
 1: Wellington Road 7 & Middlebrook Road/David Street West 2028 Total SAT Peak Hour

Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	26	40	48	28	23	70	253	81	35	271	25
Future Vol, veh/h	8	26	40	48	28	23	70	253	81	35	271	25
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, %	0	0	0	2	0	5	0	1	3	3	2	0
Mvmt Flow	9	28	43	52	30	25	76	275	88	38	295	27

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	884	900	309	891
Stage 1	385	385	-	471
Stage 2	499	515	-	420
Critical Hdwy	7.1	6.5	6.2	7.12
Critical Hdwy Stg 1	6.1	5.5	-	6.12
Critical Hdwy Stg 2	6.1	5.5	-	6.12
Follow-up Hdwy	3.5	4	3.3	3.518
Pot Cap-1 Maneuver	268	280	736	263
Stage 1	642	614	-	573
Stage 2	557	538	-	611
Platoon blocked, %				
Mov Cap-1 Maneuver	215	248	736	207
Mov Cap-2 Maneuver	215	248	-	207
Stage 1	593	590	-	529
Stage 2	467	497	-	526

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.1	27.4	1.4	0.9
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1249	-	-	377	266	1190	-	-
HCM Lane V/C Ratio	0.061	-	-	0.213	0.405	0.032	-	-
HCM Control Delay (s)	8.1	0	-	17.1	27.4	8.1	0	-
HCM Lane LOS	A	A	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.8	1.9	0.1	-	-

Lanes, Volumes, Timings
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Total SAT Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	69	81	41	5	0
Future Volume (vph)	2	69	81	41	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Fit		0.954				
Fit Protected		0.999			0.950	
Satd. Flow (prot)	0	1898	1813	0	1805	0
Fit Permitted		0.999			0.950	
Satd. Flow (perm)	0	1898	1813	0	1805	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		293.5	283.4		65.0	
Travel Time (s)		21.1	20.4		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	2	75	88	45	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	77	133	0	5	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	16.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
2: Middlebrook Road & Site Access

(210482) 7450 Middlebrook Road
2028 Total SAT Peak Hour

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	69	81	41	5	0
Future Vol, veh/h	2	69	81	41	5	0
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, %	0	0	0	0	0	0
Mvmt Flow	2	75	88	45	5	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	133	0	190
Stage 1	-	-	111
Stage 2	-	-	79
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	1464	-	804
Stage 1	-	-	919
Stage 2	-	-	949
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1464	-	803
Mov Cap-2 Maneuver	-	-	803
Stage 1	-	-	918
Stage 2	-	-	949

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	803
HCM Lane V/C Ratio	0.001	-	-	-	0.007
HCM Control Delay (s)	7.5	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0