Briarwood Residential Development, Dundalk ON

Transportation Impact Study

Paradigm Transportation Solutions Limited

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Project Summary

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Transportation Impact Study



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Executive Summary

Content

Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential development located on Ida Street in Dundalk, Grey County.

This TIS includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for a five and ten-year horizon from full build-out (2034 and 2039), and assessment of traffic impacts with recommendations to accommodate the proposed development as appropriate.

Development Concept

The subject site is located on the east side of Ida Street between Hanbury Street to the north and Eco Parkway to the south. The proposed development includes four three-storey buildings accommodating a total of 376 units (94 units per building).

Vehicular access is proposed via two full-moves driveways to Ida Street.

The development is anticipated to be completed by 2029.

Conclusions

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

- **Existing Traffic Conditions:** The study area intersections are operating with acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 139 and 182 trips during the AM and PM peak hours, respectively.
- **Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service, except for the northbound and southbound approaches at Ida Street and Grey Road 9 which are forecast to operate with LOS F during the AM and PM peak hours starting under 2034 (five-year) background traffic conditions.
- **Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under

background traffic conditions. The site driveways are forecast to operate with LOS C or better during the AM and PM peak hours.

- **Site Access:** A southbound left-turn lane with 15 metres of storage is warranted on Ida Street at both site driveways under 2034 and 2039 total traffic conditions.
- **Ida Street and Grey Road 9:** Given the poor levels of service forecast for the northbound and southbound approaches starting under background conditions, traffic signal and roundabout control have been reviewed under 2039 total traffic conditions:
  - Traffic signal control is not warranted under background or total traffic conditions. Although not warranted, operational analyses indicate that auxiliary turn lanes would be required for the eastbound, westbound and northbound approaches for the intersection to operate with acceptable levels of service.
  - The Township is considering a one-lane roundabout for the intersection. Based on operational analyses, the intersection is forecast to operate with acceptable levels of service under roundabout control.

Recommendations

Based on the findings of this study, it is recommended that:

- A southbound left-turn lane with 15 metres of storage be provided on Ida Street at both site driveways; and
- Traffic control improvements (signalization with additional turn lanes or roundabout) be considered by the Township and County at the intersection of Ida Street and Grey Road 9, regardless of whether the development proceeds.

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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited has been retained to conduct this Transportation Impact Study (TIS) for a proposed residential development located on Ida Street in Dundalk, Grey County. **Figure 1.1** illustrates the subject development location.

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 Grey County staff via e-mail in September 2024, includes:

- Assessment of the current traffic and site conditions within the study area;
- Estimates of background traffic growth for five and ten years from full build-out (2034 and 2039);
- 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:
  - Grey Road 9 and Ida Street (unsignalized);
  - Grey Road 9 and Grey Road 8 (unsignalized);
  - Ida Street and Future Accesses.
- Recommendations necessary to mitigate the site generated traffic in a satisfactory manner.

Appendix A contains the pre-study consultation material and responses from the Grey County.

This study has been prepared in accordance with the requirements detailed by the *Grey County TIS guidelines*[1].

[1] Grey County, Development Application Guidelines Transportation Impact Report, No Date.



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Location of Subject Site

2 Existing Conditions

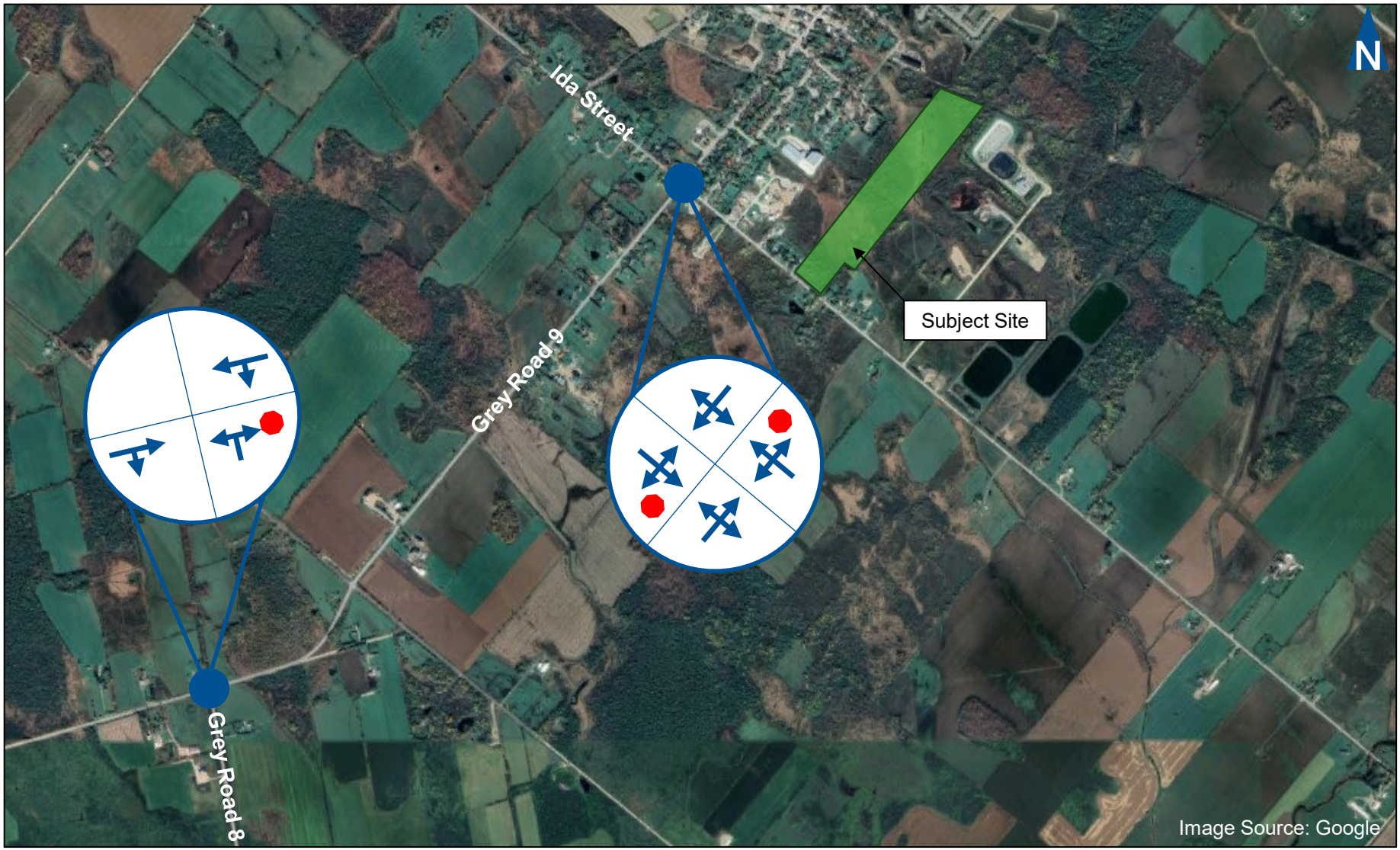
2.1 Existing Roadways

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

- **Ida Street** is a north-south local road[2] with a two-lane cross section and a posted speed limit of 40 km/h.
- **Grey Road 9** is an east-west county road with a two-lane cross section and a posted speed limit of 40 km/h east of Ida Street and 80 km/h to the west.
- **Grey Road 8** is a north-south county road with a two-lane cross section and a posted speed limit of 80 km/h.

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

[2] Grey County, *The County of Grey Official Plan Schedule A Land Use Types*, 2024.



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Existing Lane Configuration and Traffic Control

Briarwood Residential Development, Dundalk TIS
230576

Figure 2.1

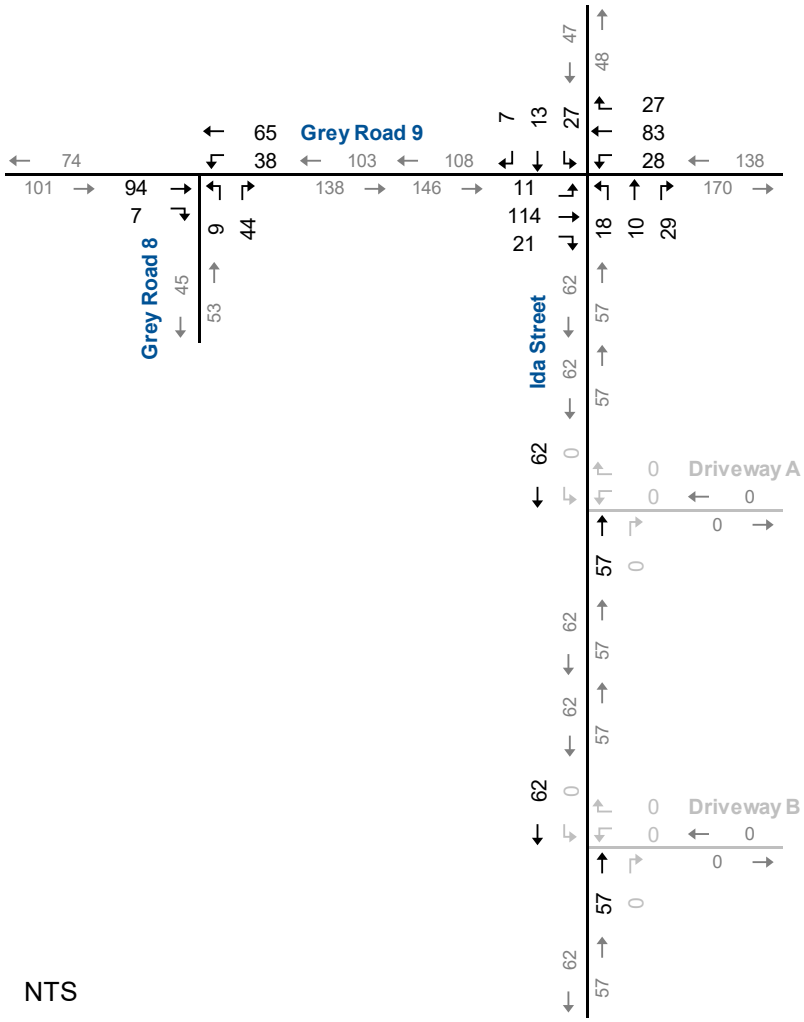
2.2 Traffic Volumes

Turning movement counts were collected by Paradigm on 14 November 2023.

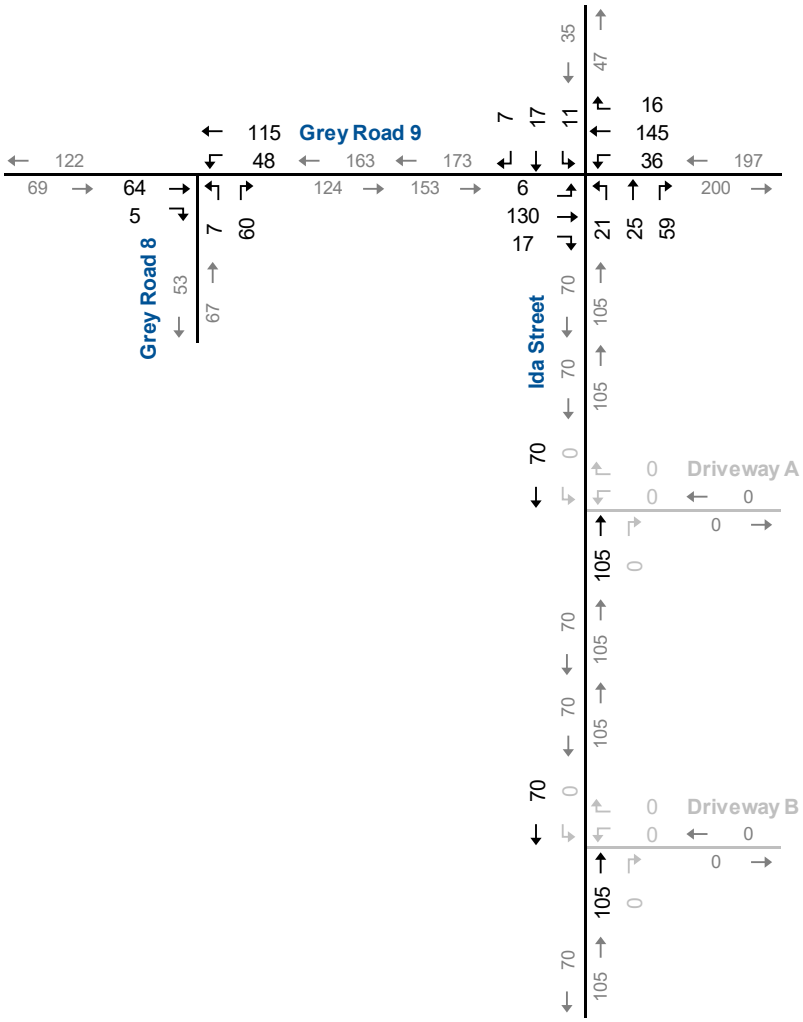
Figure 2.2 illustrates the existing AM and PM weekday peak hour traffic volumes.

Appendix B contains the detailed traffic counts for the study area intersections.

AM Peak Hour



PM Peak Hour



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Existing (2023) Traffic Volumes

2.3 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 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.

The operations at the study area intersections have been assessed using Synchro 11. For the purpose of this report, movements with LOS E or worse are considered critical.

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 study area intersections are operating with acceptable levels of service, and with no problem movements.

Appendix C contains the detailed Synchro 11 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	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	B	>	**B**	<	B	>	**B**
			Delay	<	8	>	**1**	<	8	>	**2**	<	11	>	**11**	<	12	>	**12**
			V/C	<	0.01	>		<	0.02	>		<	0.09	>		<	0.09	>	
			Q	<	0	>		<	1	>		<	2	>		<	2	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**				
			Delay		0	>	**0**	<	8		**3**	10		>	**10**				
			V/C		0.00	>		<	0.03			0.07		>					
			Q		0	>		<	1			2		>					
PM Peak Hour	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	B	>	**B**	<	B	>	**B**
			Delay	<	8	>	**0**	<	8	>	**1**	<	12	>	**12**	<	13	>	**13**
			V/C	<	0.01	>		<	0.03	>		<	0.17	>		<	0.07	>	
			Q	<	0	>		<	1	>		<	4	>		<	2	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**				
			Delay		0	>	**0**	<	8		**2**	9		>	**9**				
			V/C		0.00	>		<	0.04			0.08		>					
			Q		0	>		<	1			2		>					

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

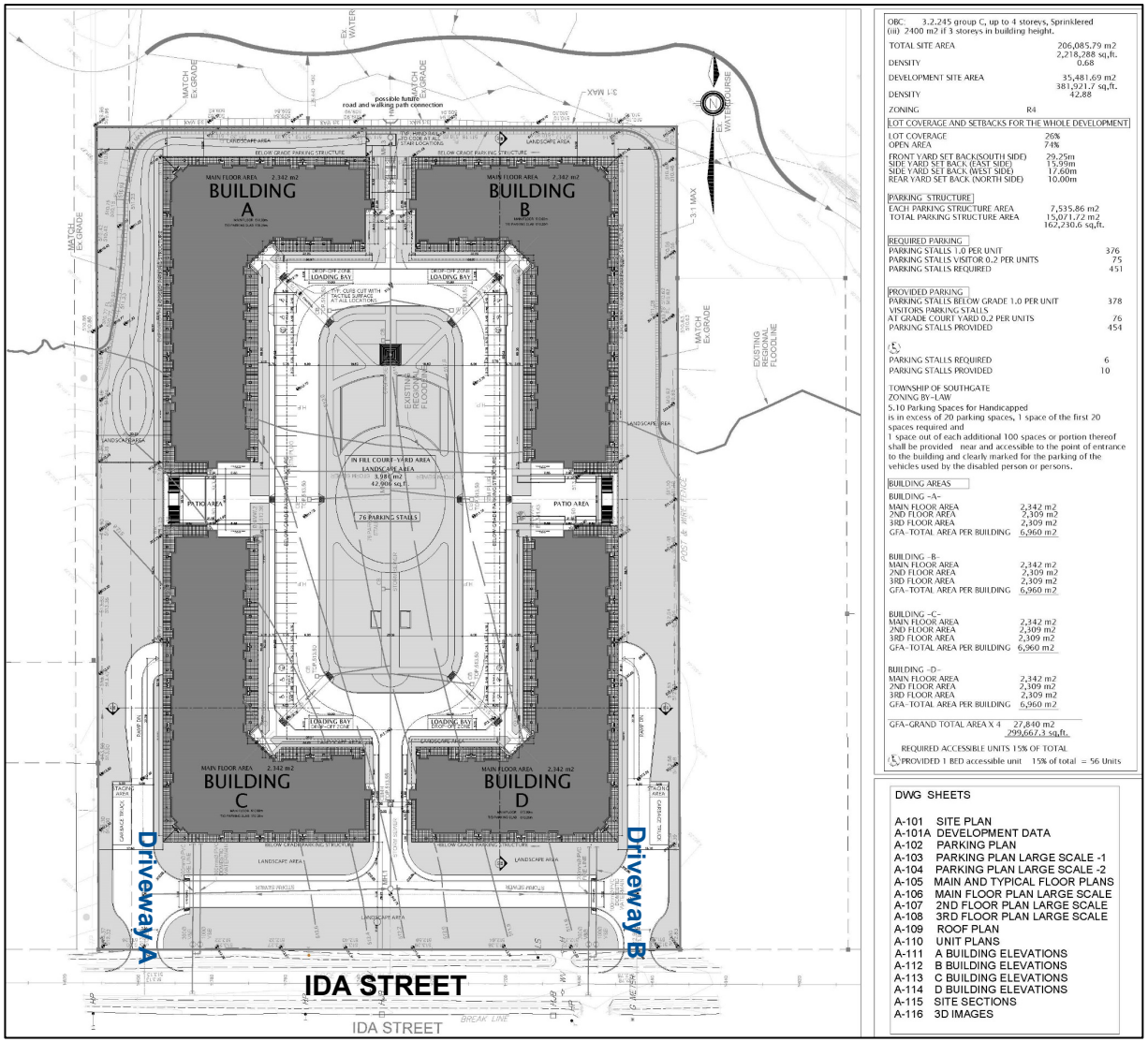
3.1 Development Description

The subject site is located on the east side of Ida Street between Hanbury Street to the north and Eco Parkway to the south. The proposed development includes four three-storey buildings accommodating a total of 376 units (94 units per building).

Vehicular access is proposed via two full-moves driveways to Ida Street.

The development is anticipated to be completed by 2029.

Figure 3.1 shows the development concept.



OBC: 3.2.245 group C, up to 4 storeys, Sprinklered
(iii) 2400 m2 if 3 storeys in building height.

TOTAL SITE AREA	206,085.79 m2 2,218,288 sq.ft.
DENSITY	0.68
DEVELOPMENT SITE AREA	35,481.69 m2 381,921.7 sq.ft.
DENSITY	42.88
ZONING	R4

LOT COVERAGE AND SETBACKS FOR THE WHOLE DEVELOPMENT

LOT COVERAGE	26%
OPEN AREA	74%
FRONT YARD SET BACK(SOUTH SIDE)	29.25m
SIDE YARD SET BACK (EAST SIDE)	15.99m
SIDE YARD SET BACK (WEST SIDE)	17.60m
REAR YARD SET BACK (NORTH SIDE)	10.00m

PARKING STRUCTURE

EACH PARKING STRUCTURE AREA	7,535.86 m2
TOTAL PARKING STRUCTURE AREA	15,071.72 m2 162,230.6 sq.ft.

REQUIRED PARKING

PARKING STALLS 1.0 PER UNIT	376
PARKING STALLS VISITOR 0.2 PER UNITS	75
PARKING STALLS REQUIRED	451

PROVIDED PARKING

PARKING STALLS BELOW GRADE 1.0 PER UNIT	378
VISITORS PARKING STALLS AT GRADE COURT YARD 0.2 PER UNITS	76
PARKING STALLS PROVIDED	454

PARKING STALLS REQUIRED	6
PARKING STALLS PROVIDED	10

TOWNSHIP OF SOUTHGATE
ZONING BY-LAW
5.10 Parking Spaces for Handicapped
is in excess of 20 parking spaces, 1 space of the first 20 spaces required and
1 space out of each additional 100 spaces or portion thereof shall be provided near and accessible to the point of entrance to the building and clearly marked for the parking of the vehicles used by the disabled person or persons.

BUILDING AREAS

BUILDING -A-	
MAIN FLOOR AREA	2,342 m2
2ND FLOOR AREA	2,309 m2
3RD FLOOR AREA	2,309 m2
GFA-TOTAL AREA PER BUILDING	6,960 m2
BUILDING -B-	
MAIN FLOOR AREA	2,342 m2
2ND FLOOR AREA	2,309 m2
3RD FLOOR AREA	2,309 m2
GFA-TOTAL AREA PER BUILDING	6,960 m2
BUILDING -C-	
MAIN FLOOR AREA	2,342 m2
2ND FLOOR AREA	2,309 m2
3RD FLOOR AREA	2,309 m2
GFA-TOTAL AREA PER BUILDING	6,960 m2
BUILDING -D-	
MAIN FLOOR AREA	2,342 m2
2ND FLOOR AREA	2,309 m2
3RD FLOOR AREA	2,309 m2
GFA-TOTAL AREA PER BUILDING	6,960 m2
GFA-GRAND TOTAL AREA X 4	27,840 m2 299,667.3 sq.ft.

REQUIRED ACCESSIBLE UNITS 15% OF TOTAL
PROVIDED 1 BED accessible unit 15% of total = 56 Units

DWG SHEETS

A-101	SITE PLAN
A-101A	DEVELOPMENT DATA
A-102	PARKING PLAN
A-103	PARKING PLAN LARGE SCALE -1
A-104	PARKING PLAN LARGE SCALE -2
A-105	MAIN AND TYPICAL FLOOR PLANS
A-106	MAIN FLOOR PLAN LARGE SCALE
A-107	2ND FLOOR PLAN LARGE SCALE
A-108	3RD FLOOR PLAN LARGE SCALE
A-109	ROOF PLAN
A-110	UNIT PLANS
A-111	A BUILDING ELEVATIONS
A-112	B BUILDING ELEVATIONS
A-113	C BUILDING ELEVATIONS
A-114	D BUILDING ELEVATIONS
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Proposed Concept Plan

3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual[3] equations for Land Use Code (LUC) 220 Multifamily Housing (Low-Rise) 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 Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 220 - Multifamily Housing (Low-Rise)	376	Eq	33	106	**139**	Eq	115	67	**182**
Total Trip Generation			**33**	**106**	**139**		**115**	**67**	**182**

LUC 220 - AM: T = 0.31(X) + 22.85 | PM: T = 0.43(X) + 20.55

3.3 Development Trip Distribution and Assignment

The trip distribution was determined based on existing travel patterns within the study area and future Eco Parkway extension (discussed in more detail in **Section 4.1**). **Table 3.2** displays the breakdown of trip distributions used in this study.

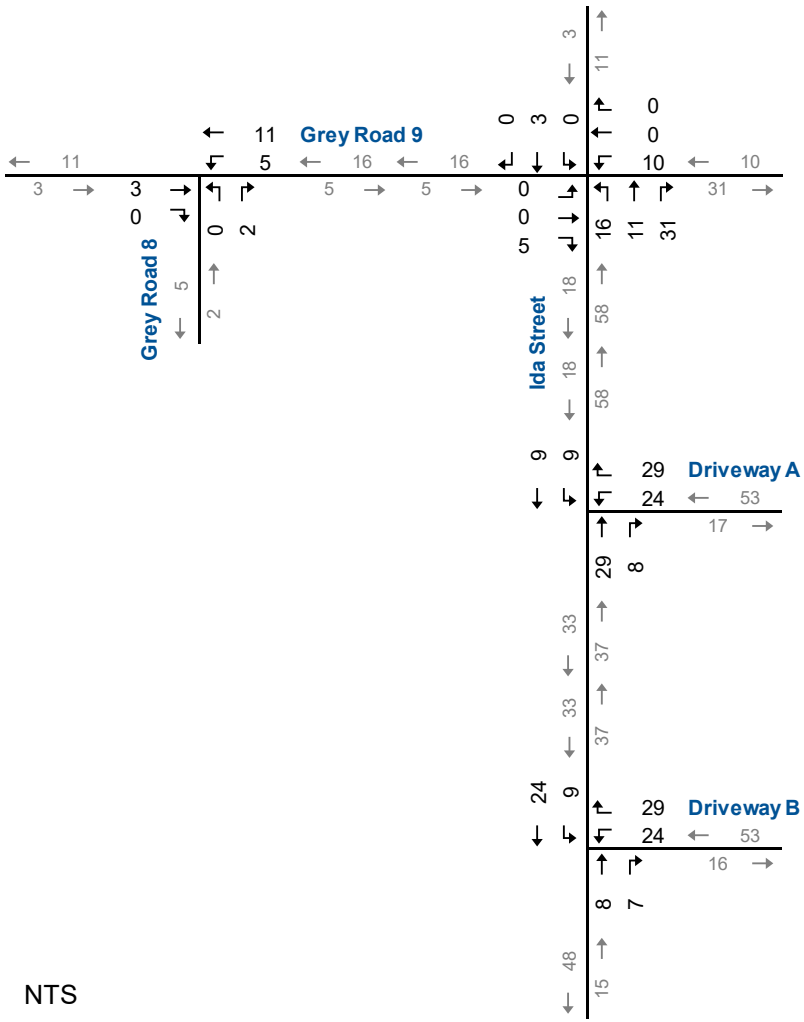
TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	Percentage
North via Ida St	10%
South via Ida St	45%
South via Grey Rd 8	5%
East via Grey Rd 9	30%
West via Grey Rd 9	10%
Total	**100%**

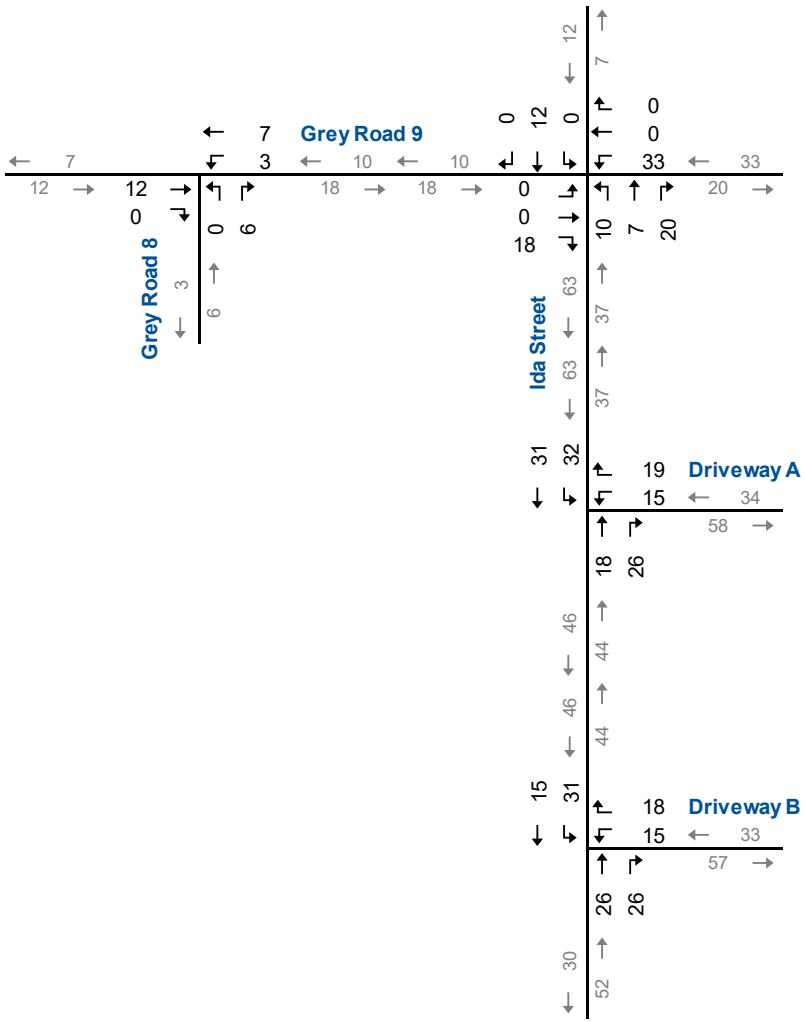
Figure 3.2 illustrates the site-generated traffic volumes for the AM and PM peak hours.

[3] 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 2034 and 2039 horizon years.

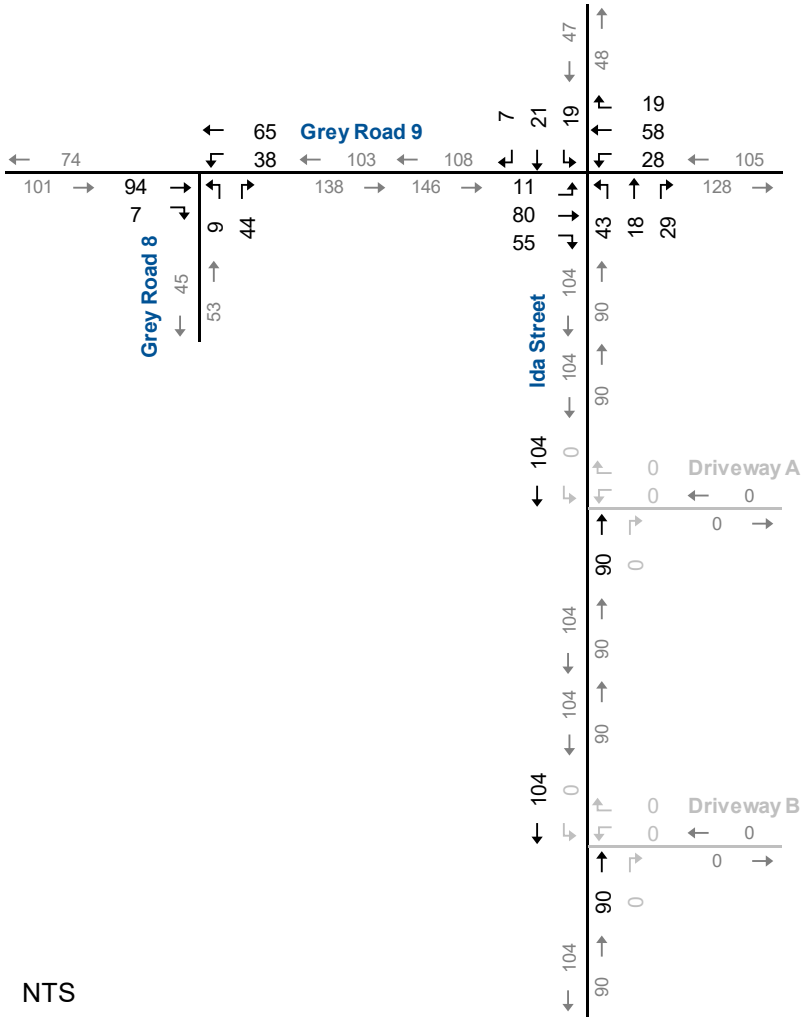
4.1 Planned Network Improvements

During pre-study consultation, the Township indicated that Eco Parkway will be extended to Highway 10 with construction anticipated to begin in 2025. In 2017, a TIS[4] was completed for the extension and industrial lands on either side. The 2017 TIS assumed that 30% of the traffic, including all truck traffic, on Grey Road 9 would use Eco Parkway. The existing traffic volumes in **Figure 2.2** have been redistributed based on this assumption.

Figure 4.1 illustrates the redistributed existing traffic volumes.

[4] Triton Engineering Services Limited, *Industrial Access Road Grey Road 9 and Ida Street Traffic Impact Study*, June 2017.

AM Peak Hour


Grey Road 9
Grey Road 8
Ida Street
Driveway A
Driveway B
74
65
38
103
108
7
21
19
19
58
28
105
101
94
7
138
146
11
80
55
128
9
44
43
18
29
45
53
104
90
0
104
90
0
104
90
0
104
90
0
104
90
0
104
90
0
0
0

4.2 Background Traffic Forecasts

4.2.1 General Growth

To derive the 2034 and 2039 generalized background traffic volumes, a growth rate of 2% was applied to the existing roadway traffic volumes.

4.2.2 Other Area Developments

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

- **Glen Elg Phase 2:** The residential development is located north of Glen Elg Street and proposes 89 single-family units and 66 townhouse units. The TIS completed in September 2020[5] indicates that the development is forecast to generate 100 AM peak hour trips and 132 PM peak hour trips.
- **Glen Elg Phase 3:** The residential development is located north of Todd Crescent and east of the Grey County CP Rail Trail. The development proposes 369 single-family units and 90 townhouse/semi-detached units. The TIS completed in August 2022[6] indicates that the development is forecast to generate 285 AM peak hour trips and 389 PM peak hour trips.
- **Ida Street Development:** The residential development is located in the northwest corner of Ida Street and Grey Road 9 and proposes 269 single-family units, 52 townhouse units and lands to be occupied by the Township including office and recreational uses. The TIS completed in May 2024[7] indicates that the development is forecast to generate 471 AM peak hour trips and 616 PM peak hour trips.
- **White Rose Phase 3:** The residential development is located at the northerly terminus of Bradley Street and east of Todd Crescent. The development proposes 33 single-family units, 24 townhouse units and 34 senior units. The TIS completed in

[5] C.F. Crozier & Associates Inc., *Traffic Impact Study Southgate Meadows Inc. Township of Southgate GlenElg Residential Development Phase 2*, September 2020.
[6] C.F. Crozier & Associates Inc., *Traffic Impact Study GlenElg Phase 3 Dundalk Grey County Ontario*, August 2022.
[7] C.F. Crozier & Associates Inc., *Transportation Impact Study Ida Street Development Township of Southgate Grey County*, May 2024.

September 2020[8] indicates that the development is forecast to generate 53 AM peak hour trips and 61 PM peak hour trips.

- **Eco Parkway Industrial Lands:** The 260 acres of industrial lands on either side of the Eco Parkway extension. The TIS completed in 2017 indicates that full development is forecast to generate 1,376 AM peak hour trips and 1,266 PM peak hour trips.

Figure 4.2 illustrates the location of the other area developments.

Appendix D contains the other area development traffic volumes.

[8] Triton Engineering Services Limited, *White Rose (Phase 3) Plan of Subdivision Township of Southgate (Dundalk) Grey County Traffic Impact Study*, September 2020.



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Other Area Development Locations

4.3 2034 (Five-Year) Horizon

4.3.1 Background Traffic

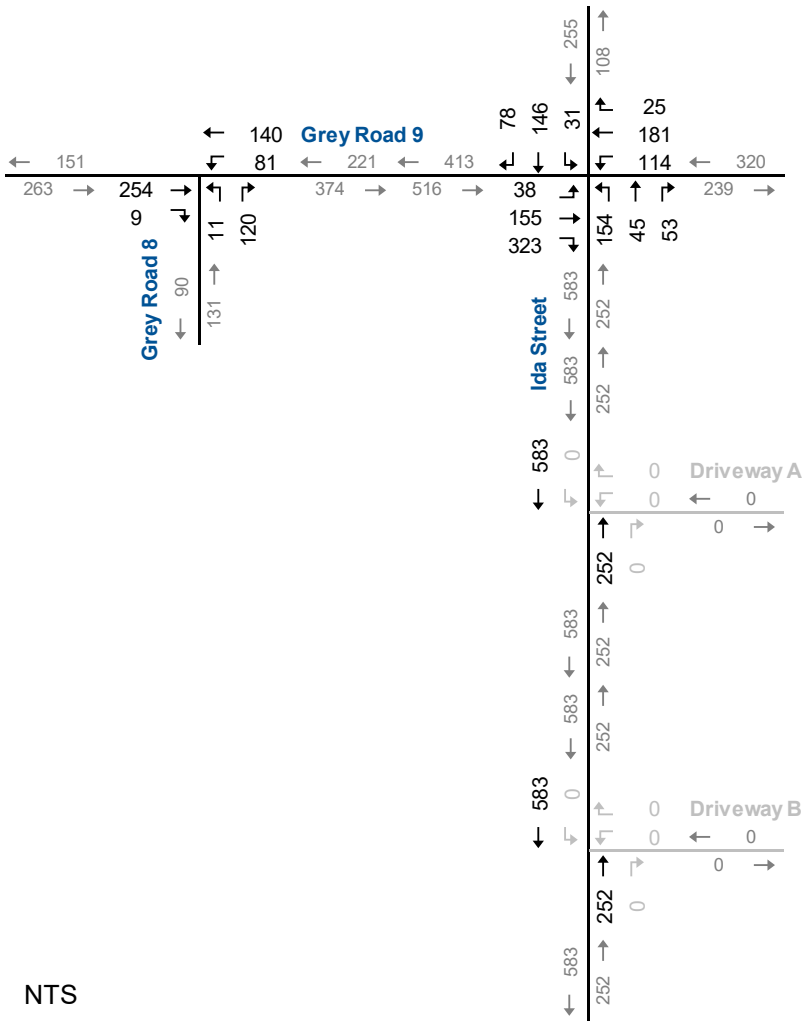
Figure 4.3 illustrates the 2034 background traffic volumes, including road traffic growth and other area development traffic.

The 2034 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

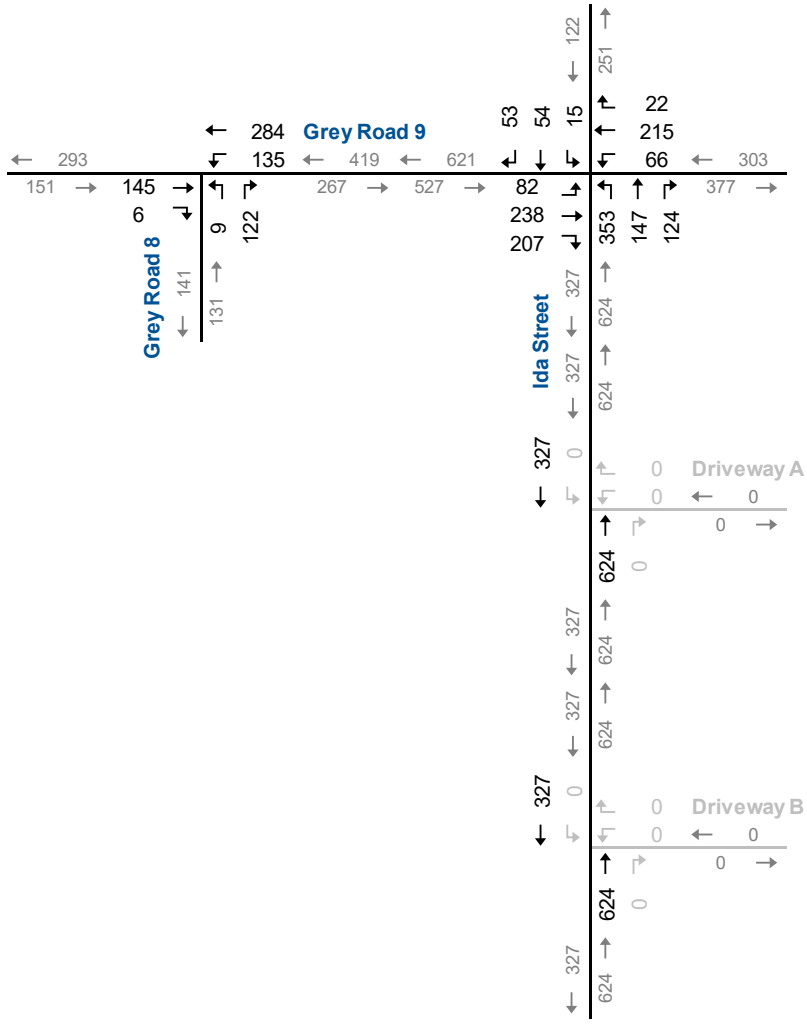
Table 4.1 summarizes the results of the 2034 background traffic operations. The results indicate that the study area intersections are forecast to operate with acceptable levels of service, except for the northbound and southbound approaches at Ida Street and Grey Road 9 which are forecast to operate with LOS F during the AM and PM peak hours.

Appendix E contains the supporting detailed Synchro 11 reports.

AM Peak Hour



PM Peak Hour



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2034 Background Traffic Volumes

TABLE 4.1: 2034 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	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**3**	<	2403	>	**2403**	<	183	>	**183**
			V/C	<	0.03	>		<	0.13	>		<	5.96	>		<	1.24	>	
			Q	<	1	>		<	3	>		<	238	>		<	105	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	12		>	**12**				
			V/C		0.00	>		<	0.07			0.21		>					
			Q		0	>		<	2			6		>					
PM Peak Hour	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**2**	<	1444	>	**1444**	<	61	>	**61**
			V/C	<	0.07	>		<	0.07	>		<	4.09	>		<	0.71	>	
			Q	<	2	>		<	2	>		<	508	>		<	33	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**2**	11		>	**11**				
			V/C		0.00	>		<	0.11			0.18		>					
			Q		0	>		<	3			5		>					

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

4.3.2 Total Traffic

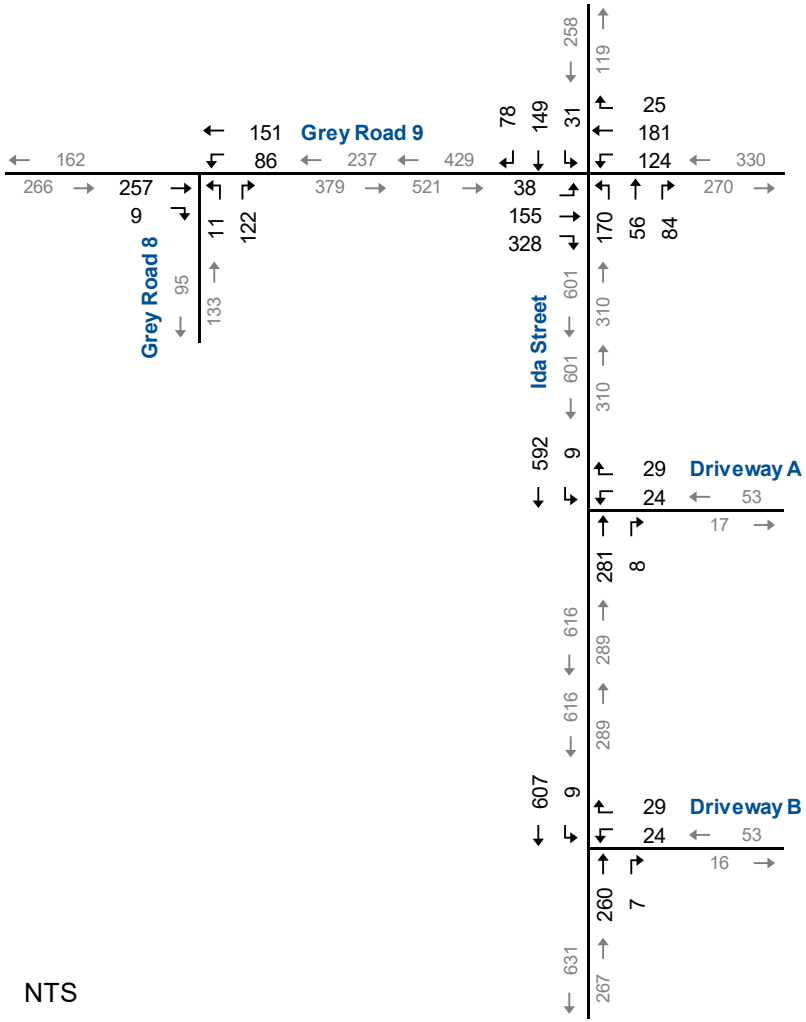
Figure 4.4 illustrate the 2034 total traffic volumes, including trips generated by the proposed development.

The 2034 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

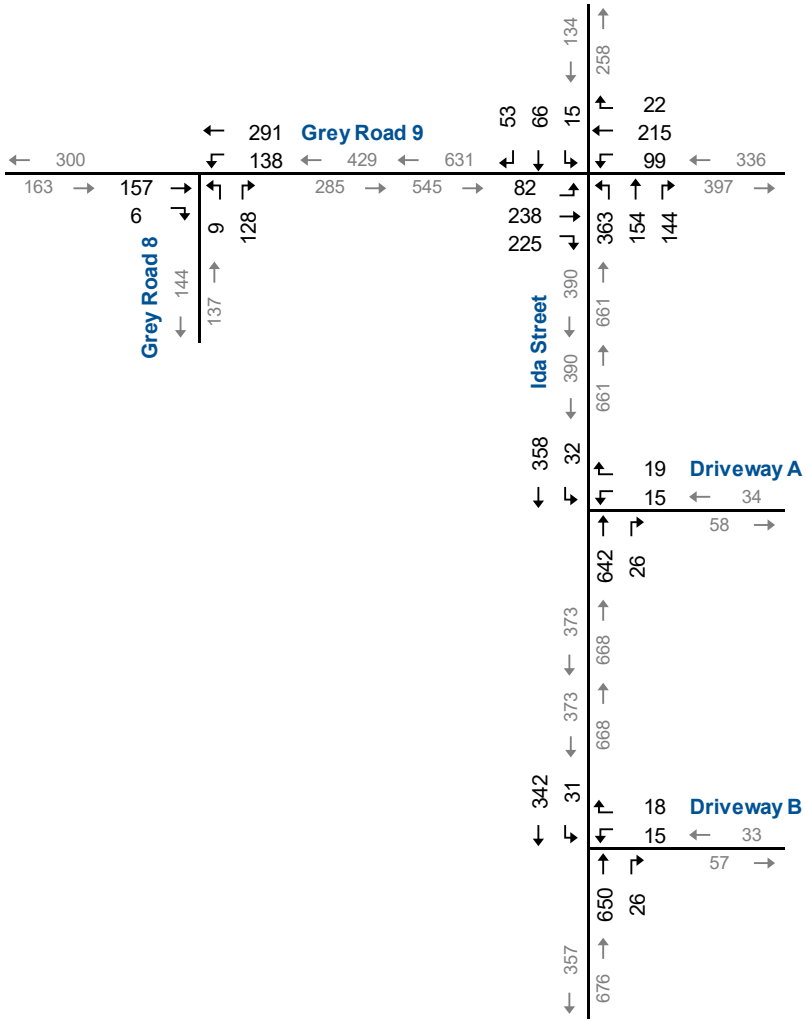
Table 4.2 summarizes the results of the 2034 total traffic operations. The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2034 background traffic conditions.

Appendix F contains the supporting detailed Synchro 11 reports.

AM Peak Hour



PM Peak Hour



2034 Total Traffic Volumes

Figure 4.4

TABLE 4.2: 2034 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	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**4**	<	7125	>	**7125**	<	232	>	**232**
			V/C	<	0.03	>		<	0.14	>		<	16.05	>		<	1.35	>	
			Q	<	1	>		<	4	>		<	319	>		<	118	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	12		>	**12**				
			V/C		0.00	>		<	0.08			0.22		>					
			Q		0	>		<	2			6		>					
	Ida Street & Driveway A	TWSC	LOS					B		>	**B**		A	>	**A**	<	A		**A**
			Delay					15		>	**15**		0	>	**0**	<	8		**0**
			V/C					0.14		>			0.00	>		<	0.01		
			Q					4		>			0	>		<	0		
	Ida Street & Driveway B	TWSC	LOS					B		>	**B**		A	>	**A**	<	A		**A**
			Delay					15		>	**15**		0	>	**0**	<	8		**0**
			V/C					0.14		>			0.00	>		<	0.01		
			Q					4		>			0	>		<	0		
PM Peak Hour	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**3**	<	2205	>	**2205**	<	291	>	**291**
			V/C	<	0.07	>		<	0.10	>		<	5.75	>		<	1.37	>	
			Q	<	2	>		<	2	>		<	583	>		<	77	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	11		>	**11**				
			V/C		0.00	>		<	0.11			0.19		>					
			Q		0	>		<	3			5		>					
	Ida Street & Driveway A	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					19		>	**19**		0	>	**0**	<	9		**1**
			V/C					0.13		>			0.00	>		<	0.04		
			Q					3		>			0	>		<	1		
	Ida Street & Driveway B	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					19		>	**19**		0	>	**0**	<	9		**1**
			V/C					0.12		>			0.00	>		<	0.04		
			Q					3		>			0	>		<	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



4.4 2039 (Ten-Year) Horizon

4.4.1 Background Traffic

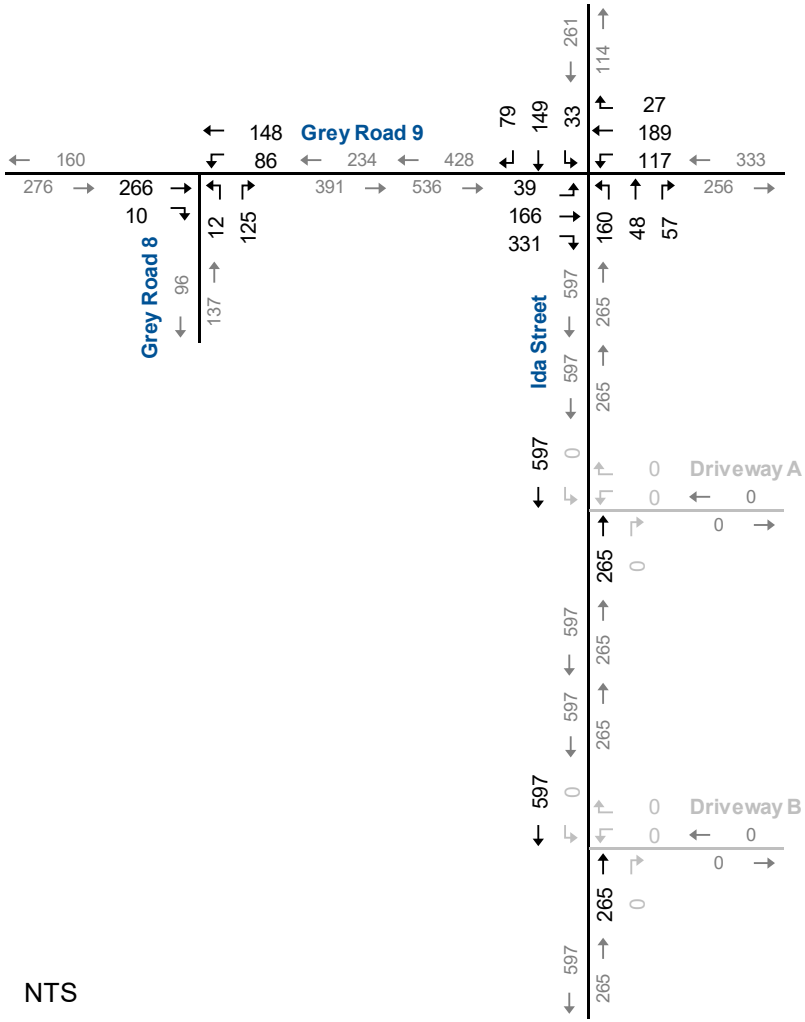
Figure 4.5 illustrates the 2039 background traffic volumes, including road traffic growth and other area development traffic.

The 2039 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

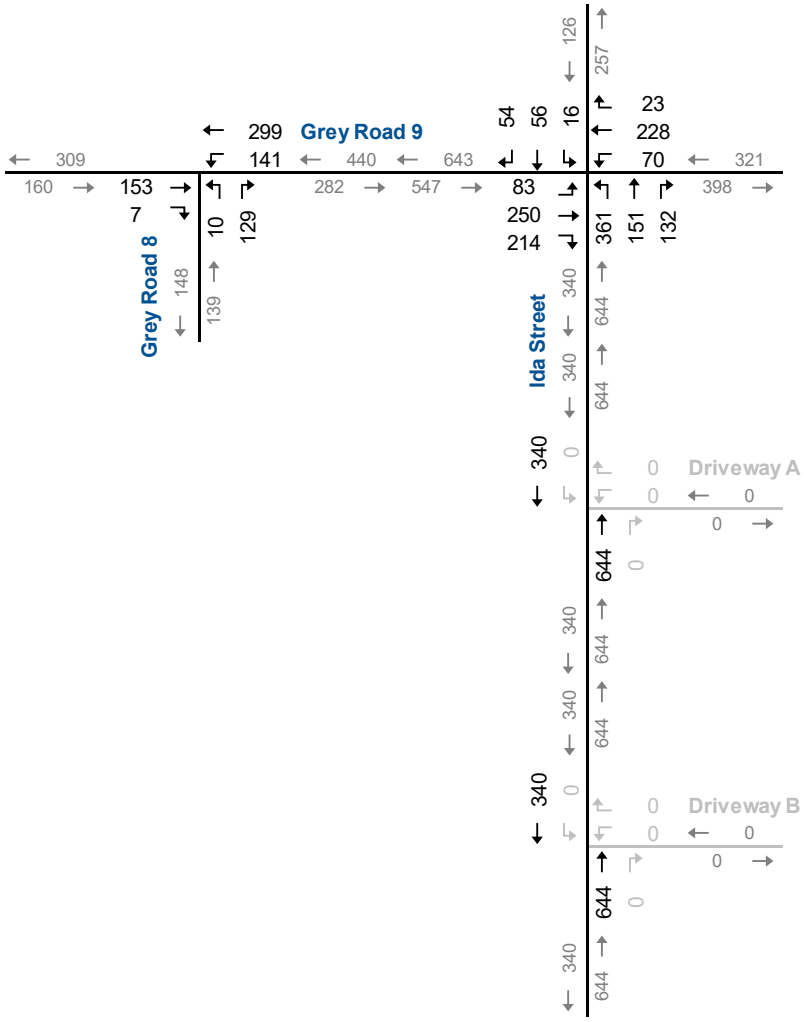
Table 4.3 summarizes the results of the 2039 background traffic operations. The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2034 background traffic operations.

Appendix G contains the supporting detailed Synchro 11 reports.

AM Peak Hour



PM Peak Hour



NTS

paradigm TRANSPORTATION SOLUTIONS LIMITED

2039 Background Traffic Volumes

TABLE 4.3: 2039 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	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**3**	<	8112	>	**8112**	<	233	>	**233**
			V/C	<	0.04	>		<	0.13	>		<	18.00	>		<	1.36	>	
			Q	<	1	>		<	4	>		<	277	>		<	120	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	12		>	**12**				
			V/C		0.00	>		<	0.08			0.23		>					
			Q		0	>		<	2			7		>					
PM Peak Hour	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**2**	<	1709	>	**1709**	<	103	>	**103**
			V/C	<	0.07	>		<	0.07	>		<	4.67	>		<	0.89	>	
			Q	<	2	>		<	2	>		<	543	>		<	46	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**2**	11		>	**11**				
			V/C		0.00	>		<	0.11			0.20		>					
			Q		0	>		<	3			5		>					

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

4.4.2 Total Traffic

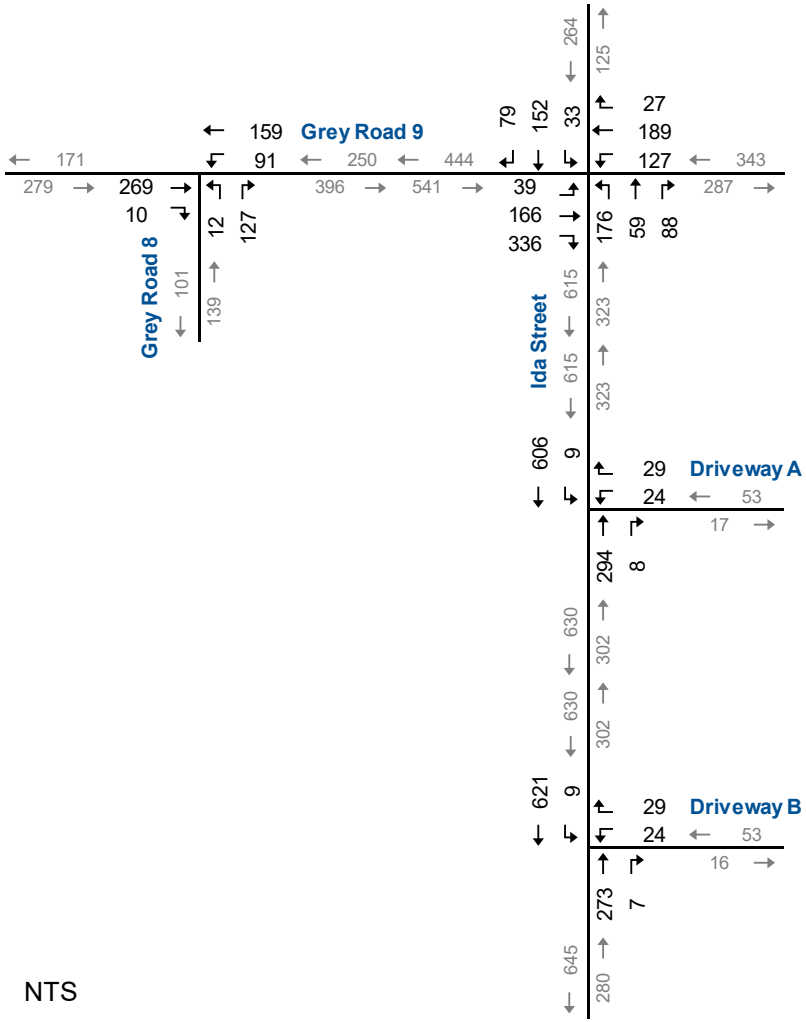
Figure 4.6 illustrate the 2039 total traffic volumes, including trips generated by the proposed development.

The 2039 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

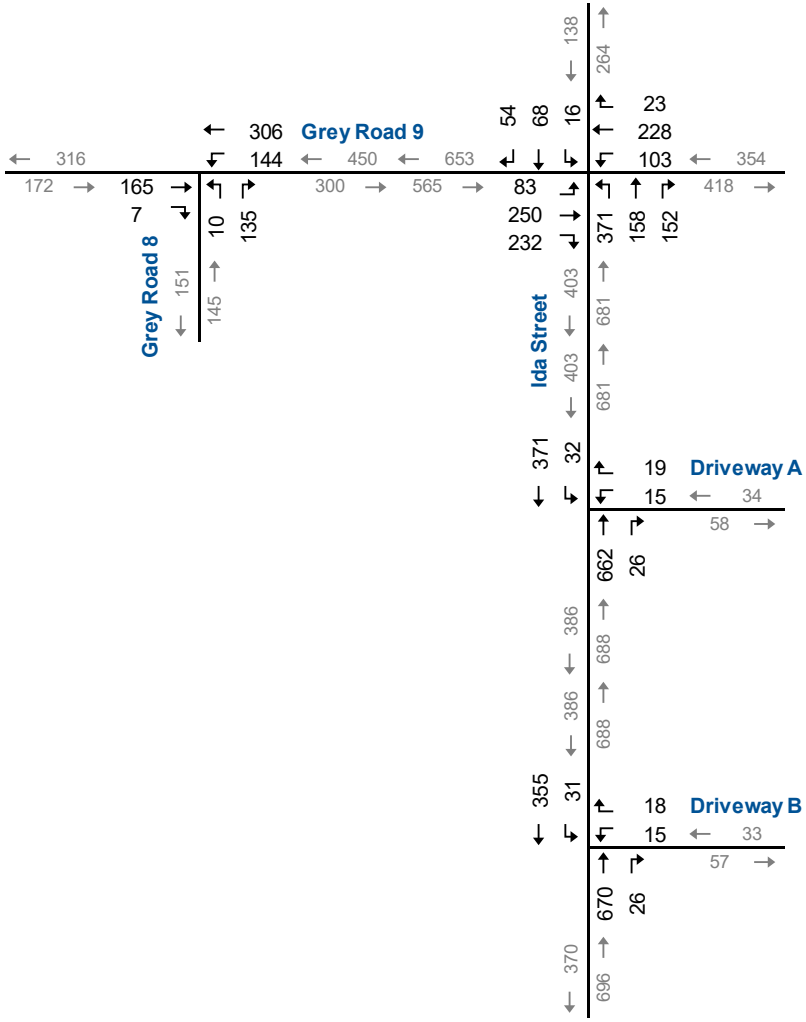
Table 4.4 summarizes the results of the 2039 total traffic operations. The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2039 background traffic conditions.

Appendix H contains the supporting detailed Synchro 11 reports.

AM Peak Hour



PM Peak Hour



NTS

2039 Total Traffic Volumes

Briarwood Residential Development, Dundalk TIS
230576

Figure 4.6

TABLE 4.4: 2039 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	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	10	>	**4**	<	Error	>	**Error**	<	293	>	**293**
			V/C	<	0.04	>		<	0.15	>		<	Error	>		<	1.50	>	
			Q	<	1	>		<	4	>		<	Error	>		<	134	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	12		>	**12**				
			V/C		0.00	>		<	0.08			0.23		>					
			Q		0	>		<	2			7		>					
	Ida Street & Driveway A	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					15		>	**15**		0	>	**0**	<	8		**0**
			V/C					0.14		>			0.00	>		<	0.01		
			Q					4		>			0	>		<	0		
	Ida Street & Driveway B	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					15		>	**15**		0	>	**0**	<	8		**0**
			V/C					0.14		>			0.00	>		<	0.01		
			Q					4		>			0	>		<	0		
PM Peak Hour	Ida Street & Grey Road 9	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	F	>	**F**	<	F	>	**F**
			Delay	<	8	>	**1**	<	9	>	**3**	<	2654	>	**2654**	<	Error	>	**Error**
			V/C	<	0.07	>		<	0.11	>		<	6.73	>		<	Error	>	
			Q	<	2	>		<	3	>		<	616	>		<	Error	>	
	Grey Road 8 & Grey Road 9	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**				
			Delay		0	>	**0**	<	8		**3**	11		>	**11**				
			V/C		0.00	>		<	0.12			0.21		>					
			Q		0	>		<	3			6		>					
	Ida Street & Driveway A	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					20		>	**20**		0	>	**0**	<	9		**1**
			V/C					0.13		>			0.00	>		<	0.04		
			Q					4		>			0	>		<	1		
	Ida Street & Driveway B	TWSC	LOS					C		>	**C**		A	>	**A**	<	A		**A**
			Delay					20		>	**20**		0	>	**0**	<	9		**1**
			V/C					0.13		>			0.00	>		<	0.04		
			Q					3		>			0	>		<	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

5 Remedial Measures

5.1 Site Access

The Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads[9] provides guidance on the assessment and/or need for auxiliary left-turn lanes.

Warrants have been calculated for southbound left-turns at Ida Street and the proposed site accesses. 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 50 km/h (10 km/h over the posted speed limit). Based on this criterion, a southbound left-turn lane with 15 metres of storage is warranted under 2034 and 2039 total traffic conditions.

Appendix I contains the warrant nomographs.

5.2 Ida Street and Grey Road 9

The northbound and southbound approaches at the intersection of Grey Road 9 and Ida Street are forecast to operate with poor levels of service starting under 2034 background traffic conditions, prior to the proposed development. This section reviews improvements at this intersection under 2039 total traffic conditions, including traffic signal and roundabout control.

5.2.1 Signal Warrants

The intersection of Grey Road 9 and Ida Street has been assessed using the *Ontario Traffic Manual (OTM)* signal warrant guidelines[10] Justification 7 for projected traffic volumes to determine if a change in traffic control is warranted. Justification 7 requires the warrants to be met at 120% for existing intersections to account for uncertainty in using traffic forecasts.

Based on the warrant analysis, traffic control signals are not warranted under background or total traffic conditions, as the warrants are not met to 120%. **Appendix J** contains the warrant analysis worksheets.

[9] Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020).
[10] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2012).

Although not warranted to the 120% threshold, the volume forecasts do reach 100% of the warrant thresholds suggesting that if traffic forecasts are accurate, then a signal would be warranted in the future. Therefore, the intersection of Grey Road 9 and Ida Street has been analyzed with traffic signal control under 2039 total traffic conditions to determine if signalization would improve operations. For the intersection to operate with acceptable levels of service under traffic signal control, auxiliary lanes are required on the eastbound, westbound and northbound approaches. **Table 5.1** summarizes the results of the operational analysis.

Appendix K contains the supporting detailed Synchro 11 reports.

5.2.2 Roundabout

The Township has indicated that a single-lane roundabout is being considered at Ida Street and Grey Road 9. **Table 5.2** summarizes the results of the roundabout analysis under 2039 total traffic conditions. The results indicate that the intersection is forecast to operate with acceptable levels of service under roundabout control. The roundabout option is forecast to operate better than signalization with additional turn lanes.

Appendix K contains the supporting detailed Arcady reports.



TABLE 5.1: IDA STREET AND GREY ROAD 9 TRAFFIC OPERATIONS – TRAFFIC SIGNAL CONTROL

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	
AM Peak Hour	Ida Street & Grey Road 9	TCS	LOS	C	C	A	**B**	D	C	>	**C**	B	A	>	**A**	<	A	>	**A**	**B**
			Delay	24	26	10	**16**	35	30	>	**32**	11	4	>	**8**	<	7	>	**7**	**16**
			V/C	0.24	0.46	0.68		0.62	0.63	>		0.38	0.18	>		<	0.30	>		
			Q	12	36	21		32	46	>		31	13	>		<	33	>		
			Stor.	25	-	25		35	-	>		100	-	>		<	-	>		
			Avail.	13	-	4		3	-	>		69	-	>		<	-	>		
PM Peak Hour	Ida Street & Grey Road 9	TCS	LOS	C	C	A	**C**	C	C	>	**C**	B	A	>	**B**	<	A	>	**A**	**B**
			Delay	28	29	8	**20**	34	30	>	**31**	19	7	>	**13**	<	5	>	**5**	**19**
			V/C	0.44	0.63	0.53		0.57	0.66	>		0.69	0.33	>		<	0.16	>		
			Q	22	53	16		27	52	>		92	34	>		<	14	>		
			Stor.	25	-	25		35	-	>		100	-	>		<	-	>		
			Avail.	3	-	9		8	-	>		8	-	>		<	-	>		

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)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
< / > - Shared with through movement

TABLE 5.2: IDA STREET AND GREY ROAD 9 TRAFFIC OPERATIONS – ROUNDABOUT CONTROL

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	
AM Peak Hour	Ida Street & Grey Road 9	RBT	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
			Delay	<	9	>	**9**	<	6	>	**6**	<	6	>	**6**	<	6	>	**6**	**7**
			V/C	<	0.55	>		<	0.35	>		<	0.32	>		<	0.3	>		
			Q	<	9	>		<	9	>		<	9	>		<	8	>		
PM Peak Hour	Ida Street & Grey Road 9	RBT	LOS	<	A	>	**A**	<	A	>	**A**	<	B	>	**B**	<	A	>	**A**	**A**
			Delay	<	8	>	**8**	<	8	>	**8**	<	13	>	**13**	<	6	>	**6**	**10**
			V/C	<	0.54	>		<	0.45	>		<	0.72	>		<	0.18	>		
			Q	<	10	>		<	8	>		<	47	>		<	8	>		

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)
RBT - Roundabout
< / > - Shared with through movement

6 Conclusions and Recommendations

6.1 Conclusions

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

- **Existing Traffic Conditions:** The study area intersections are operating with acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 139 and 182 trips during the AM and PM peak hours, respectively.
- **Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service, except for the northbound and southbound approaches at Ida Street and Grey Road 9 which are forecast to operate with LOS F during the AM and PM peak hours starting under 2034 (five-year) background traffic conditions.
- **Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under background traffic conditions. The site driveways are forecast to operate with LOS C or better during the AM and PM peak hours.
- **Site Access:** A southbound left-turn lane with 15 metres of storage is warranted on Ida Street at both site driveways under 2034 and 2039 total traffic conditions.
- **Ida Street and Grey Road 9:** Given the poor levels of service forecast for the northbound and southbound approaches starting under background conditions, traffic signal and roundabout control have been reviewed under 2039 total traffic conditions:
  - Traffic signal control is not warranted under background or total traffic conditions. Although not warranted, operational analyses indicate that auxiliary turn lanes would be required for the eastbound, westbound and northbound approaches for the intersection to operate with acceptable levels of service.
  - The Township is considering a one-lane roundabout for the intersection. Based on operational analyses, the intersection is forecast to operate with acceptable levels of service under roundabout control.

6.2 Recommendations

Based on the findings of this study, it is recommended that:

- A southbound left-turn lane with 15 metres of storage be provided on Ida Street at both site driveways; and
- Traffic control improvements (signalization with additional turn lanes or roundabout) be considered by the Township and County at the intersection of Ida Street and Grey Road 9, regardless of whether the development proceeds.

Appendix A

Pre-Study Consultation

From:	Jim Ellis
To:	Maddison Murch
Cc:	Matt Brouwer
Subject:	RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation
Date:	September 25, 2024 2:57:40 PM
Attachments:	image005.jpg image006.png image007.png image008.png image009.png image010.jpg image011.png image012.png image013.png

Hi Maddison

It appears as I have not been circulated with some of these emails. David Smith has not been with the Township for sometime now, so the messages are not getting through to me.

The Township was exploring if a roundabout could be considered at the Grey 9 & Ida intersection, it does have some limitations with the residential driveways in close proximity of a roundabout at the east side of the intersection. There is a possibility of shifting with the Flato lands on the northwest corner and limitations on the southwest corner which would involve acquiring lands from the Wesleyan Church. Without more detail we are not sure if this is possible.

Definitely we would support & recommend the speed reduction to 40 km/h as indicated.

Eco Parkway Phase 2 is slated to begin construction next year continuing from the current road out to Hwy 10. This is being designed and built at the County standards if in the future they may consider taking this roadway connecting Hwy 10 to the Main & Ida connection.

The intersection should also be considered for turn lanes and if traffic signalization is warranted if the roundabout cannot meet design within the lands available.
It was noted at the County planning meeting last week if roundabout could handle the tractor trailers and wide farm machinery travelling through.
Regards
jim

Jim Ellis, CRS S, Dipl. M.M.
Public Works Manager
jellis@southgate.ca

Township of Southgate
185667 Grey Road 9
RR #1
Dundalk, ON N0C 1B0
1-888-560-6607 x 250
Fax 519-923-9262

From: Maddison Murch <mmurch@ptsl.com>
Sent: Wednesday, September 25, 2024 1:55 PM
To: David Smith <dsmith@southgate.ca>
Cc: Jim Ellis <jellis@southgate.ca>; Matt Brouwer <mbrouwer@ptsl.com>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Hi David,

I'm just following up to see if the Township has any comments on our TIS scope of work (see below).

Regards,

Maddison Murch, P.Eng.
Transportation Engineer



5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x205
m: 226.268.3697

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

From: Trevor Ireton <Trevor.Ireton@grey.ca>
Sent: September 9, 2024 7:28 AM
To: Maddison Murch <mmurch@ptsl.com>; dsmith@southgate.ca
Cc: Matt Brouwer <mbrouwer@ptsl.com>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Hello Maddison,

The County accepts the noted changes in scope for this work. We will leave Southgate to provide their acceptance on their behalf.

One note regarding the roundabout. There has been some brief discussion regarding the potential for a roundabout at this location. This is being led by the Township. There are still only preliminary talks so nothing is known at this time.

Regards,

Trevor Ireton, *P.Eng.*
Engineering Manager
Phone: +1 548-877-0896



From: Maddison Murch <mmurch@ptsl.com>
Sent: Wednesday, September 4, 2024 1:53 PM
To: Trevor Ireton <Trevor.Ireton@grey.ca>; dsmith@southgate.ca
Cc: Matt Brouwer <mbrouwer@ptsl.com>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

[EXTERNAL EMAIL]

Hi Trevor and David,

In January, we were in contact with the County regarding the TIS scope of work for a proposed development in Dundalk on the east side Ida Street between Hanbury St and Eco Parkway. We did not complete the TIS at that time as a new concept was being prepared.

A new concept has since been prepared, see attached. We are reaching out to both the County and Township to confirm the TIS scope of work since its been a while since our last correspondence.

Our proposed scope of work generally remains the same as below, with the following changes/additions:

- Other Area Developments:
  - GlenElg Phase 2 and 3
  - White Rose Phase 3
  - Ida Street Development (northwest corner of Ida Street and Grey Road 9)
- Background roadway improvements:
  - We have a copy of the Industrial Access Road (Grey Road 9 and Ida Street) TIS completed for the Township in June 2017. During our original correspondence, there was no mention of the new access road. We just want to confirm if this project will be moving forward and if you are aware of the timing of this project. It also appears that a Class EA was prepared for the access road. Are you able to provide us with a copy of this document?
  - During our original correspondence, the county mentioned a potential future roundabout at Ida Street and Grey Road 9. We just want to confirm if theres been any updates on the status if these improvements. Is this still unknown at this time?

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

Regards,

Maddison Murch, P.Eng.
Transportation Engineer

5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x205
m: 226.268.3697

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

From: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>
Sent: January 24, 2024 8:39 AM
To: Maddison Murch <mmurch@ptsl.com>; Trevor Ireton <Trevor.Ireton@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Thanks for letting me know, it seems we're having some difficulties with our website at the moment. Here you go - 05. Glenelg Phase 3 TIS - Crozier - August 2022.pdf

Stephanie Lacey-Avon
Senior Planner
Phone: +1 548-877-0853

From: Maddison Murch <mmurch@ptsl.com>
Sent: Wednesday, January 24, 2024 8:24 AM
To: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>; Trevor Ireton <Trevor.Ireton@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

[EXTERNAL EMAIL]

Thanks Trevor and Stephanie for the responses.

Stephanie, the traffic impact study link on the County's website seems to be broken. Are you able to send the study pdf via email?

Regards,

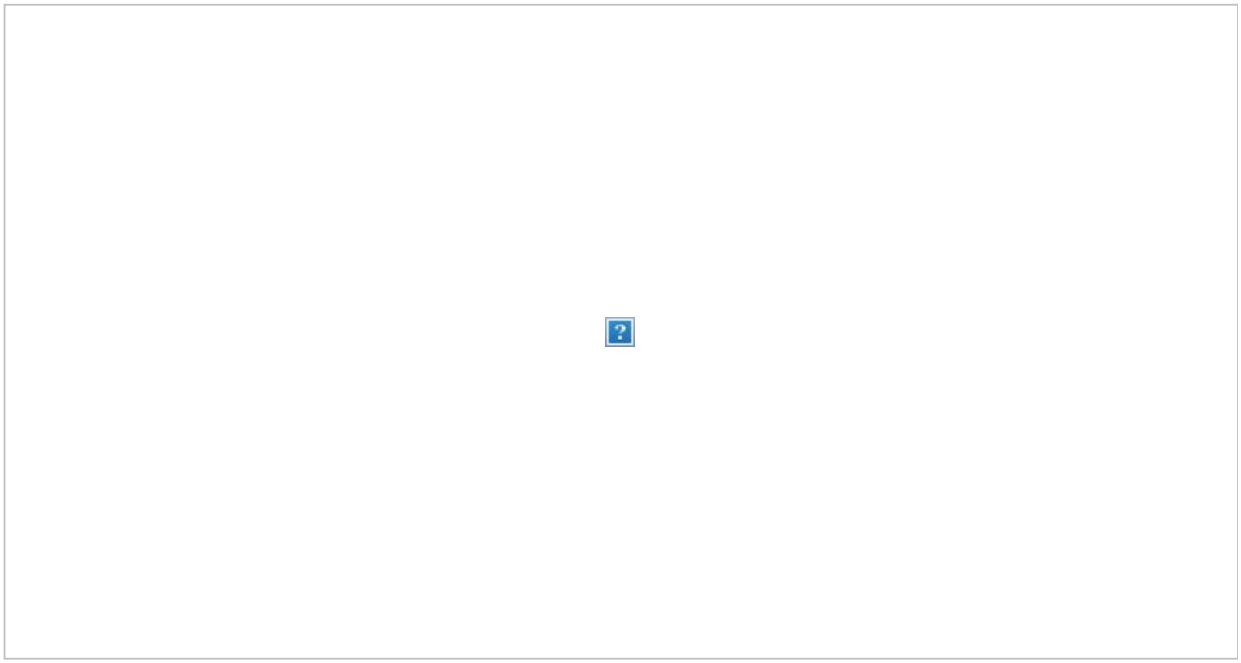
Maddison Murch, P.Eng.
Transportation Engineer

5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x205

From: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>
Sent: Tuesday, January 23, 2024 7:00 AM
To: Trevor Ireton <Trevor.Ireton@grey.ca>; Maddison Murch <mmurch@ptsl.com>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Hi Maddison,

I apologize for the delay, you can view active planning applications in the Township of Southgate on the County's website here: https://www.grey.ca/government/land-use-planning/active-development. More specifically, Glenelg – Phase 3 Plan of Subdivision will be one that you'll want to review their TIS. You can access this information all on our website via the link provided. Please let me know if you have any further questions. Thank you,



Stephanie Lacey-Avon
Senior Planner
Phone: +1 519-372-0219 ext. 1296



From: Trevor Ireton <Trevor.Ireton@grey.ca>
Sent: Thursday, January 18, 2024 9:22 AM
To: Maddison Murch <mmurch@ptsl.com>; Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Hello Maddison,

The terms of reference in general look good from Transportation Services perspective.

I do want to note some upcoming road reconstruction work on Grey Road 9 in 2026. We will be reconstructing Grey Road 9 including the underground infrastructure from Ida Street to Proton Street.

We are also aware that the Township of Southgate has been investigating a potential future roundabout at Ida Street and Grey Road 9. This is not a certainty but it is something that has been suggested.

In terms of growth rate and other area developments, I will leave that up to our planning team to fill in accordingly.

If you have any follow up questions or concerns, please let me know.

Thanks,

Trevor Ireton
Engineering Manager
Phone: +1 548-877-0896

From: Maddison Murch <mmurch@ptsl.com>
Sent: Wednesday, January 17, 2024 10:53 AM
To: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>; Trevor Ireton <Trevor.Ireton@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

[EXTERNAL EMAIL]

Hi Stephanie,

Happy new year!

Thank you for the confirmation email, I'm just checking in on the status of the TIS scope of work review.

Regards,

Maddison Murch, P.Eng.
Transportation Engineer

5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x205

From: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>
Sent: Thursday, December 21, 2023 9:39 AM
To: Maddison Murch <mmurch@ptsl.com>; Trevor Ireton <Trevor.Ireton@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>; Becky Hillyer <Becky.Hillyer@grey.ca>
Subject: RE: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

Hi Maddison,

Thank you for reaching out, we have circulated your request to the appropriate individuals at the County for their review. You can expect to hear back from the County within the first few weeks of the new year, confirming the scope of the ToR.

Have a great holiday!

Stephanie Lacey-Avon
Senior Planner
Phone: +1 519-372-0219 ext. 1296



From: Maddison Murch <mmurch@ptsl.com>
Sent: Tuesday, December 19, 2023 9:16 AM
To: Stephanie Lacey-Avon <Stephanie.Lacey-Avon@grey.ca>; Trevor Ireton <Trevor.Ireton@grey.ca>
Cc: Matt Brouwer <mbrouwer@ptsl.com>
Subject: (230576) Grey Rd 9 & Ida St, Dundalk TIS Pre-Study Consultation

[EXTERNAL EMAIL]

Hi Stephanie and Trevor,

We have been retained to complete the Transportation Impact Study (TIS) for the proposed residential development on Ida Street between Hanbury Street and Eco Parkway (CON 2 SWTSR PT LOT 234). The development proposes 477 units with two road connections to Ida Street. A preliminary concept plan is attached.

Based on the above information, we have prepared the following scope of work for review/approval:

- Weekday AM and PM peak hours for analysis
- Study area intersections:
  - Grey Road 9 and Ida Street;
  - Grey Road 9 and Grey Road 8;
  - Two connections to Ida Street.
- Horizon Year: existing conditions, and five and ten years from full build-out.
- Background Growth Rate: 2% per annum**, please confirm.**
- Other Area Developments: **Please confirm and provide relevant TIS reports or site statistics.**
- Background roadway improvements: **Please confirm**
- Trip Generation: ITE Trip Generation Manual 11th Edition
- Trip Distribution: Existing conditions
- Review of internal road length without a secondary access.

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

Regards,

Maddison Murch, P.Eng.
Transportation Engineer

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

Holiday Office Closure: Friday 2023-12-22 through 2024-01-01



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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: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023

Turning Movement Data

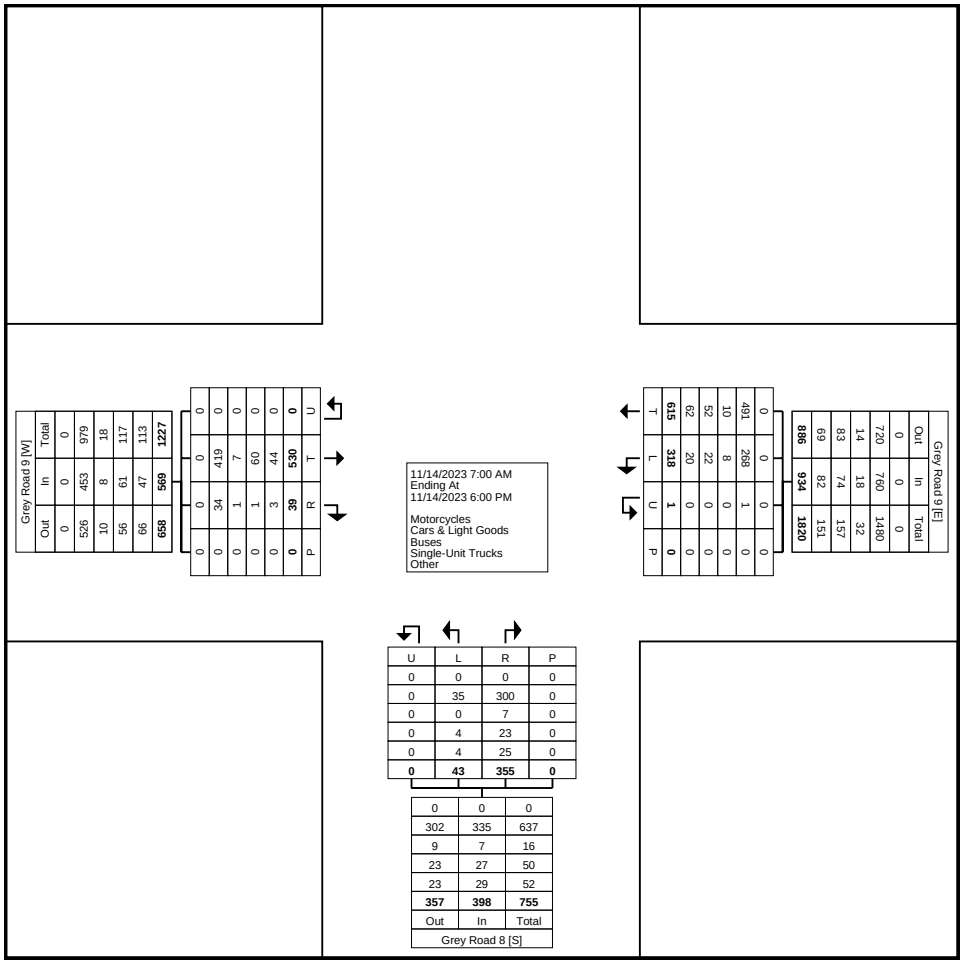
Start Time	Grey Road 9 Eastbound					Grey Road 9 Westbound					Grey Road 8 Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	5	1	0	0	6	10	4	0	0	14	2	8	0	0	10	30
7:15 AM	13	1	0	0	14	11	20	0	0	31	5	11	0	0	16	61
7:30 AM	24	3	0	0	27	14	19	0	0	33	1	8	0	0	9	69
7:45 AM	19	2	0	0	21	6	11	0	0	17	2	14	0	0	16	54
Hourly Total	61	7	0	0	68	41	54	0	0	95	10	41	0	0	51	214
8:00 AM	38	1	0	0	39	7	15	0	0	22	1	11	0	0	12	73
8:15 AM	15	0	0	0	15	8	17	0	0	25	0	9	0	0	9	49
8:30 AM	14	2	0	0	16	7	23	0	0	30	2	17	0	0	19	65
8:45 AM	21	4	0	0	25	12	17	0	0	29	0	10	0	0	10	64
Hourly Total	88	7	0	0	95	34	72	0	0	106	3	47	0	0	50	251
9:00 AM	16	1	0	0	17	17	10	0	0	27	1	16	0	0	17	61
9:15 AM	18	1	0	0	19	13	13	0	0	26	2	8	0	0	10	55
9:30 AM	21	0	0	0	21	1	19	0	0	20	0	19	0	0	19	60
9:45 AM	20	1	0	0	21	10	10	0	0	20	0	11	0	0	11	52
Hourly Total	75	3	0	0	78	41	52	0	0	93	3	54	0	0	57	228
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM	14	1	0	0	15	6	16	0	0	22	0	8	0	0	8	45
12:15 PM	13	1	0	0	14	8	17	0	0	25	0	16	0	0	16	55
12:30 PM	19	1	0	0	20	6	20	0	0	26	2	7	0	0	9	55
12:45 PM	19	0	0	0	19	11	13	0	0	24	1	9	0	0	10	53
Hourly Total	65	3	0	0	68	31	66	0	0	97	3	40	0	0	43	208
1:00 PM	10	1	0	0	11	8	20	0	0	28	1	11	0	0	12	51
1:15 PM	20	1	0	0	21	13	17	0	0	30	1	6	0	0	7	58
1:30 PM	7	1	0	0	8	13	15	0	0	28	1	11	0	0	12	48
1:45 PM	9	2	0	0	11	8	18	0	0	26	1	9	0	0	10	47
Hourly Total	46	5	0	0	51	42	70	0	0	112	4	37	0	0	41	204
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	18	3	0	0	21	13	16	0	0	29	2	5	0	0	7	57
3:15 PM	16	2	0	0	18	11	22	0	0	33	1	8	0	0	9	60
3:30 PM	17	0	0	0	17	7	20	0	0	27	2	7	0	0	9	53
3:45 PM	17	0	0	0	17	14	31	0	0	45	3	14	0	0	17	79
Hourly Total	68	5	0	0	73	45	89	0	0	134	8	34	0	0	42	249
4:00 PM	21	1	0	0	22	8	35	0	0	43	0	5	0	0	5	70
4:15 PM	14	0	0	0	14	6	16	0	0	22	0	18	0	0	18	54
4:30 PM	12	2	0	0	14	12	32	0	0	44	3	13	0	0	16	74
4:45 PM	14	0	0	0	14	14	20	0	0	34	1	13	0	0	14	62

Hourly Total	61	3	0	0	64	40	103	0	0	143	4	49	0	0	53	260
5:00 PM	20	1	0	0	21	7	27	0	0	34	2	19	0	0	21	76
5:15 PM	18	2	0	0	20	15	36	1	0	52	1	15	0	0	16	88
5:30 PM	19	0	0	0	19	15	22	0	0	37	5	8	0	0	13	69
5:45 PM	9	3	0	0	12	7	24	0	0	31	0	11	0	0	11	54
Hourly Total	66	6	0	0	72	44	109	1	0	154	8	53	0	0	61	287
Grand Total	530	39	0	0	569	318	615	1	0	934	43	355	0	0	398	1901
Approach %	93.1	6.9	0.0	-	-	34.0	65.8	0.1	-	-	10.8	89.2	0.0	-	-	-
Total %	27.9	2.1	0.0	-	29.9	16.7	32.4	0.1	-	49.1	2.3	18.7	0.0	-	20.9	-
Motorcycles	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
Cars & Light Goods	419	34	0	-	453	268	491	1	-	760	35	300	0	-	335	1548
% Cars & Light Goods	79.1	87.2	-	-	79.6	84.3	79.8	100.0	-	81.4	81.4	84.5	-	-	84.2	81.4
Buses	7	1	0	-	8	8	10	0	-	18	0	7	0	-	7	33
% Buses	1.3	2.6	-	-	1.4	2.5	1.6	0.0	-	1.9	0.0	2.0	-	-	1.8	1.7
Single-Unit Trucks	60	1	0	-	61	22	52	0	-	74	4	23	0	-	27	162
% Single-Unit Trucks	11.3	2.6	-	-	10.7	6.9	8.5	0.0	-	7.9	9.3	6.5	-	-	6.8	8.5
Articulated Trucks	44	3	0	-	47	20	62	0	-	82	4	25	0	-	29	158
% Articulated Trucks	8.3	7.7	-	-	8.3	6.3	10.1	0.0	-	8.8	9.3	7.0	-	-	7.3	8.3
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023



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: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023

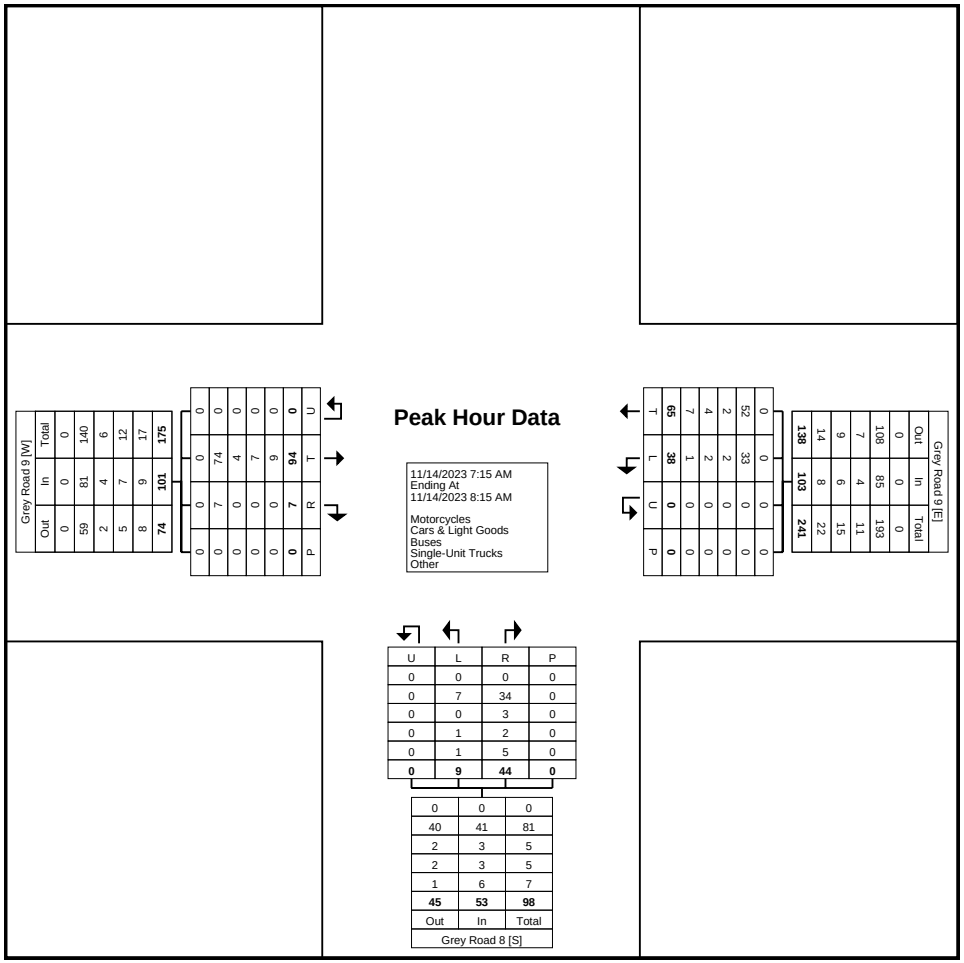
Turning Movement Peak Hour Data (7:15 AM)

Start Time	Grey Road 9 Eastbound					Grey Road 9 Westbound					Grey Road 8 Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
7:15 AM	13	1	0	0	14	11	20	0	0	31	5	11	0	0	16	61
7:30 AM	24	3	0	0	27	14	19	0	0	33	1	8	0	0	9	69
7:45 AM	19	2	0	0	21	6	11	0	0	17	2	14	0	0	16	54
8:00 AM	38	1	0	0	39	7	15	0	0	22	1	11	0	0	12	73
Total	94	7	0	0	101	38	65	0	0	103	9	44	0	0	53	257
Approach %	93.1	6.9	0.0	-	-	36.9	63.1	0.0	-	-	17.0	83.0	0.0	-	-	-
Total %	36.6	2.7	0.0	-	39.3	14.8	25.3	0.0	-	40.1	3.5	17.1	0.0	-	20.6	-
PHF	0.618	0.583	0.000	-	0.647	0.679	0.813	0.000	-	0.780	0.450	0.786	0.000	-	0.828	0.880
Motorcycles	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
Cars & Light Goods	74	7	0	-	81	33	52	0	-	85	7	34	0	-	41	207
% Cars & Light Goods	78.7	100.0	-	-	80.2	86.8	80.0	-	-	82.5	77.8	77.3	-	-	77.4	80.5
Buses	4	0	0	-	4	2	2	0	-	4	0	3	0	-	3	11
% Buses	4.3	0.0	-	-	4.0	5.3	3.1	-	-	3.9	0.0	6.8	-	-	5.7	4.3
Single-Unit Trucks	7	0	0	-	7	2	4	0	-	6	1	2	0	-	3	16
% Single-Unit Trucks	7.4	0.0	-	-	6.9	5.3	6.2	-	-	5.8	11.1	4.5	-	-	5.7	6.2
Articulated Trucks	9	0	0	-	9	1	7	0	-	8	1	5	0	-	6	23
% Articulated Trucks	9.6	0.0	-	-	8.9	2.6	10.8	-	-	7.8	11.1	11.4	-	-	11.3	8.9
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023



Grey Road 9 [W]	U	T	R	P	Total
Out	0	69	2	5	8	74
In	0	81	4	7	6	101
Total	0	140	6	12	17	175
	0	74	4	7	6	94
	0	7	0	0	0	7
	0	0	0	0	0	0
	0	0	0	0	0	0

T	L	U	P	Grey Road 9 [E]	Out	In	Total
0	0	0	0		0	0	0
52	33	0	0		108	85	193
2	2	0	0		7	4	11
4	2	0	0		9	6	15
2	1	0	0		14	8	22
65	**38**	**0**	**0**		**138**	**103**	**241**
0	0	0	0				

U	L	R	P
0	0	0	0
0	7	34	0
0	0	3	0
0	1	2	0
0	1	5	0
0	**9**	**44**	**0**

0	0	0
40	41	81
2	3	5
2	3	5
1	6	7
45	**53**	**98**
Out	In	Total
Grey Road 8 [S]		

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: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023

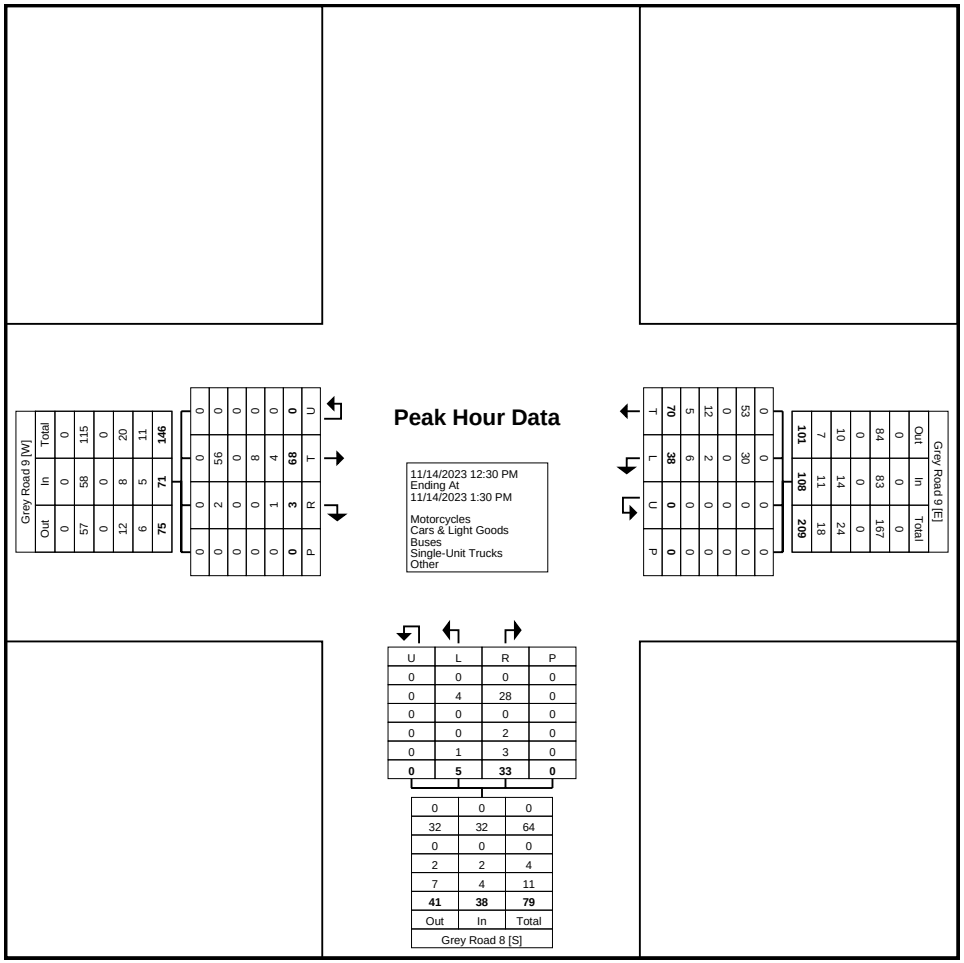
Turning Movement Peak Hour Data (12:30 PM)

Start Time	Grey Road 9 Eastbound					Grey Road 9 Westbound					Grey Road 8 Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
12:30 PM	19	1	0	0	20	6	20	0	0	26	2	7	0	0	9	55
12:45 PM	19	0	0	0	19	11	13	0	0	24	1	9	0	0	10	53
1:00 PM	10	1	0	0	11	8	20	0	0	28	1	11	0	0	12	51
1:15 PM	20	1	0	0	21	13	17	0	0	30	1	6	0	0	7	58
Total	68	3	0	0	71	38	70	0	0	108	5	33	0	0	38	217
Approach %	95.8	4.2	0.0	-	-	35.2	64.8	0.0	-	-	13.2	86.8	0.0	-	-	-
Total %	31.3	1.4	0.0	-	32.7	17.5	32.3	0.0	-	49.8	2.3	15.2	0.0	-	17.5	-
PHF	0.850	0.750	0.000	-	0.845	0.731	0.875	0.000	-	0.900	0.625	0.750	0.000	-	0.792	0.935
Motorcycles	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
Cars & Light Goods	56	2	0	-	58	30	53	0	-	83	4	28	0	-	32	173
% Cars & Light Goods	82.4	66.7	-	-	81.7	78.9	75.7	-	-	76.9	80.0	84.8	-	-	84.2	79.7
Buses	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
Single-Unit Trucks	8	0	0	-	8	2	12	0	-	14	0	2	0	-	2	24
% Single-Unit Trucks	11.8	0.0	-	-	11.3	5.3	17.1	-	-	13.0	0.0	6.1	-	-	5.3	11.1
Articulated Trucks	4	1	0	-	5	6	5	0	-	11	1	3	0	-	4	20
% Articulated Trucks	5.9	33.3	-	-	7.0	15.8	7.1	-	-	10.2	20.0	9.1	-	-	10.5	9.2
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023



Grey Road 9 [W]	U	T	R	P
Total	0	115	0	20	11	146
In	0	58	0	8	5	71
Out	0	57	0	12	6	75

U	L	R	P
0	0	0	0
0	56	0	8	4	68	T
0	2	0	0	1	3	R
0	0	0	0	0	0	P

T	70	5	12	0	53	0
L	38	6	2	0	30	0
U	0	0	0	0	0	0
P	0	0	0	0	0	0

101	7	10	0	84	0	Out	Grey Road 9 [E]
108	11	14	0	83	0	In	
209	18	24	0	167	0	Total	

U	L	R	P
0	0	0	0
0	4	28	0
0	0	0	0
0	0	2	0
0	1	3	0
0	**5**	**33**	**0**

0	0	0
32	32	64
0	0	0
2	2	4
7	4	11
41	**38**	**79**
Out	In	Total
Grey Road 8 [S]		

Turning Movement Peak Hour Data Plot (12:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023

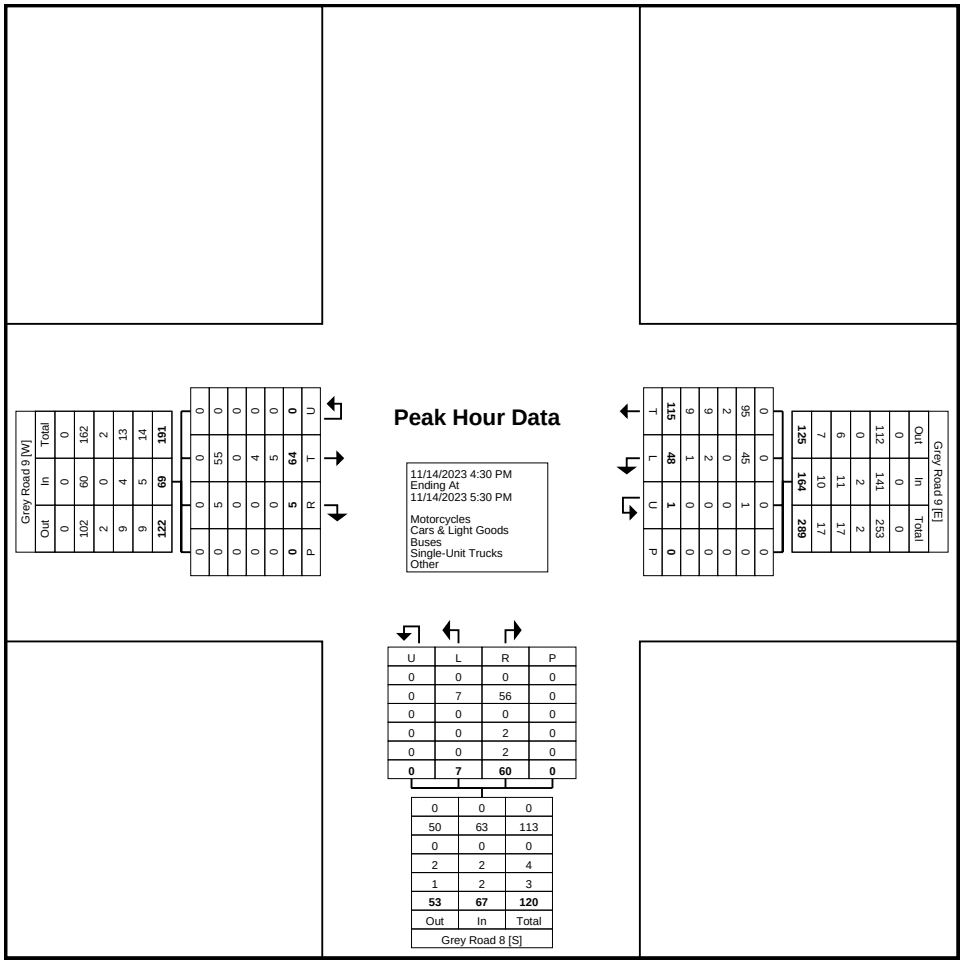
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Grey Road 9 Eastbound					Grey Road 9 Westbound					Grey Road 8 Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
4:30 PM	12	2	0	0	14	12	32	0	0	44	3	13	0	0	16	74
4:45 PM	14	0	0	0	14	14	20	0	0	34	1	13	0	0	14	62
5:00 PM	20	1	0	0	21	7	27	0	0	34	2	19	0	0	21	76
5:15 PM	18	2	0	0	20	15	36	1	0	52	1	15	0	0	16	88
Total	64	5	0	0	69	48	115	1	0	164	7	60	0	0	67	300
Approach %	92.8	7.2	0.0	-	-	29.3	70.1	0.6	-	-	10.4	89.6	0.0	-	-	-
Total %	21.3	1.7	0.0	-	23.0	16.0	38.3	0.3	-	54.7	2.3	20.0	0.0	-	22.3	-
PHF	0.800	0.625	0.000	-	0.821	0.800	0.799	0.250	-	0.788	0.583	0.789	0.000	-	0.798	0.852
Motorcycles	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
Cars & Light Goods	55	5	0	-	60	45	95	1	-	141	7	56	0	-	63	264
% Cars & Light Goods	85.9	100.0	-	-	87.0	93.8	82.6	100.0	-	86.0	100.0	93.3	-	-	94.0	88.0
Buses	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	2
% Buses	0.0	0.0	-	-	0.0	0.0	1.7	0.0	-	1.2	0.0	0.0	-	-	0.0	0.7
Single-Unit Trucks	4	0	0	-	4	2	9	0	-	11	0	2	0	-	2	17
% Single-Unit Trucks	6.3	0.0	-	-	5.8	4.2	7.8	0.0	-	6.7	0.0	3.3	-	-	3.0	5.7
Articulated Trucks	5	0	0	-	5	1	9	0	-	10	0	2	0	-	2	17
% Articulated Trucks	7.8	0.0	-	-	7.2	2.1	7.8	0.0	-	6.1	0.0	3.3	-	-	3.0	5.7
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Grey Road 8
Site Code: 230576
Start Date: 11/14/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Ida Street
Site Code: 230576
Start Date: 11/14/2023

Turning Movement Data

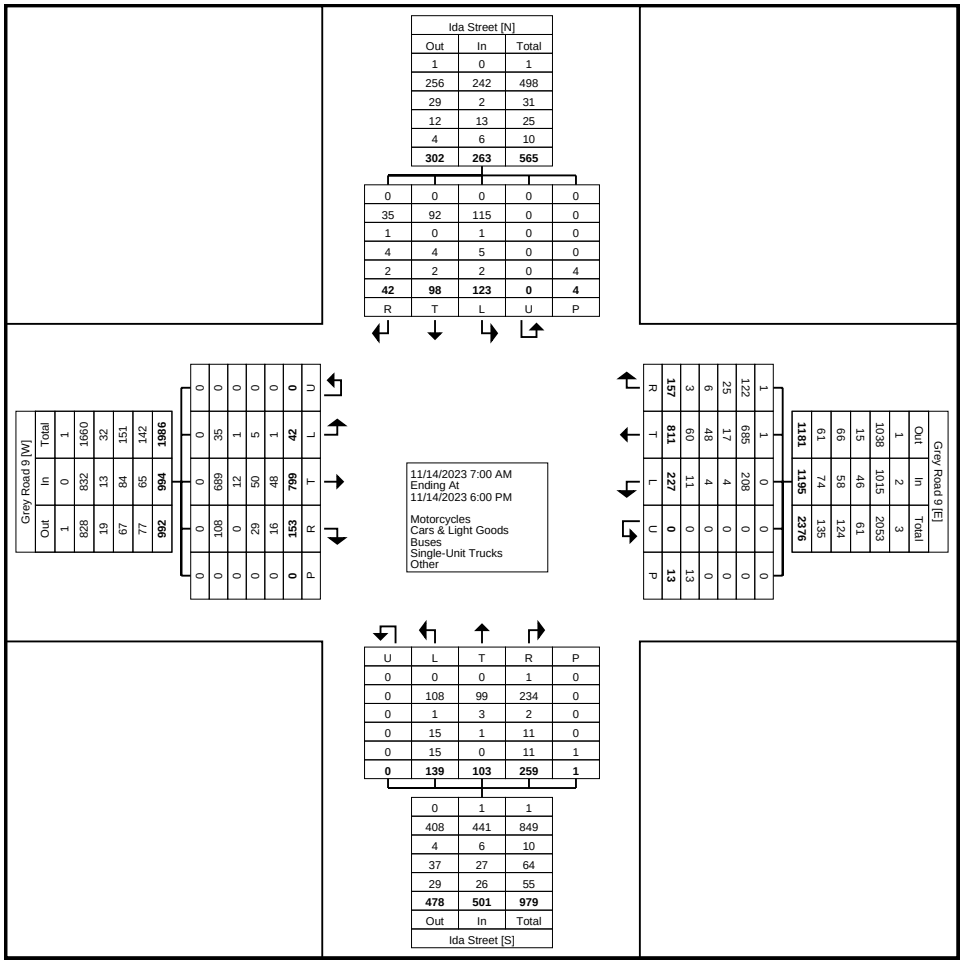
Start Time	Grey Road 9 Eastbound						Grey Road 9 Westbound						Ida Street Northbound						Ida Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	11	0	0	0	11	7	11	2	0	0	20	2	0	5	0	0	7	4	0	3	0	0	7	45
7:15 AM	0	21	6	0	0	27	9	23	1	0	0	33	2	1	2	0	0	5	6	5	2	0	0	13	78
7:30 AM	0	26	5	0	0	31	6	36	4	0	0	46	2	2	3	0	0	7	1	9	1	0	0	11	95
7:45 AM	0	27	6	0	0	33	3	12	1	0	0	16	2	1	9	0	0	12	6	6	2	0	0	14	75
Hourly Total	0	85	17	0	0	102	25	82	8	0	0	115	8	4	19	0	0	31	17	20	8	0	0	45	293
8:00 AM	1	30	9	0	0	40	8	17	1	0	4	26	5	1	8	0	0	14	5	0	1	0	0	6	86
8:15 AM	5	27	5	0	0	37	4	19	5	0	0	28	5	5	6	0	0	16	9	2	2	0	1	13	94
8:30 AM	2	30	2	0	0	34	7	23	10	0	0	40	6	4	10	0	1	20	6	4	2	0	1	12	106
8:45 AM	3	27	5	0	0	35	9	24	11	0	0	44	2	0	5	0	0	7	7	7	2	0	0	16	102
Hourly Total	11	114	21	0	0	146	28	83	27	0	4	138	18	10	29	0	1	57	27	13	7	0	2	47	388
9:00 AM	3	24	2	0	0	29	6	18	4	0	0	28	4	2	7	0	0	13	2	3	3	0	0	8	78
9:15 AM	0	23	6	0	0	29	5	18	1	0	0	24	3	5	4	0	0	12	6	3	0	0	0	9	74
9:30 AM	0	27	7	0	0	34	8	11	3	0	0	22	4	0	5	0	0	9	3	2	2	0	0	7	72
9:45 AM	2	33	4	0	0	39	15	18	5	0	0	38	2	0	5	0	0	7	5	3	0	0	0	8	92
Hourly Total	5	107	19	0	0	131	34	65	13	0	0	112	13	7	21	0	0	41	16	11	5	0	0	32	316
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM	0	23	6	0	0	29	8	20	3	0	0	31	4	3	5	0	0	12	2	4	1	0	0	7	79
12:15 PM	0	28	5	0	0	33	5	22	3	0	0	30	5	2	9	0	0	16	2	2	1	0	0	5	84
12:30 PM	0	23	3	0	0	26	11	20	3	0	1	34	4	2	8	0	0	14	1	1	1	0	0	3	77
12:45 PM	1	29	5	0	0	35	10	28	8	0	0	46	3	3	9	0	0	15	1	1	3	0	0	5	101
Hourly Total	1	103	19	0	0	123	34	90	17	0	1	141	16	10	31	0	0	57	6	8	6	0	0	20	341
1:00 PM	1	23	3	0	0	27	5	25	2	0	0	32	4	0	8	0	0	12	8	2	1	0	0	11	82
1:15 PM	0	21	3	0	0	24	8	22	0	0	0	30	3	1	2	0	0	6	1	5	1	0	0	7	67
1:30 PM	1	14	5	0	0	20	7	23	2	0	0	32	8	3	10	0	0	21	3	3	0	0	0	6	79
1:45 PM	0	22	4	0	0	26	7	21	2	0	0	30	5	2	11	0	0	18	1	0	0	0	0	1	75
Hourly Total	2	80	15	0	0	97	27	91	6	0	0	124	20	6	31	0	0	57	13	10	2	0	0	25	303
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	18	12	0	0	30	3	19	8	0	0	30	10	3	9	0	0	22	7	4	1	0	0	12	94
3:15 PM	5	21	5	0	0	31	7	42	19	0	4	68	4	4	8	0	0	16	5	1	0	0	1	6	121
3:30 PM	5	21	4	0	0	30	8	27	14	0	2	49	3	2	8	0	0	13	3	4	1	0	0	8	100
3:45 PM	3	27	9	0	0	39	2	35	9	0	0	46	7	3	12	0	0	22	4	2	4	0	1	10	117
Hourly Total	13	87	30	0	0	130	20	123	50	0	6	193	24	12	37	0	0	73	19	11	6	0	2	36	432
4:00 PM	2	25	5	0	0	32	7	40	8	0	0	55	7	6	9	0	0	22	1	2	0	0	0	3	112
4:15 PM	1	21	7	0	0	29	6	35	6	0	0	47	2	10	9	0	0	21	5	5	0	0	0	10	107
4:30 PM	2	22	7	0	0	31	8	35	5	0	0	48	3	6	16	0	0	25	3	2	0	0	0	5	109

4:45 PM	0	28	4	0	0	32	13	39	3	0	2	55	0	5	15	0	0	20	3	7	0	0	0	10	117
Hourly Total	5	96	23	0	0	124	34	149	22	0	2	205	12	27	49	0	0	88	12	16	0	0	0	28	445
5:00 PM	3	41	4	0	0	48	9	26	3	0	0	38	11	9	17	0	0	37	3	2	3	0	0	8	131
5:15 PM	1	39	2	0	0	42	6	45	5	0	0	56	7	5	11	0	0	23	2	6	4	0	0	12	133
5:30 PM	1	25	1	0	0	27	6	39	3	0	0	48	5	8	9	0	0	22	5	1	1	0	0	7	104
5:45 PM	0	22	2	0	0	24	4	18	3	0	0	25	5	5	5	0	0	15	3	0	0	0	0	3	67
Hourly Total	5	127	9	0	0	141	25	128	14	0	0	167	28	27	42	0	0	97	13	9	8	0	0	30	435
Grand Total	42	799	153	0	0	994	227	811	157	0	13	1195	139	103	259	0	1	501	123	98	42	0	4	263	2953
Approach %	4.2	80.4	15.4	0.0	-	-	19.0	67.9	13.1	0.0	-	-	27.7	20.6	51.7	0.0	-	-	46.8	37.3	16.0	0.0	-	-	-
Total %	1.4	27.1	5.2	0.0	-	33.7	7.7	27.5	5.3	0.0	-	40.5	4.7	3.5	8.8	0.0	-	17.0	4.2	3.3	1.4	0.0	-	8.9	-
Motorcycles	0	0	0	0	-	0	0	1	1	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.6	-	-	0.2	0.0	0.0	0.4	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	35	689	108	0	-	832	208	685	122	0	-	1015	108	99	234	0	-	441	115	92	35	0	-	242	2530
% Cars & Light Goods	83.3	86.2	70.6	-	-	83.7	91.6	84.5	77.7	-	-	84.9	77.7	96.1	90.3	-	-	88.0	93.5	93.9	83.3	-	-	92.0	85.7
Buses	1	12	0	0	-	13	4	17	25	0	-	46	1	3	2	0	-	6	1	0	1	0	-	2	67
% Buses	2.4	1.5	0.0	-	-	1.3	1.8	2.1	15.9	-	-	3.8	0.7	2.9	0.8	-	-	1.2	0.8	0.0	2.4	-	-	0.8	2.3
Single-Unit Trucks	5	50	29	0	-	84	4	48	6	0	-	58	15	1	11	0	-	27	5	4	4	0	-	13	182
% Single-Unit Trucks	11.9	6.3	19.0	-	-	8.5	1.8	5.9	3.8	-	-	4.9	10.8	1.0	4.2	-	-	5.4	4.1	4.1	9.5	-	-	4.9	6.2
Articulated Trucks	1	48	16	0	-	65	11	60	2	0	-	73	15	0	11	0	-	26	2	2	2	0	-	6	170
% Articulated Trucks	2.4	6.0	10.5	-	-	6.5	4.8	7.4	1.3	-	-	6.1	10.8	0.0	4.2	-	-	5.2	1.6	2.0	4.8	-	-	2.3	5.8
Bicycles on Road	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.6	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	23.1	-	-	-	-	-	0.0	-	-	-	-	-	25.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	10	-	-	-	-	-	1	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	76.9	-	-	-	-	-	100.0	-	-	-	-	-	75.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Ida Street
Site Code: 230576
Start Date: 11/14/2023



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: Grey Road 9 & Ida Street
Site Code: 230576
Start Date: 11/14/2023

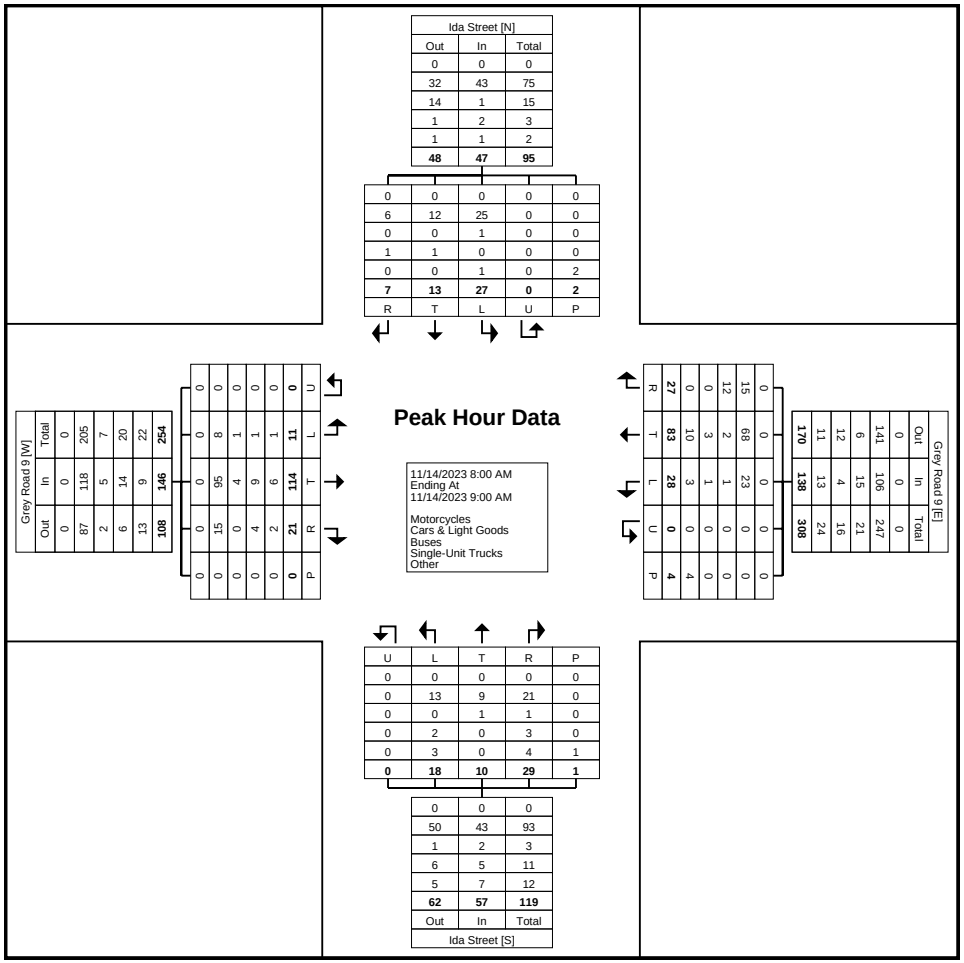
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Grey Road 9 Eastbound						Grey Road 9 Westbound						Ida Street Northbound						Ida Street 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	
8:00 AM	1	30	9	0	0	40	8	17	1	0	4	26	5	1	8	0	0	14	5	0	1	0	0	6	86
8:15 AM	5	27	5	0	0	37	4	19	5	0	0	28	5	5	6	0	0	16	9	2	2	0	1	13	94
8:30 AM	2	30	2	0	0	34	7	23	10	0	0	40	6	4	10	0	1	20	6	4	2	0	1	12	106
8:45 AM	3	27	5	0	0	35	9	24	11	0	0	44	2	0	5	0	0	7	7	7	2	0	0	16	102
Total	11	114	21	0	0	146	28	83	27	0	4	138	18	10	29	0	1	57	27	13	7	0	2	47	388
Approach %	7.5	78.1	14.4	0.0	-	-	20.3	60.1	19.6	0.0	-	-	31.6	17.5	50.9	0.0	-	-	57.4	27.7	14.9	0.0	-	-	-
Total %	2.8	29.4	5.4	0.0	-	37.6	7.2	21.4	7.0	0.0	-	35.6	4.6	2.6	7.5	0.0	-	14.7	7.0	3.4	1.8	0.0	-	12.1	-
PHF	0.550	0.950	0.583	0.000	-	0.913	0.778	0.865	0.614	0.000	-	0.784	0.750	0.500	0.725	0.000	-	0.713	0.750	0.464	0.875	0.000	-	0.734	0.915
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	8	95	15	0	-	118	23	68	15	0	-	106	13	9	21	0	-	43	25	12	6	0	-	43	310
% Cars & Light Goods	72.7	83.3	71.4	-	-	80.8	82.1	81.9	55.6	-	-	76.8	72.2	90.0	72.4	-	-	75.4	92.6	92.3	85.7	-	-	91.5	79.9
Buses	1	4	0	0	-	5	1	2	12	0	-	15	0	1	1	0	-	2	1	0	0	0	-	1	23
% Buses	9.1	3.5	0.0	-	-	3.4	3.6	2.4	44.4	-	-	10.9	0.0	10.0	3.4	-	-	3.5	3.7	0.0	0.0	-	-	2.1	5.9
Single-Unit Trucks	1	9	4	0	-	14	1	3	0	0	-	4	2	0	3	0	-	5	0	1	1	0	-	2	25
% Single-Unit Trucks	9.1	7.9	19.0	-	-	9.6	3.6	3.6	0.0	-	-	2.9	11.1	0.0	10.3	-	-	8.8	0.0	7.7	14.3	-	-	4.3	6.4
Articulated Trucks	1	6	2	0	-	9	3	10	0	0	-	13	3	0	4	0	-	7	1	0	0	0	-	1	30
% Articulated Trucks	9.1	5.3	9.5	-	-	6.2	10.7	12.0	0.0	-	-	9.4	16.7	0.0	13.8	-	-	12.3	3.7	0.0	0.0	-	-	2.1	7.7
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	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	50.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	50.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Ida Street
Site Code: 230576
Start Date: 11/14/2023



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Grey Road 9 & Ida Street
Site Code: 230576
Start Date: 11/14/2023

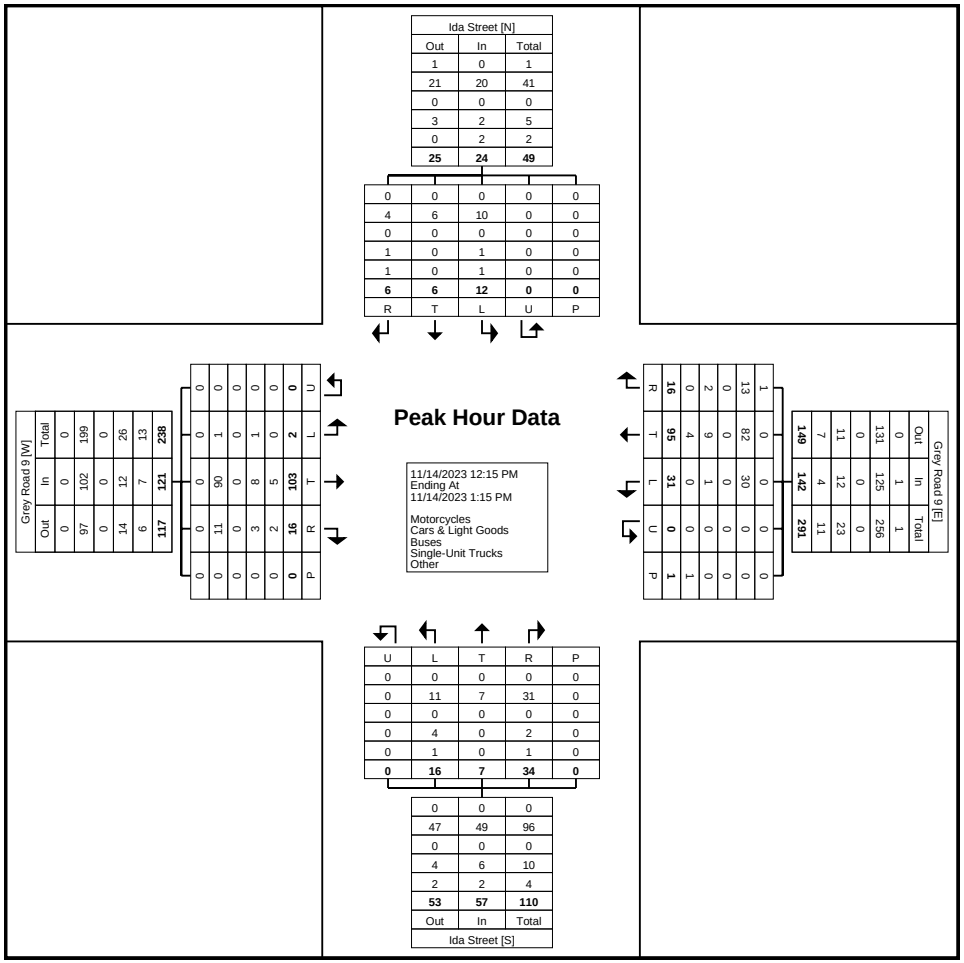
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Grey Road 9 Eastbound						Grey Road 9 Westbound						Ida Street Northbound						Ida Street 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	
12:15 PM	0	28	5	0	0	33	5	22	3	0	0	30	5	2	9	0	0	16	2	2	1	0	0	5	84
12:30 PM	0	23	3	0	0	26	11	20	3	0	1	34	4	2	8	0	0	14	1	1	1	0	0	3	77
12:45 PM	1	29	5	0	0	35	10	28	8	0	0	46	3	3	9	0	0	15	1	1	3	0	0	5	101
1:00 PM	1	23	3	0	0	27	5	25	2	0	0	32	4	0	8	0	0	12	8	2	1	0	0	11	82
Total	2	103	16	0	0	121	31	95	16	0	1	142	16	7	34	0	0	57	12	6	6	0	0	24	344
Approach %	1.7	85.1	13.2	0.0	-	-	21.8	66.9	11.3	0.0	-	-	28.1	12.3	59.6	0.0	-	-	50.0	25.0	25.0	0.0	-	-	-
Total %	0.6	29.9	4.7	0.0	-	35.2	9.0	27.6	4.7	0.0	-	41.3	4.7	2.0	9.9	0.0	-	16.6	3.5	1.7	1.7	0.0	-	7.0	-
PHF	0.500	0.888	0.800	0.000	-	0.864	0.705	0.848	0.500	0.000	-	0.772	0.800	0.583	0.944	0.000	-	0.891	0.375	0.750	0.500	0.000	-	0.545	0.851
Motorcycles	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	6.3	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	1	90	11	0	-	102	30	82	13	0	-	125	11	7	31	0	-	49	10	6	4	0	-	20	296
% Cars & Light Goods	50.0	87.4	68.8	-	-	84.3	96.8	86.3	81.3	-	-	88.0	68.8	100.0	91.2	-	-	86.0	83.3	100.0	66.7	-	-	83.3	86.0
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	1	8	3	0	-	12	1	9	2	0	-	12	4	0	2	0	-	6	1	0	1	0	-	2	32
% Single-Unit Trucks	50.0	7.8	18.8	-	-	9.9	3.2	9.5	12.5	-	-	8.5	25.0	0.0	5.9	-	-	10.5	8.3	0.0	16.7	-	-	8.3	9.3
Articulated Trucks	0	5	2	0	-	7	0	4	0	0	-	4	1	0	1	0	-	2	1	0	1	0	-	2	15
% Articulated Trucks	0.0	4.9	12.5	-	-	5.8	0.0	4.2	0.0	-	-	2.8	6.3	0.0	2.9	-	-	3.5	8.3	0.0	16.7	-	-	8.3	4.4
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Turning Movement Peak Hour Data Plot (12:15 PM)

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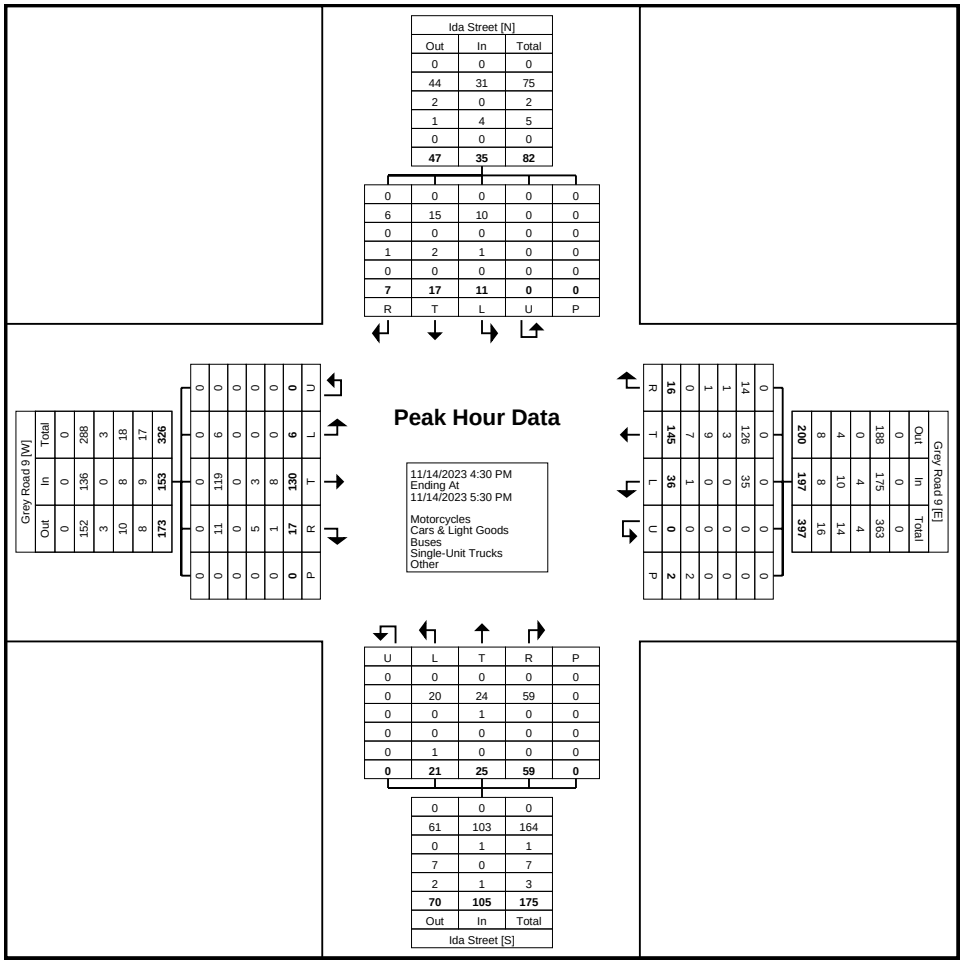
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Grey Road 9 Eastbound						Grey Road 9 Westbound						Ida Street Northbound						Ida Street 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	2	22	7	0	0	31	8	35	5	0	0	48	3	6	16	0	0	25	3	2	0	0	0	5	109
4:45 PM	0	28	4	0	0	32	13	39	3	0	2	55	0	5	15	0	0	20	3	7	0	0	0	10	117
5:00 PM	3	41	4	0	0	48	9	26	3	0	0	38	11	9	17	0	0	37	3	2	3	0	0	8	131
5:15 PM	1	39	2	0	0	42	6	45	5	0	0	56	7	5	11	0	0	23	2	6	4	0	0	12	133
Total	6	130	17	0	0	153	36	145	16	0	2	197	21	25	59	0	0	105	11	17	7	0	0	35	490
Approach %	3.9	85.0	11.1	0.0	-	-	18.3	73.6	8.1	0.0	-	-	20.0	23.8	56.2	0.0	-	-	31.4	48.6	20.0	0.0	-	-	-
Total %	1.2	26.5	3.5	0.0	-	31.2	7.3	29.6	3.3	0.0	-	40.2	4.3	5.1	12.0	0.0	-	21.4	2.2	3.5	1.4	0.0	-	7.1	-
PHF	0.500	0.793	0.607	0.000	-	0.797	0.692	0.806	0.800	0.000	-	0.879	0.477	0.694	0.868	0.000	-	0.709	0.917	0.607	0.438	0.000	-	0.729	0.921
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	6	119	11	0	-	136	35	126	14	0	-	175	20	24	59	0	-	103	10	15	6	0	-	31	445
% Cars & Light Goods	100.0	91.5	64.7	-	-	88.9	97.2	86.9	87.5	-	-	88.8	95.2	96.0	100.0	-	-	98.1	90.9	88.2	85.7	-	-	88.6	90.8
Buses	0	0	0	0	-	0	0	3	1	0	-	4	0	1	0	0	-	1	0	0	0	0	-	0	5
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	2.1	6.3	-	-	2.0	0.0	4.0	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	1.0
Single-Unit Trucks	0	3	5	0	-	8	0	9	1	0	-	10	0	0	0	0	-	0	1	2	1	0	-	4	22
% Single-Unit Trucks	0.0	2.3	29.4	-	-	5.2	0.0	6.2	6.3	-	-	5.1	0.0	0.0	0.0	-	-	0.0	9.1	11.8	14.3	-	-	11.4	4.5
Articulated Trucks	0	8	1	0	-	9	1	7	0	0	-	8	1	0	0	0	-	1	0	0	0	0	-	0	18
% Articulated Trucks	0.0	6.2	5.9	-	-	5.9	2.8	4.8	0.0	-	-	4.1	4.8	0.0	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	3.7
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Turning Movement Peak Hour Data Plot (4:30 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)	11	114	21	28	83	27	18	10	29	27	13	7
Future Volume (vph)	11	114	21	28	83	27	18	10	29	27	13	7
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
Ped Bike Factor												
Frt		0.980			0.974			0.931			0.979	
Flt Protected		0.996			0.990			0.984			0.972	
Satd. Flow (prot)	0	1552	0	0	1489	0	0	1394	0	0	1668	0
Flt Permitted		0.996			0.990			0.984			0.972	
Satd. Flow (perm)	0	1552	0	0	1489	0	0	1394	0	0	1668	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	17%	29%	18%	18%	44%	28%	10%	28%	7%	8%	14%
Adj. Flow (vph)	12	124	23	30	90	29	20	11	32	29	14	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	159	0	0	149	0	0	63	0	0	51	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

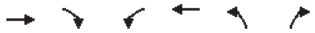
Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	114	21	28	83	27	18	10	29	27	13	7
Future Vol, veh/h	11	114	21	28	83	27	18	10	29	27	13	7
Conflicting Peds, #/hr	2	0	1	1	0	2	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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, %	27	17	29	18	18	44	28	10	28	7	8	14
Mvmt Flow	12	124	23	30	90	29	20	11	32	29	14	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	121	0	0	148	0	0	337	342	141	352	339	107
Stage 1	-	-	-	-	-	-	161	161	-	167	167	-
Stage 2	-	-	-	-	-	-	176	181	-	185	172	-
Critical Hdwy	4.37	-	-	4.28	-	-	7.38	6.6	6.48	7.17	6.58	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.38	5.6	-	6.17	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.38	5.6	-	6.17	5.58	-
Follow-up Hdwy	2.443	-	-	2.362	-	-	3.752	4.09	3.552	3.563	4.072	3.426
Pot Cap-1 Maneuver	1325	-	-	1341	-	-	570	567	842	594	573	915
Stage 1	-	-	-	-	-	-	784	750	-	823	749	-
Stage 2	-	-	-	-	-	-	769	735	-	805	745	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1323	-	-	1340	-	-	540	546	838	546	552	913
Mov Cap-2 Maneuver	-	-	-	-	-	-	540	546	-	546	552	-
Stage 1	-	-	-	-	-	-	775	742	-	813	730	-
Stage 2	-	-	-	-	-	-	730	716	-	753	737	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	1.6	11	11.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	661	1323	-	-	1340	-	-	583
HCM Lane V/C Ratio	0.094	0.009	-	-	0.023	-	-	0.088
HCM Control Delay (s)	11	7.7	0	-	7.7	0	-	11.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.3



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	94	7	38	65	9	44
Future Volume (vph)	94	7	38	65	9	44
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	0.990				0.888	
Flt Protected				0.982	0.991	
Satd. Flow (prot)	1574	0	0	1589	1361	0
Flt Permitted				0.982	0.991	
Satd. Flow (perm)	1574	0	0	1589	1361	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	21%	0%	13%	20%	22%	23%
Adj. Flow (vph)	102	8	41	71	10	48
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	0	0	112	58	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	94	7	38	65	9	44
Future Vol, veh/h	94	7	38	65	9	44
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, %	21	0	13	20	22	23
Mvmt Flow	102	8	41	71	10	48

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	110	0	259	106
Stage 1	-	-	-	-	106	-
Stage 2	-	-	-	-	153	-
Critical Hdwy	-	-	4.23	-	6.62	6.43
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	-	-	2.317	-	3.698	3.507
Pot Cap-1 Maneuver	-	-	1414	-	689	894
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	828	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1414	-	668	894
Mov Cap-2 Maneuver	-	-	-	-	668	-
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	845	-	-	1414	-
HCM Lane V/C Ratio	0.068	-	-	0.029	-
HCM Control Delay (s)	9.6	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	130	17	36	145	16	21	25	59	11	17	7
Future Volume (vph)	6	130	17	36	145	16	21	25	59	11	17	7
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
Ped Bike Factor												
Frt		0.985			0.989			0.924			0.972	
Flt Protected		0.998			0.991			0.990			0.984	
Satd. Flow (prot)	0	1676	0	0	1675	0	0	1705	0	0	1630	0
Flt Permitted		0.998			0.991			0.990			0.984	
Satd. Flow (perm)	0	1676	0	0	1675	0	0	1705	0	0	1630	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	9%	35%	3%	13%	13%	5%	4%	0%	9%	12%	14%
Adj. Flow (vph)	7	141	18	39	158	17	23	27	64	12	18	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	166	0	0	214	0	0	114	0	0	38	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

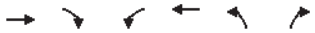
Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	130	17	36	145	16	21	25	59	11	17	7
Future Vol, veh/h	6	130	17	36	145	16	21	25	59	11	17	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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	9	35	3	13	13	5	4	0	9	12	14
Mvmt Flow	7	141	18	39	158	17	23	27	64	12	18	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	175	0	0	159	0	0	422	417	152	457	418	167
Stage 1	-	-	-	-	-	-	164	164	-	245	245	-
Stage 2	-	-	-	-	-	-	258	253	-	212	173	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.15	6.54	6.2	7.19	6.62	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.54	-	6.19	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.54	-	6.19	5.62	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.545	4.036	3.3	3.581	4.108	3.426
Pot Cap-1 Maneuver	1414	-	-	1414	-	-	537	524	900	502	511	847
Stage 1	-	-	-	-	-	-	831	759	-	743	685	-
Stage 2	-	-	-	-	-	-	740	694	-	774	737	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1414	-	-	1414	-	-	503	505	898	434	493	847
Mov Cap-2 Maneuver	-	-	-	-	-	-	503	505	-	434	493	-
Stage 1	-	-	-	-	-	-	827	755	-	739	664	-
Stage 2	-	-	-	-	-	-	691	672	-	688	733	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.4	11.5	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	669	1414	-	-	1414	-	-	514
HCM Lane V/C Ratio	0.171	0.005	-	-	0.028	-	-	0.074
HCM Control Delay (s)	11.5	7.6	0	-	7.6	0	-	12.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	0.2



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	64	5	48	115	7	60
Future Volume (vph)	64	5	48	115	7	60
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	0.991				0.880	
Flt Protected				0.986	0.995	
Satd. Flow (prot)	1665	0	0	1647	1566	0
Flt Permitted				0.986	0.995	
Satd. Flow (perm)	1665	0	0	1647	1566	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	6%	17%	0%	7%
Adj. Flow (vph)	70	5	52	125	8	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	75	0	0	177	73	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	64	5	48	115	7	60
Future Vol, veh/h	64	5	48	115	7	60
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, %	14	0	6	17	0	7
Mvmt Flow	70	5	52	125	8	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	75	0	302	73
Stage 1	-	-	-	-	73	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.16	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1499	-	694	975
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	814	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1499	-	668	975
Mov Cap-2 Maneuver	-	-	-	-	668	-
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	784	-

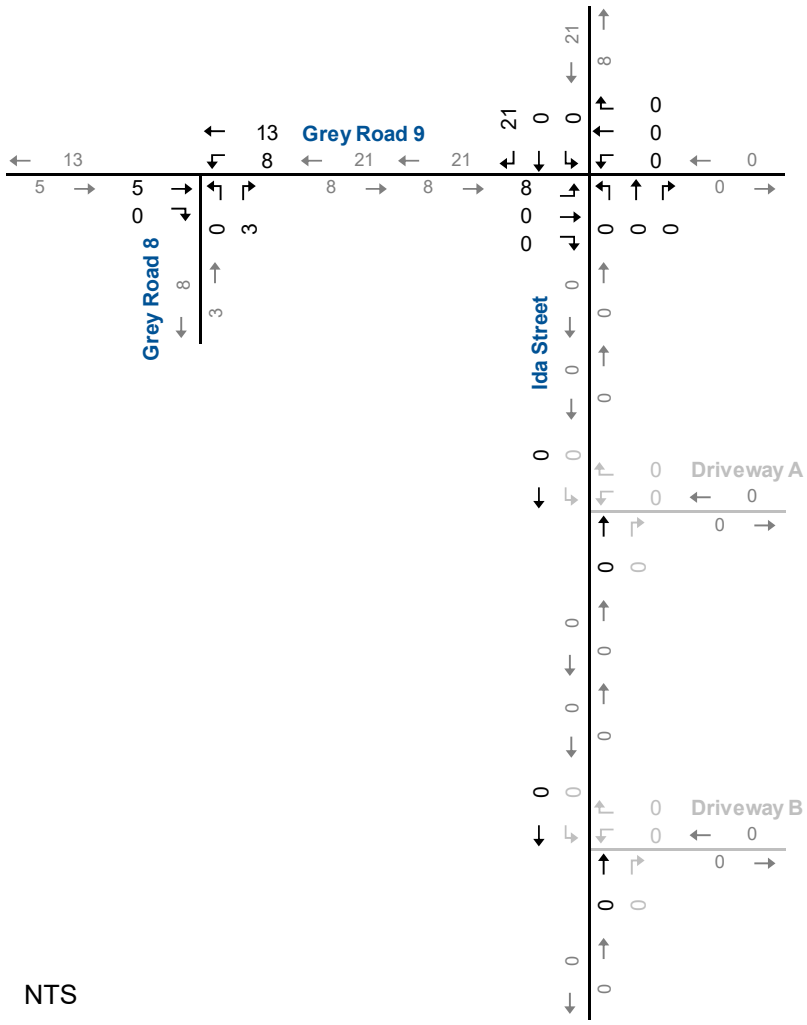
Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	930	-	-	1499	-
HCM Lane V/C Ratio	0.078	-	-	0.035	-
HCM Control Delay (s)	9.2	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

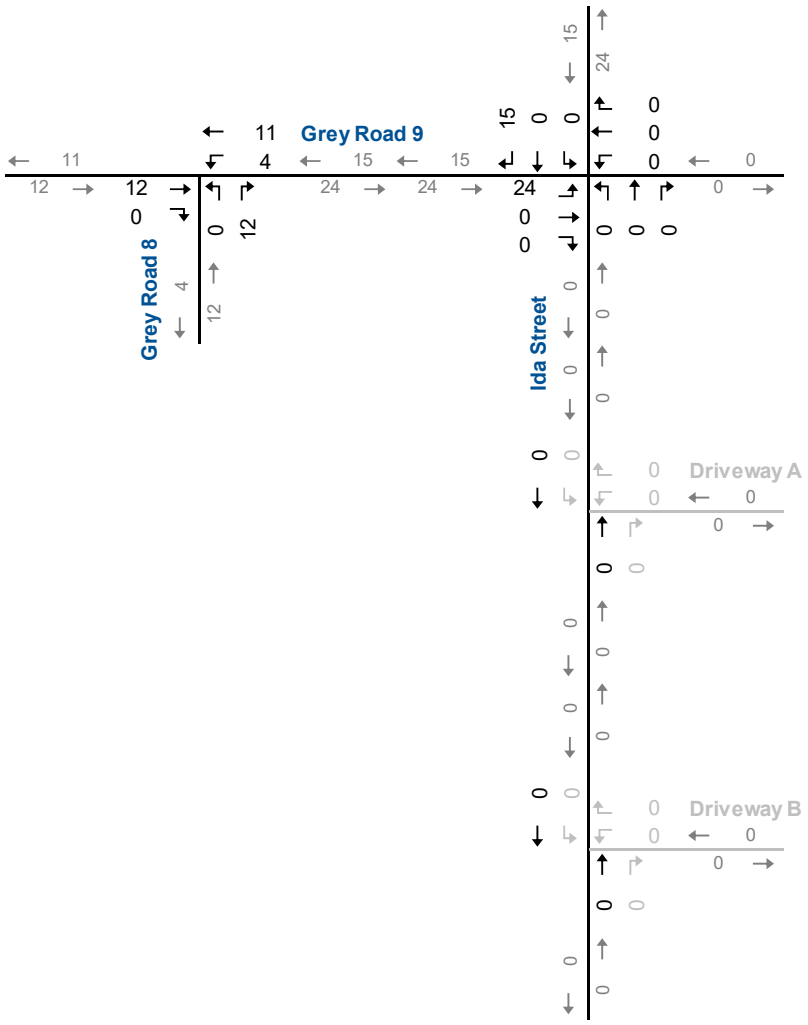
Appendix D

Other Area Development Traffic Volumes

AM Peak Hour



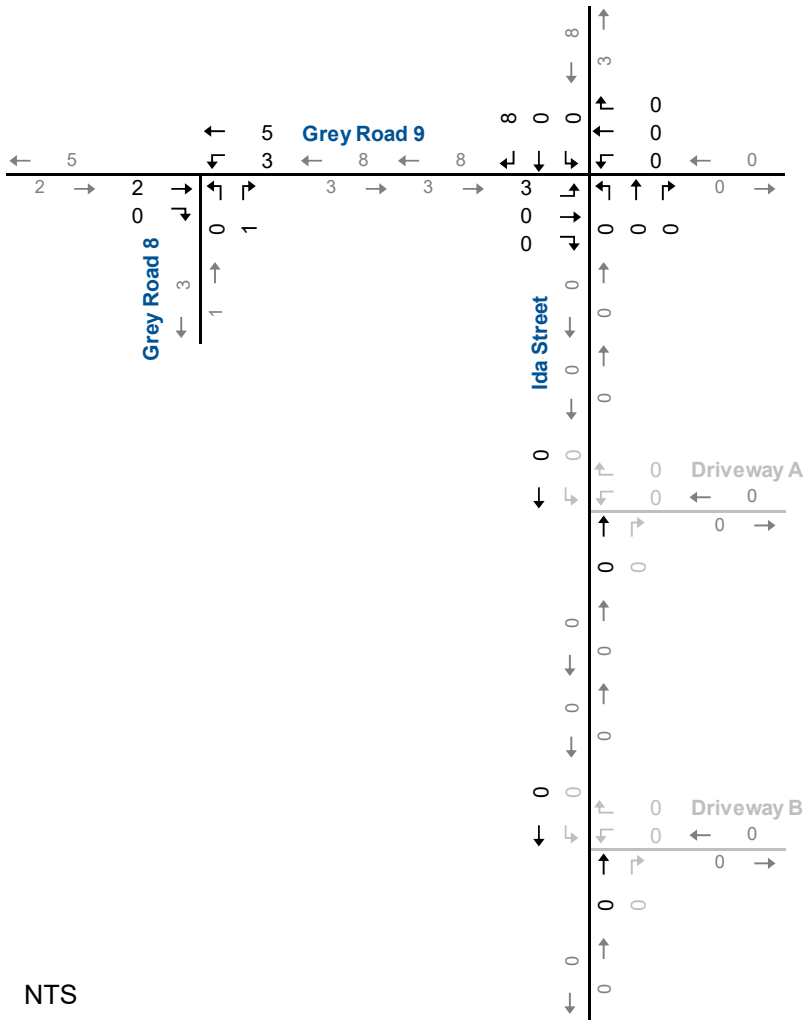
PM Peak Hour



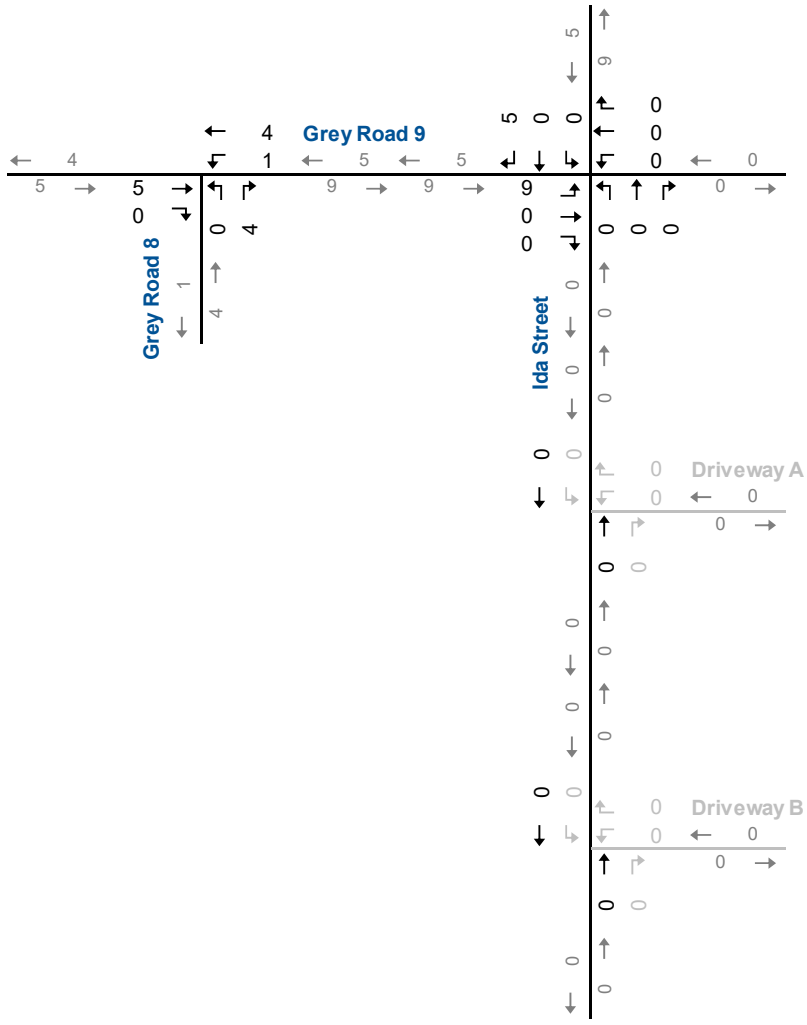
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Other Area Development Traffic Volumes
GlenElg Phase 3

AM Peak Hour



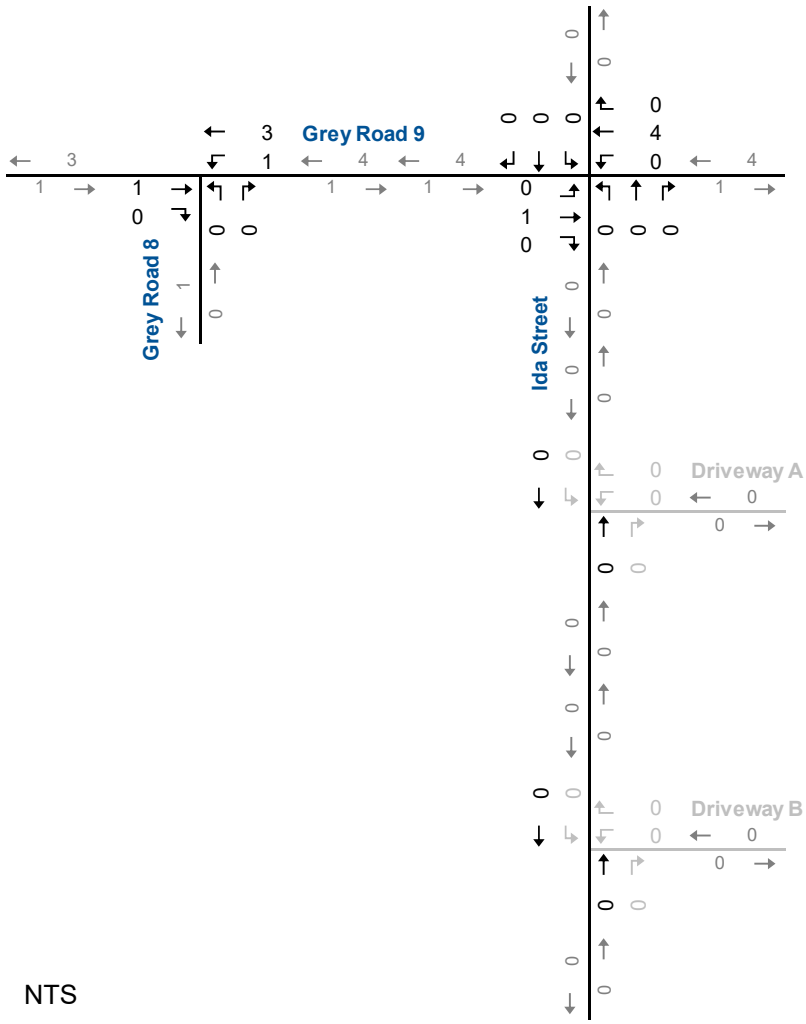
PM Peak Hour



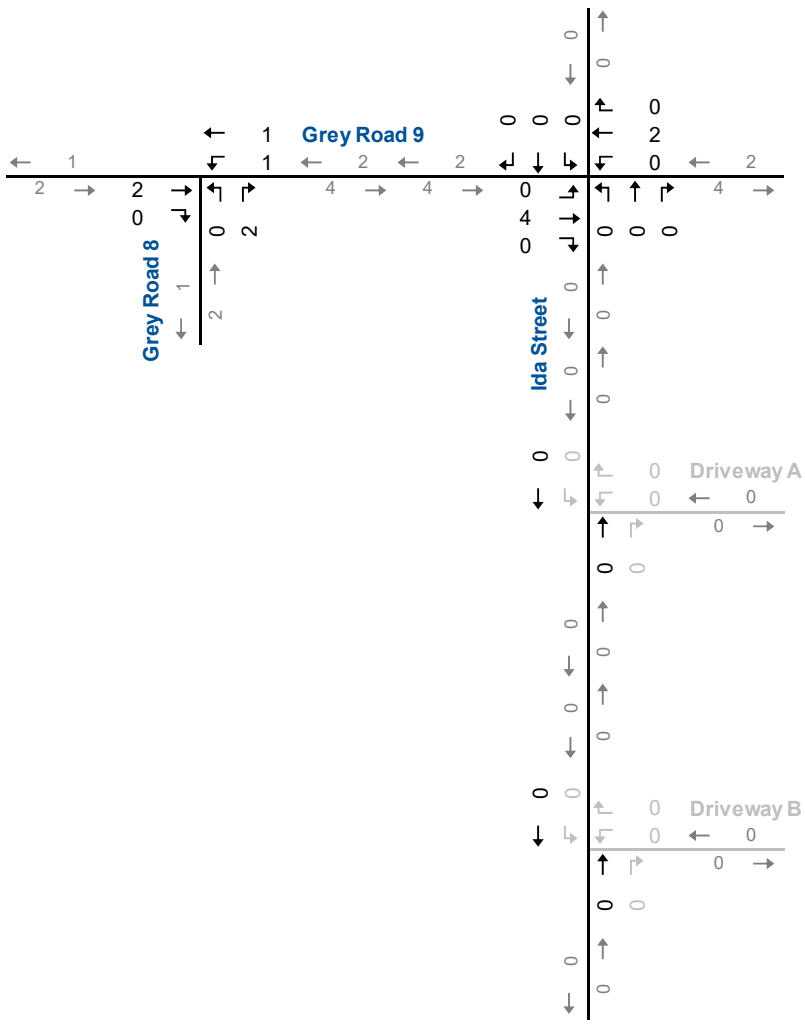
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Other Area Development Traffic Volumes
GlenElg Phase 2

AM Peak Hour



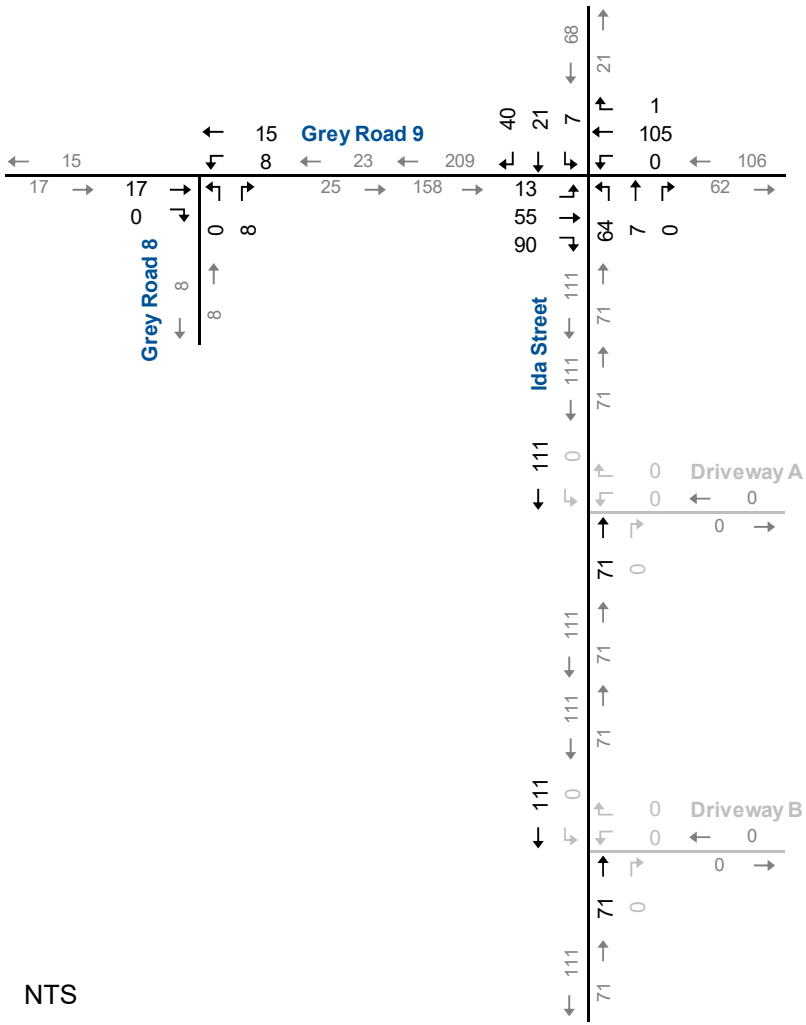
PM Peak Hour



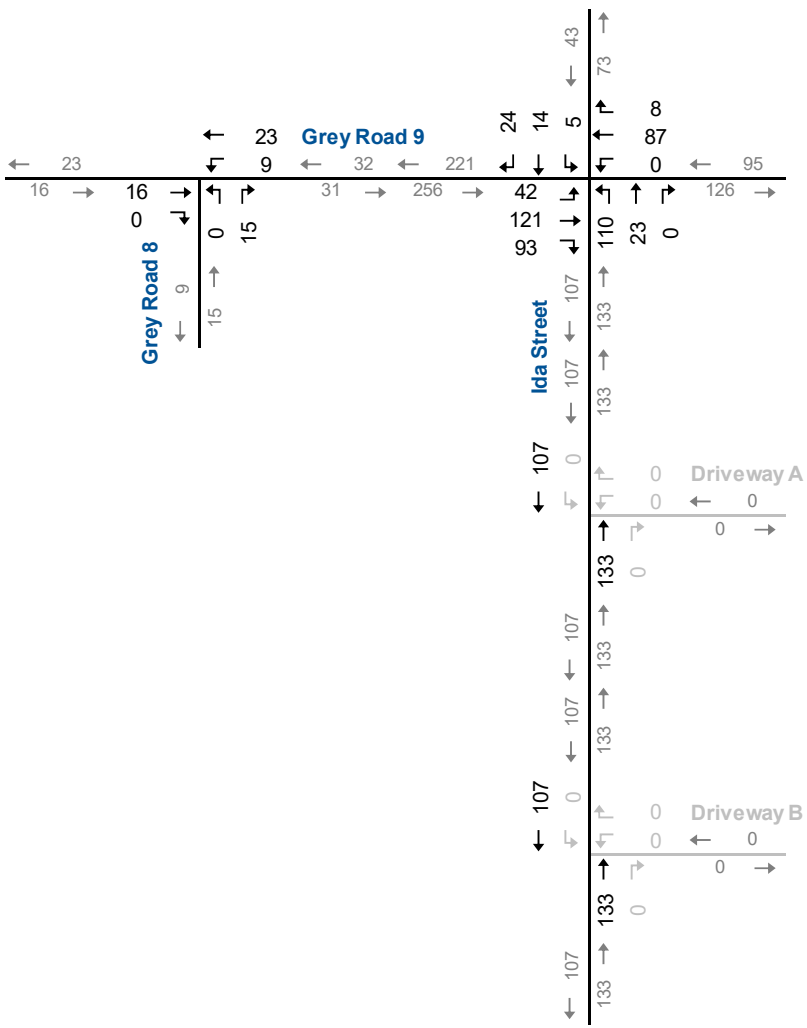
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Other Area Development Traffic Volumes
White Rose

AM Peak Hour

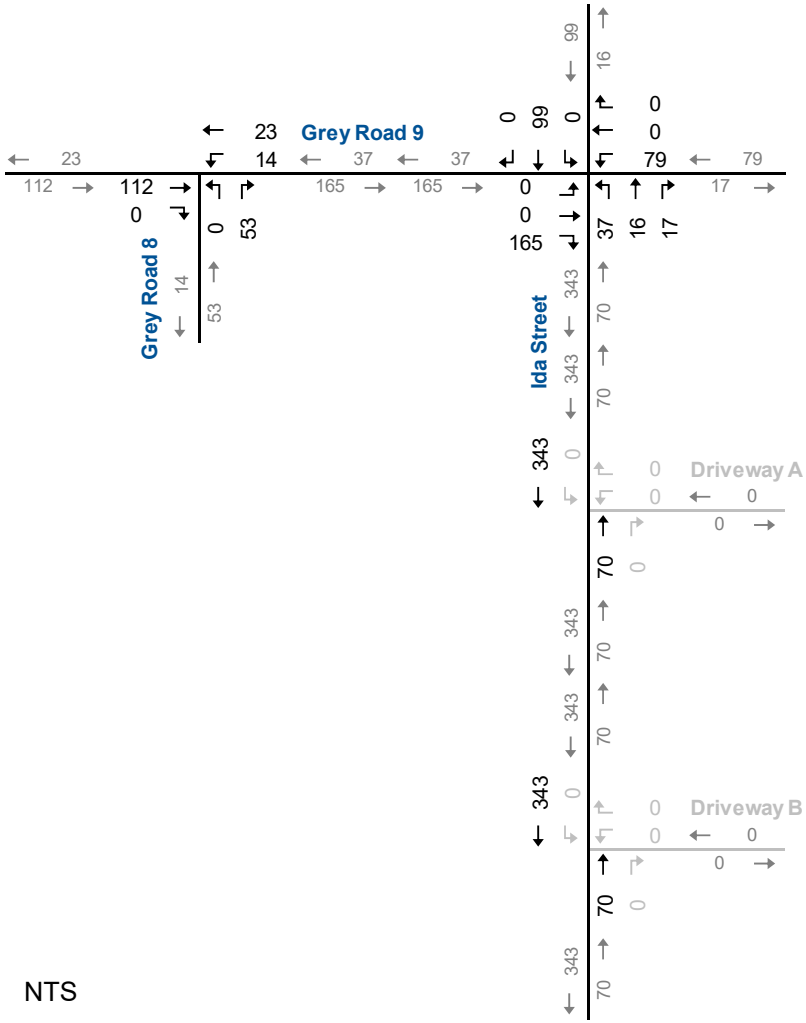


PM Peak Hour

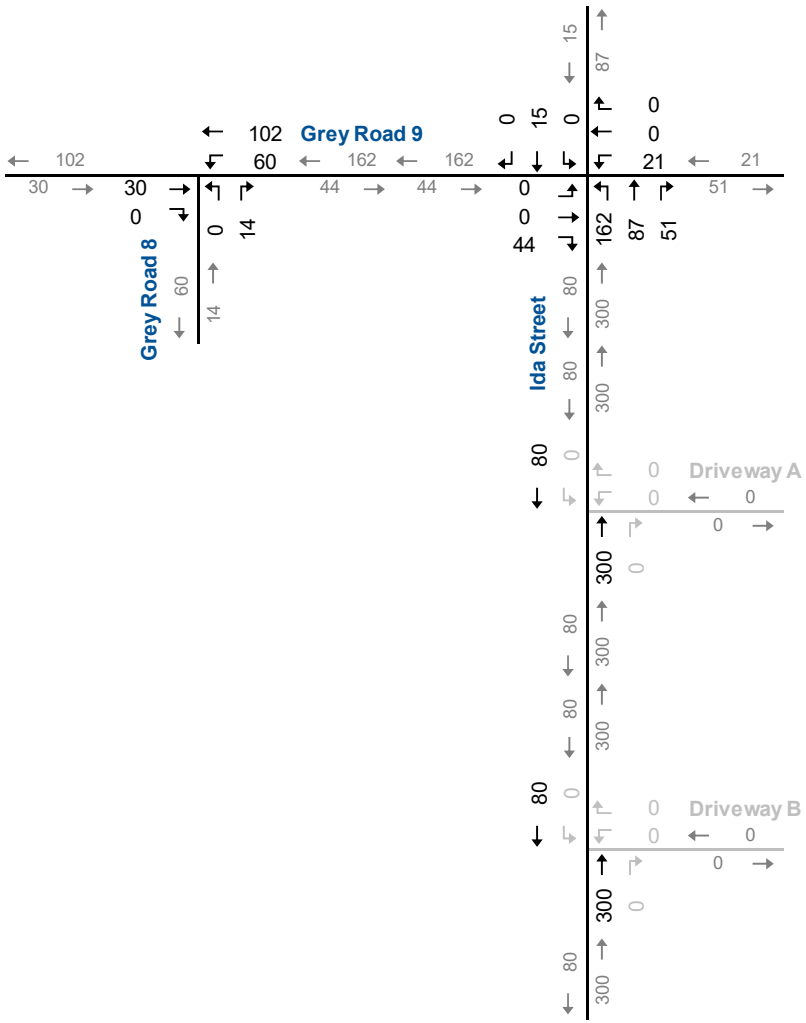


Other Area Development Traffic Volumes
Ida Street Development

AM Peak Hour



PM Peak Hour



NTS

Other Area Development Traffic Volumes
Eco Parkway Industrial Lands

Appendix E

2034 Background Traffic Operations Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	38	155	323	114	181	25	154	45	53	31	146	78
Future Volume (vph)	38	155	323	114	181	25	154	45	53	31	146	78
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
Ped Bike Factor												
Frt		0.915			0.990			0.971			0.959	
Flt Protected		0.996			0.982			0.970			0.994	
Satd. Flow (prot)	0	1360	0	0	1635	0	0	1351	0	0	1637	0
Flt Permitted		0.996			0.982			0.970			0.994	
Satd. Flow (perm)	0	1360	0	0	1635	0	0	1351	0	0	1637	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	5%	38%	18%	3%	63%	42%	5%	28%	5%	10%	14%
Adj. Flow (vph)	41	168	351	124	197	27	167	49	58	34	159	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	560	0	0	348	0	0	274	0	0	278	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	486.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	38	155	323	114	181	25	154	45	53	31	146	78
Future Vol, veh/h	38	155	323	114	181	25	154	45	53	31	146	78
Conflicting Peds, #/hr	2	0	1	1	0	2	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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, %	27	5	38	18	3	63	42	5	28	5	10	14
Mvmt Flow	41	168	351	124	197	27	167	49	58	34	159	85

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	520	0	0	1008	901	349	944	1063	213
Stage 1	-	-	-	-	-	-	427	427	-	461	461	-
Stage 2	-	-	-	-	-	-	581	474	-	483	602	-
Critical Hdwy	4.37	-	-	4.28	-	-	7.52	6.55	6.48	7.15	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Follow-up Hdwy	2.443	-	-	2.362	-	-	3.878	4.045	3.552	3.545	4.09	3.426
Pot Cap-1 Maneuver	1208	-	-	969	-	-	185	275	639	239	216	798
Stage 1	-	-	-	-	-	-	534	580	-	575	552	-
Stage 2	-	-	-	-	-	-	436	553	-	559	476	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1206	-	-	968	-	-	~ 30	222	636	154	174	797
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	222	-	154	174	-
Stage 1	-	-	-	-	-	-	506	550	-	545	470	-
Stage 2	-	-	-	-	-	-	220	471	-	438	451	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	3.3	$ 2403.2	183.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	46	1206	-	-	968	-	-	224
HCM Lane V/C Ratio	5.955	0.034	-	-	0.128	-	-	1.237
HCM Control Delay (s)	$ 2403.2	8.1	0	-	9.3	0	-	183.1
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	31.7	0.1	-	-	0.4	-	-	14

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	9	81	140	11	120
Future Volume (vph)	254	9	81	140	11	120
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	0.995				0.876	
Flt Protected				0.982	0.996	
Satd. Flow (prot)	1572	0	0	1589	1349	0
Flt Permitted				0.982	0.996	
Satd. Flow (perm)	1572	0	0	1589	1349	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	21%	0%	13%	20%	22%	23%
Adj. Flow (vph)	276	10	88	152	12	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	286	0	0	240	142	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	254	9	81	140	11	120
Future Vol, veh/h	254	9	81	140	11	120
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, %	21	0	13	20	22	23
Mvmt Flow	276	10	88	152	12	130

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	286	0	609	281
Stage 1	-	-	-	-	281	-
Stage 2	-	-	-	-	328	-
Critical Hdwy	-	-	4.23	-	6.62	6.43
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	-	-	2.317	-	3.698	3.507
Pot Cap-1 Maneuver	-	-	1216	-	427	710
Stage 1	-	-	-	-	723	-
Stage 2	-	-	-	-	687	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1216	-	393	710
Mov Cap-2 Maneuver	-	-	-	-	393	-
Stage 1	-	-	-	-	723	-
Stage 2	-	-	-	-	633	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	665	-	-	1216	-
HCM Lane V/C Ratio	0.214	-	-	0.072	-
HCM Control Delay (s)	11.9	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	82	238	207	66	215	22	353	147	124	15	54	53
Future Volume (vph)	82	238	207	66	215	22	353	147	124	15	54	53
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
Ped Bike Factor												
Frt		0.947			0.990			0.973			0.941	
Flt Protected		0.992			0.989			0.973			0.994	
Satd. Flow (prot)	0	1597	0	0	1799	0	0	1546	0	0	1576	0
Flt Permitted		0.992			0.989			0.973			0.994	
Satd. Flow (perm)	0	1597	0	0	1799	0	0	1546	0	0	1576	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	0%	30%	3%	3%	9%	26%	7%	0%	0%	15%	14%
Adj. Flow (vph)	89	259	225	72	234	24	384	160	135	16	59	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	573	0	0	330	0	0	679	0	0	133	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	577

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	82	238	207	66	215	22	353	147	124	15	54	53
Future Vol, veh/h	82	238	207	66	215	22	353	147	124	15	54	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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	30	3	3	9	26	7	0	0	15	14
Mvmt Flow	89	259	225	72	234	24	384	160	135	16	59	58

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	484	0	0	999	952	374	1089	1052	246
Stage 1	-	-	-	-	-	-	550	550	-	390	390	-
Stage 2	-	-	-	-	-	-	449	402	-	699	662	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.36	6.57	6.2	7.1	6.65	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.734	4.063	3.3	3.5	4.135	3.426
Pot Cap-1 Maneuver	1318	-	-	1074	-	-	~ 201	254	677	195	215	764
Stage 1	-	-	-	-	-	-	479	508	-	638	586	-
Stage 2	-	-	-	-	-	-	546	592	-	434	440	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1318	-	-	1074	-	-	~ 122	212	676	53	179	764
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 122	212	-	53	179	-
Stage 1	-	-	-	-	-	-	433	459	-	577	540	-
Stage 2	-	-	-	-	-	-	415	546	-	204	398	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	1.9	$ 1443.5	60.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	166	1318	-	-	1074	-	-	187
HCM Lane V/C Ratio	4.086	0.068	-	-	0.067	-	-	0.709
HCM Control Delay (s)	$ 1443.5	7.9	0	-	8.6	0	-	60.9
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	67.8	0.2	-	-	0.2	-	-	4.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	145	6	135	284	9	122
Future Volume (vph)	145	6	135	284	9	122
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	0.994				0.874	
Flt Protected				0.984	0.997	
Satd. Flow (prot)	1665	0	0	1648	1554	0
Flt Permitted				0.984	0.997	
Satd. Flow (perm)	1665	0	0	1648	1554	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	6%	17%	0%	7%
Adj. Flow (vph)	158	7	147	309	10	133
Shared Lane Traffic (%)						
Lane Group Flow (vph)	165	0	0	456	143	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

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

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	145	6	135	284	9	122
Future Vol, veh/h	145	6	135	284	9	122
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, %	14	0	6	17	0	7
Mvmt Flow	158	7	147	309	10	133

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	165	0	765	162
Stage 1	-	-	-	-	162	-
Stage 2	-	-	-	-	603	-
Critical Hdwy	-	-	4.16	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1389	-	374	870
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	550	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1389	-	326	870
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	480	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	781	-	-	1389	-
HCM Lane V/C Ratio	0.182	-	-	0.106	-
HCM Control Delay (s)	10.6	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.4	-

Appendix F

2034 Total Traffic Operations Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	155	328	124	181	25	170	56	84	31	149	78
Future Volume (vph)	38	155	328	124	181	25	170	56	84	31	149	78
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
Ped Bike Factor												
Frt		0.915			0.990			0.964			0.959	
Flt Protected		0.996			0.982			0.973			0.994	
Satd. Flow (prot)	0	1359	0	0	1632	0	0	1355	0	0	1638	0
Flt Permitted		0.996			0.982			0.973			0.994	
Satd. Flow (perm)	0	1359	0	0	1632	0	0	1355	0	0	1638	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	5%	38%	18%	3%	63%	42%	5%	28%	5%	10%	14%
Adj. Flow (vph)	41	168	357	135	197	27	185	61	91	34	162	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	566	0	0	359	0	0	337	0	0	281	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1599.9

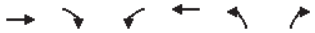
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	155	328	124	181	25	170	56	84	31	149	78
Future Vol, veh/h	38	155	328	124	181	25	170	56	84	31	149	78
Conflicting Peds, #/hr	2	0	1	1	0	2	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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, %	27	5	38	18	3	63	42	5	28	5	10	14
Mvmt Flow	41	168	357	135	197	27	185	61	91	34	162	85

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	526	0	0	1034	926	352	992	1091	213
Stage 1	-	-	-	-	-	-	430	430	-	483	483	-
Stage 2	-	-	-	-	-	-	604	496	-	509	608	-
Critical Hdwy	4.37	-	-	4.28	-	-	7.52	6.55	6.48	7.15	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Follow-up Hdwy	2.443	-	-	2.362	-	-	3.878	4.045	3.552	3.545	4.09	3.426
Pot Cap-1 Maneuver	1208	-	-	964	-	-	~ 178	266	637	222	208	798
Stage 1	-	-	-	-	-	-	532	578	-	559	540	-
Stage 2	-	-	-	-	-	-	423	540	-	541	473	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1206	-	-	963	-	-	~ 12	211	634	125	165	797
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 12	211	-	125	165	-
Stage 1	-	-	-	-	-	-	504	548	-	529	452	-
Stage 2	-	-	-	-	-	-	204	452	-	389	448	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	3.5	$ 7125.1	232.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	21	1206	-	-	963	-	-	207
HCM Lane V/C Ratio	16.046	0.034	-	-	0.14	-	-	1.355
HCM Control Delay (s)	$ 7125.1	8.1	0	-	9.3	0	-	232.5
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	42.5	0.1	-	-	0.5	-	-	15.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	257	9	86	151	11	122
Future Volume (vph)	257	9	86	151	11	122
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	0.995				0.876	
Flt Protected				0.982	0.996	
Satd. Flow (prot)	1572	0	0	1588	1349	0
Flt Permitted				0.982	0.996	
Satd. Flow (perm)	1572	0	0	1588	1349	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	21%	0%	13%	20%	22%	23%
Adj. Flow (vph)	279	10	93	164	12	133
Shared Lane Traffic (%)						
Lane Group Flow (vph)	289	0	0	257	145	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	257	9	86	151	11	122
Future Vol, veh/h	257	9	86	151	11	122
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, %	21	0	13	20	22	23
Mvmt Flow	279	10	93	164	12	133

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	289	0	634	284
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	-	-	4.23	-	6.62	6.43
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	-	-	2.317	-	3.698	3.507
Pot Cap-1 Maneuver	-	-	1212	-	413	708
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	671	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1212	-	378	708
Mov Cap-2 Maneuver	-	-	-	-	378	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	615	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	660	-	-	1212	-
HCM Lane V/C Ratio	0.219	-	-	0.077	-
HCM Control Delay (s)	12	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	29	281	8	9	592
Future Volume (vph)	24	29	281	8	9	592
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	0.926		0.996			
Flt Protected	0.978					0.999
Satd. Flow (prot)	1721	0	1465	0	0	1499
Flt Permitted	0.978					0.999
Satd. Flow (perm)	1721	0	1465	0	0	1499
Link Speed (k/h)	50		40			40
Link Distance (m)	81.6		125.6			638.7
Travel Time (s)	5.9		11.3			57.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	30%	0%	0%	27%
Adj. Flow (vph)	26	32	305	9	10	643
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	314	0	0	653
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	29	281	8	9	592
Future Vol, veh/h	24	29	281	8	9	592
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	30	0	0	27
Mvmt Flow	26	32	305	9	10	643

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	973	310	0	0	314	0
Stage 1	310	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	282	735	-	-	1258	-
Stage 1	748	-	-	-	-	-
Stage 2	516	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	279	735	-	-	1258	-
Mov Cap-2 Maneuver	279	-	-	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.9	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	422	1258	-
HCM Lane V/C Ratio	-	-	0.137	0.008	-
HCM Control Delay (s)	-	-	14.9	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	29	260	7	9	607
Future Volume (vph)	24	29	260	7	9	607
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	0.926		0.996			
Flt Protected	0.978					0.999
Satd. Flow (prot)	1721	0	1465	0	0	1499
Flt Permitted	0.978					0.999
Satd. Flow (perm)	1721	0	1465	0	0	1499
Link Speed (k/h)	50		40			40
Link Distance (m)	91.1		137.7			125.6
Travel Time (s)	6.6		12.4			11.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	30%	0%	0%	27%
Adj. Flow (vph)	26	32	283	8	10	660
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	291	0	0	670
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	29	260	7	9	607
Future Vol, veh/h	24	29	260	7	9	607
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	30	0	0	27
Mvmt Flow	26	32	283	8	10	660

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	967	287	0	0	291	0
Stage 1	287	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	284	757	-	-	1282	-
Stage 1	766	-	-	-	-	-
Stage 2	507	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	281	757	-	-	1282	-
Mov Cap-2 Maneuver	281	-	-	-	-	-
Stage 1	766	-	-	-	-	-
Stage 2	501	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.7	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	428	1282	-
HCM Lane V/C Ratio	-	-	0.135	0.008	-
HCM Control Delay (s)	-	-	14.7	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	82	238	225	99	215	22	363	154	144	15	66	53
Future Volume (vph)	82	238	225	99	215	22	363	154	144	15	66	53
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
Ped Bike Factor												
Frt		0.944			0.991			0.971			0.946	
Flt Protected		0.993			0.985			0.973			0.995	
Satd. Flow (prot)	0	1585	0	0	1794	0	0	1549	0	0	1583	0
Flt Permitted		0.993			0.985			0.973			0.995	
Satd. Flow (perm)	0	1585	0	0	1794	0	0	1549	0	0	1583	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	0%	30%	3%	3%	9%	26%	7%	0%	0%	15%	14%
Adj. Flow (vph)	89	259	245	108	234	24	395	167	157	16	72	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	593	0	0	366	0	0	719	0	0	146	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	893.6

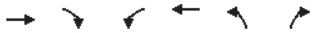
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	82	238	225	99	215	22	363	154	144	15	66	53
Future Vol, veh/h	82	238	225	99	215	22	363	154	144	15	66	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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	30	3	3	9	26	7	0	0	15	14
Mvmt Flow	89	259	245	108	234	24	395	167	157	16	72	58

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	504	0	0	1087	1034	384	1186	1144	246
Stage 1	-	-	-	-	-	-	560	560	-	462	462	-
Stage 2	-	-	-	-	-	-	527	474	-	724	682	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.36	6.57	6.2	7.1	6.65	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.734	4.063	3.3	3.5	4.135	3.426
Pot Cap-1 Maneuver	1318	-	-	1055	-	-	~ 174	227	668	167	189	764
Stage 1	-	-	-	-	-	-	473	503	-	584	543	-
Stage 2	-	-	-	-	-	-	493	549	-	420	431	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1318	-	-	1055	-	-	~ 86	180	667	20	150	764
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 86	180	-	20	150	-
Stage 1	-	-	-	-	-	-	427	454	-	527	478	-
Stage 2	-	-	-	-	-	-	~ 341	483	-	183	389	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	2.6	$ 2204.6	290.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	125	1318	-	-	1055	-	-	106
HCM Lane V/C Ratio	5.748	0.068	-	-	0.102	-	-	1.374
HCM Control Delay (s)	$ 2204.6	7.9	0	-	8.8	0	-	290.7
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	77.7	0.2	-	-	0.3	-	-	10.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	157	6	138	291	9	128
Future Volume (vph)	157	6	138	291	9	128
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	0.995				0.874	
Flt Protected				0.984	0.997	
Satd. Flow (prot)	1666	0	0	1648	1554	0
Flt Permitted				0.984	0.997	
Satd. Flow (perm)	1666	0	0	1648	1554	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	6%	17%	0%	7%
Adj. Flow (vph)	171	7	150	316	10	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	0	0	466	149	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	157	6	138	291	9	128
Future Vol, veh/h	157	6	138	291	9	128
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, %	14	0	6	17	0	7
Mvmt Flow	171	7	150	316	10	139

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	178	0	791	175
Stage 1	-	-	-	-	175	-
Stage 2	-	-	-	-	616	-
Critical Hdwy	-	-	4.16	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1374	-	361	856
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	543	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1374	-	313	856
Mov Cap-2 Maneuver	-	-	-	-	313	-
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	471	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	768	-	-	1374	-
HCM Lane V/C Ratio	0.194	-	-	0.109	-
HCM Control Delay (s)	10.8	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.4	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	19	642	26	32	358
Future Volume (vph)	15	19	642	26	32	358
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	0.923		0.995			
Flt Protected	0.979					0.996
Satd. Flow (prot)	1717	0	1695	0	0	1611
Flt Permitted	0.979					0.996
Satd. Flow (perm)	1717	0	1695	0	0	1611
Link Speed (k/h)	50		40			40
Link Distance (m)	81.6		125.6			638.7
Travel Time (s)	5.9		11.3			57.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	12%	0%	0%	19%
Adj. Flow (vph)	16	21	698	28	35	389
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	726	0	0	424
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	100	100		100	100	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	19	642	26	32	358
Future Vol, veh/h	15	19	642	26	32	358
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	12	0	0	19
Mvmt Flow	16	21	698	28	35	389

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1171	712	0	0	726	0
Stage 1	712	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	215	436	-	-	886	-
Stage 1	490	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	436	-	-	886	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	490	-	-	-	-	-
Stage 2	609	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.2	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	290	886	-
HCM Lane V/C Ratio	-	-	0.127	0.039	-
HCM Control Delay (s)	-	-	19.2	9.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	18	650	26	31	342
Future Volume (vph)	15	18	650	26	31	342
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	0.925		0.995			
Flt Protected	0.978					0.996
Satd. Flow (prot)	1719	0	1695	0	0	1612
Flt Permitted	0.978					0.996
Satd. Flow (perm)	1719	0	1695	0	0	1612
Link Speed (k/h)	50		40			40
Link Distance (m)	91.1		137.7			125.6
Travel Time (s)	6.6		12.4			11.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	12%	0%	0%	19%
Adj. Flow (vph)	16	20	707	28	34	372
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	0	735	0	0	406
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	100	100		100	100	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	18	650	26	31	342
Future Vol, veh/h	15	18	650	26	31	342
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	12	0	0	19
Mvmt Flow	16	20	707	28	34	372

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1161	721	0	0	735	0
Stage 1	721	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	218	431	-	-	879	-
Stage 1	485	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	207	431	-	-	879	-
Mov Cap-2 Maneuver	207	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	621	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.2	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	289	879	-
HCM Lane V/C Ratio	-	-	0.124	0.038	-
HCM Control Delay (s)	-	-	19.2	9.3	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Appendix G

2039 Background Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	39	166	331	117	189	27	160	48	57	33	149	79
Future Volume (vph)	39	166	331	117	189	27	160	48	57	33	149	79
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
Ped Bike Factor												
Frt		0.916			0.989			0.971			0.959	
Flt Protected		0.996			0.983			0.971			0.994	
Satd. Flow (prot)	0	1365	0	0	1633	0	0	1354	0	0	1638	0
Flt Permitted		0.996			0.983			0.971			0.994	
Satd. Flow (perm)	0	1365	0	0	1633	0	0	1354	0	0	1638	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	5%	38%	18%	3%	63%	42%	5%	28%	5%	10%	14%
Adj. Flow (vph)	42	180	360	127	205	29	174	52	62	36	162	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	582	0	0	361	0	0	288	0	0	284	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1585.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	39	166	331	117	189	27	160	48	57	33	149	79
Future Vol, veh/h	39	166	331	117	189	27	160	48	57	33	149	79
Conflicting Peds, #/hr	2	0	1	1	0	2	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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, %	27	5	38	18	3	63	42	5	28	5	10	14
Mvmt Flow	42	180	360	127	205	29	174	52	62	36	162	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	236	0	0	541	0	0	1043	935	365	981	1101	222
Stage 1	-	-	-	-	-	-	445	445	-	476	476	-
Stage 2	-	-	-	-	-	-	598	490	-	505	625	-
Critical Hdwy	4.37	-	-	4.28	-	-	7.52	6.55	6.48	7.15	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Follow-up Hdwy	2.443	-	-	2.362	-	-	3.878	4.045	3.552	3.545	4.09	3.426
Pot Cap-1 Maneuver	1198	-	-	952	-	-	175	262	626	226	205	788
Stage 1	-	-	-	-	-	-	522	570	-	564	543	-
Stage 2	-	-	-	-	-	-	426	544	-	544	465	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1196	-	-	951	-	-	~ 10	209	623	139	164	787
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 10	209	-	139	164	-
Stage 1	-	-	-	-	-	-	494	539	-	533	458	-
Stage 2	-	-	-	-	-	-	208	459	-	418	440	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	3.3	$ 8112.5	233
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	16	1196	-	-	951	-	-	209
HCM Lane V/C Ratio	18.003	0.035	-	-	0.134	-	-	1.357
HCM Control Delay (s)	$ 8112.5	8.1	0	-	9.4	0	-	233
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	36.9	0.1	-	-	0.5	-	-	16

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	266	10	86	148	12	125
Future Volume (vph)	266	10	86	148	12	125
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	0.995				0.877	
Flt Protected				0.982	0.996	
Satd. Flow (prot)	1572	0	0	1589	1350	0
Flt Permitted				0.982	0.996	
Satd. Flow (perm)	1572	0	0	1589	1350	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	21%	0%	13%	20%	22%	23%
Adj. Flow (vph)	289	11	93	161	13	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	300	0	0	254	149	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	266	10	86	148	12	125
Future Vol, veh/h	266	10	86	148	12	125
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, %	21	0	13	20	22	23
Mvmt Flow	289	11	93	161	13	136

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	300	0	642	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	347	-
Critical Hdwy	-	-	4.23	-	6.62	6.43
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	-	-	2.317	-	3.698	3.507
Pot Cap-1 Maneuver	-	-	1201	-	408	697
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	673	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1201	-	373	697
Mov Cap-2 Maneuver	-	-	-	-	373	-
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	616	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	648	-	-	1201	-
HCM Lane V/C Ratio	0.23	-	-	0.078	-
HCM Control Delay (s)	12.2	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.3	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	83	250	214	70	228	23	361	151	132	16	56	54
Future Volume (vph)	83	250	214	70	228	23	361	151	132	16	56	54
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
Ped Bike Factor												
Frt		0.947			0.990			0.972			0.942	
Flt Protected		0.992			0.989			0.973			0.994	
Satd. Flow (prot)	0	1597	0	0	1799	0	0	1546	0	0	1578	0
Flt Permitted		0.992			0.989			0.973			0.994	
Satd. Flow (perm)	0	1597	0	0	1799	0	0	1546	0	0	1578	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			902.0			240.3	
Travel Time (s)		8.0			13.7			81.2			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	0%	30%	3%	3%	9%	26%	7%	0%	0%	15%	14%
Adj. Flow (vph)	90	272	233	76	248	25	392	164	143	17	61	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	595	0	0	349	0	0	699	0	0	137	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	680.6

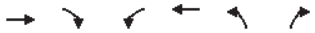
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	83	250	214	70	228	23	361	151	132	16	56	54
Future Vol, veh/h	83	250	214	70	228	23	361	151	132	16	56	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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	30	3	3	9	26	7	0	0	15	14
Mvmt Flow	90	272	233	76	248	25	392	164	143	17	61	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	273	0	0	505	0	0	1042	994	391	1137	1098	261
Stage 1	-	-	-	-	-	-	569	569	-	413	413	-
Stage 2	-	-	-	-	-	-	473	425	-	724	685	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.36	6.57	6.2	7.1	6.65	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.734	4.063	3.3	3.5	4.135	3.426
Pot Cap-1 Maneuver	1302	-	-	1055	-	-	~ 187	240	662	181	202	749
Stage 1	-	-	-	-	-	-	467	498	-	620	572	-
Stage 2	-	-	-	-	-	-	529	578	-	420	429	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1302	-	-	1055	-	-	~ 108	198	661	39	166	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 108	198	-	39	166	-
Stage 1	-	-	-	-	-	-	420	448	-	558	523	-
Stage 2	-	-	-	-	-	-	394	529	-	187	386	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	1.9	$ 1709	103.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	150	1302	-	-	1055	-	-	154
HCM Lane V/C Ratio	4.667	0.069	-	-	0.072	-	-	0.889
HCM Control Delay (s)	$ 1709	8	0	-	8.7	0	-	103.4
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	72.4	0.2	-	-	0.2	-	-	6.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	153	7	141	299	10	129
Future Volume (vph)	153	7	141	299	10	129
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	0.994				0.875	
Flt Protected				0.984	0.996	
Satd. Flow (prot)	1666	0	0	1648	1555	0
Flt Permitted				0.984	0.996	
Satd. Flow (perm)	1666	0	0	1648	1555	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	6%	17%	0%	7%
Adj. Flow (vph)	166	8	153	325	11	140
Shared Lane Traffic (%)						
Lane Group Flow (vph)	174	0	0	478	151	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	153	7	141	299	10	129
Future Vol, veh/h	153	7	141	299	10	129
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, %	14	0	6	17	0	7
Mvmt Flow	166	8	153	325	11	140

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	174	0	801	170
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	631	-
Critical Hdwy	-	-	4.16	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1379	-	356	861
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	534	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1379	-	308	861
Mov Cap-2 Maneuver	-	-	-	-	308	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	763	-	-	1379	-
HCM Lane V/C Ratio	0.198	-	-	0.111	-
HCM Control Delay (s)	10.9	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.4	-

Appendix H

2039 Total Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	39	166	336	127	189	27	176	59	88	33	152	79
Future Volume (vph)	39	166	336	127	189	27	176	59	88	33	152	79
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
Ped Bike Factor												
Frt		0.916			0.989			0.963			0.960	
Flt Protected		0.996			0.982			0.974			0.994	
Satd. Flow (prot)	0	1364	0	0	1629	0	0	1356	0	0	1640	0
Flt Permitted		0.996			0.982			0.974			0.994	
Satd. Flow (perm)	0	1364	0	0	1629	0	0	1356	0	0	1640	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	5%	38%	18%	3%	63%	42%	5%	28%	5%	10%	14%
Adj. Flow (vph)	42	180	365	138	205	29	191	64	96	36	165	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	587	0	0	372	0	0	351	0	0	287	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	53.6

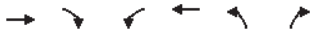
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	39	166	336	127	189	27	176	59	88	33	152	79
Future Vol, veh/h	39	166	336	127	189	27	176	59	88	33	152	79
Conflicting Peds, #/hr	2	0	1	1	0	2	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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, %	27	5	38	18	3	63	42	5	28	5	10	14
Mvmt Flow	42	180	365	138	205	29	191	64	96	36	165	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	236	0	0	546	0	0	1069	960	368	1029	1128	222
Stage 1	-	-	-	-	-	-	448	448	-	498	498	-
Stage 2	-	-	-	-	-	-	621	512	-	531	630	-
Critical Hdwy	4.37	-	-	4.28	-	-	7.52	6.55	6.48	7.15	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.52	5.55	-	6.15	5.6	-
Follow-up Hdwy	2.443	-	-	2.362	-	-	3.878	4.045	3.552	3.545	4.09	3.426
Pot Cap-1 Maneuver	1198	-	-	947	-	-	~ 168	254	623	209	197	788
Stage 1	-	-	-	-	-	-	520	568	-	549	531	-
Stage 2	-	-	-	-	-	-	413	532	-	526	463	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1196	-	-	946	-	-	-	199	620	111	~ 155	787
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	199	-	111	~ 155	-
Stage 1	-	-	-	-	-	-	491	537	-	518	441	-
Stage 2	-	-	-	-	-	-	~ 191	442	-	369	438	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	3.5		293.1
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1196	-	-	946	-	-	192
HCM Lane V/C Ratio	-	0.035	-	-	0.146	-	-	1.495
HCM Control Delay (s)	-	8.1	0	-	9.5	0	-	293.1
HCM Lane LOS	-	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0.5	-	-	17.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	269	10	91	159	12	127
Future Volume (vph)	269	10	91	159	12	127
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	0.995				0.877	
Flt Protected				0.982	0.996	
Satd. Flow (prot)	1572	0	0	1589	1350	0
Flt Permitted				0.982	0.996	
Satd. Flow (perm)	1572	0	0	1589	1350	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	21%	0%	13%	20%	22%	23%
Adj. Flow (vph)	292	11	99	173	13	138
Shared Lane Traffic (%)						
Lane Group Flow (vph)	303	0	0	272	151	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	269	10	91	159	12	127
Future Vol, veh/h	269	10	91	159	12	127
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, %	21	0	13	20	22	23
Mvmt Flow	292	11	99	173	13	138

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	303	0	669	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	371	-
Critical Hdwy	-	-	4.23	-	6.62	6.43
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	-	-	2.317	-	3.698	3.507
Pot Cap-1 Maneuver	-	-	1198	-	393	695
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	656	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1198	-	357	695
Mov Cap-2 Maneuver	-	-	-	-	357	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	642	-	-	1198	-
HCM Lane V/C Ratio	0.235	-	-	0.083	-
HCM Control Delay (s)	12.3	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.3	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	29	294	8	9	606
Future Volume (vph)	24	29	294	8	9	606
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	0.926		0.996			
Flt Protected	0.978					0.999
Satd. Flow (prot)	1721	0	1465	0	0	1499
Flt Permitted	0.978					0.999
Satd. Flow (perm)	1721	0	1465	0	0	1499
Link Speed (k/h)	50		40			40
Link Distance (m)	81.6		125.6			638.7
Travel Time (s)	5.9		11.3			57.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	30%	0%	0%	27%
Adj. Flow (vph)	26	32	320	9	10	659
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	329	0	0	669
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	29	294	8	9	606
Future Vol, veh/h	24	29	294	8	9	606
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	30	0	0	27
Mvmt Flow	26	32	320	9	10	659

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1004	325	0	0	329	0
Stage 1	325	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	270	721	-	-	1242	-
Stage 1	737	-	-	-	-	-
Stage 2	507	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	266	721	-	-	1242	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.3	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	406	1242	-
HCM Lane V/C Ratio	-	-	0.142	0.008	-
HCM Control Delay (s)	-	-	15.3	7.9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	29	273	7	9	621
Future Volume (vph)	24	29	273	7	9	621
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	0.926		0.996			
Flt Protected	0.978					0.999
Satd. Flow (prot)	1721	0	1465	0	0	1499
Flt Permitted	0.978					0.999
Satd. Flow (perm)	1721	0	1465	0	0	1499
Link Speed (k/h)	50		40			40
Link Distance (m)	91.1		137.7			125.6
Travel Time (s)	6.6		12.4			11.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	30%	0%	0%	27%
Adj. Flow (vph)	26	32	297	8	10	675
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	305	0	0	685
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	29	273	7	9	621
Future Vol, veh/h	24	29	273	7	9	621
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	30	0	0	27
Mvmt Flow	26	32	297	8	10	675

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	996	301	0	0	305	0
Stage 1	301	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	273	743	-	-	1267	-
Stage 1	755	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	269	743	-	-	1267	-
Mov Cap-2 Maneuver	269	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	493	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	413	1267	-
HCM Lane V/C Ratio	-	-	0.139	0.008	-
HCM Control Delay (s)	-	-	15.1	7.9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	83	250	232	103	228	23	371	158	152	16	68	54
Future Volume (vph)	83	250	232	103	228	23	371	158	152	16	68	54
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
Ped Bike Factor												
Frt		0.945			0.991			0.970			0.947	
Flt Protected		0.993			0.986			0.973			0.994	
Satd. Flow (prot)	0	1587	0	0	1796	0	0	1549	0	0	1584	0
Flt Permitted		0.993			0.986			0.973			0.994	
Satd. Flow (perm)	0	1587	0	0	1796	0	0	1549	0	0	1584	0
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	0%	30%	3%	3%	9%	26%	7%	0%	0%	15%	14%
Adj. Flow (vph)	90	272	252	112	248	25	403	172	165	17	74	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	614	0	0	385	0	0	740	0	0	150	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)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1040.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	83	250	232	103	228	23	371	158	152	16	68	54
Future Vol, veh/h	83	250	232	103	228	23	371	158	152	16	68	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
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	30	3	3	9	26	7	0	0	15	14
Mvmt Flow	90	272	252	112	248	25	403	172	165	17	74	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	273	0	0	524	0	0	1129	1075	400	1234	1189	261
Stage 1	-	-	-	-	-	-	578	578	-	485	485	-
Stage 2	-	-	-	-	-	-	551	497	-	749	704	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.36	6.57	6.2	7.1	6.65	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.36	5.57	-	6.1	5.65	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.734	4.063	3.3	3.5	4.135	3.426
Pot Cap-1 Maneuver	1302	-	-	1038	-	-	~ 163	215	654	155	178	749
Stage 1	-	-	-	-	-	-	462	493	-	567	530	-
Stage 2	-	-	-	-	-	-	478	537	-	407	421	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1302	-	-	1038	-	-	~ 74	~ 168	653	-	139	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 74	~ 168	-	-	139	-
Stage 1	-	-	-	-	-	-	415	443	-	509	462	-
Stage 2	-	-	-	-	-	-	~ 323	468	-	167	378	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	2.6	$ 2653.8	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	110	1302	-	-	1038	-	-	-
HCM Lane V/C Ratio	6.729	0.069	-	-	0.108	-	-	-
HCM Control Delay (s)	$ 2653.8	8	0	-	8.9	0	-	-
HCM Lane LOS	F	A	A	-	A	A	-	-
HCM 95th %tile Q(veh)	82.2	0.2	-	-	0.4	-	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	165	7	144	306	10	135
Future Volume (vph)	165	7	144	306	10	135
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	0.994				0.874	
Flt Protected				0.984	0.997	
Satd. Flow (prot)	1665	0	0	1648	1554	0
Flt Permitted				0.984	0.997	
Satd. Flow (perm)	1665	0	0	1648	1554	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	301.6			327.5	418.2	
Travel Time (s)	13.6			14.7	18.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	6%	17%	0%	7%
Adj. Flow (vph)	179	8	157	333	11	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	0	490	158	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)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	7	144	306	10	135
Future Vol, veh/h	165	7	144	306	10	135
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, %	14	0	6	17	0	7
Mvmt Flow	179	8	157	333	11	147

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	187	0	830	183
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	647	-
Critical Hdwy	-	-	4.16	-	6.4	6.27
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.363
Pot Cap-1 Maneuver	-	-	1364	-	343	847
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1364	-	295	847
Mov Cap-2 Maneuver	-	-	-	-	295	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	451	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	750	-	-	1364	-
HCM Lane V/C Ratio	0.21	-	-	0.115	-
HCM Control Delay (s)	11.1	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.4	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	19	662	26	32	371
Future Volume (vph)	15	19	662	26	32	371
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	0.923		0.995			
Flt Protected	0.979					0.996
Satd. Flow (prot)	1717	0	1695	0	0	1611
Flt Permitted	0.979					0.996
Satd. Flow (perm)	1717	0	1695	0	0	1611
Link Speed (k/h)	50		40			40
Link Distance (m)	81.6		125.6			638.7
Travel Time (s)	5.9		11.3			57.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	12%	0%	0%	19%
Adj. Flow (vph)	16	21	720	28	35	403
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	748	0	0	438
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	100	100		100	100	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	19	662	26	32	371
Future Vol, veh/h	15	19	662	26	32	371
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	12	0	0	19
Mvmt Flow	16	21	720	28	35	403

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1207	734	0	0	748	0
Stage 1	734	-	-	-	-	-
Stage 2	473	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	204	423	-	-	870	-
Stage 1	478	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	193	423	-	-	870	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	598	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	277	870	-
HCM Lane V/C Ratio	-	-	0.133	0.04	-
HCM Control Delay (s)	-	-	20	9.3	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	18	670	26	31	355
Future Volume (vph)	15	18	670	26	31	355
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	0.925		0.995			
Flt Protected	0.978					0.996
Satd. Flow (prot)	1719	0	1695	0	0	1611
Flt Permitted	0.978					0.996
Satd. Flow (perm)	1719	0	1695	0	0	1611
Link Speed (k/h)	50		40			40
Link Distance (m)	91.1		137.7			125.6
Travel Time (s)	6.6		12.4			11.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	12%	0%	0%	19%
Adj. Flow (vph)	16	20	728	28	34	386
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	0	756	0	0	420
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	100	100		100	100	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	18	670	26	31	355
Future Vol, veh/h	15	18	670	26	31	355
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	12	0	0	19
Mvmt Flow	16	20	728	28	34	386

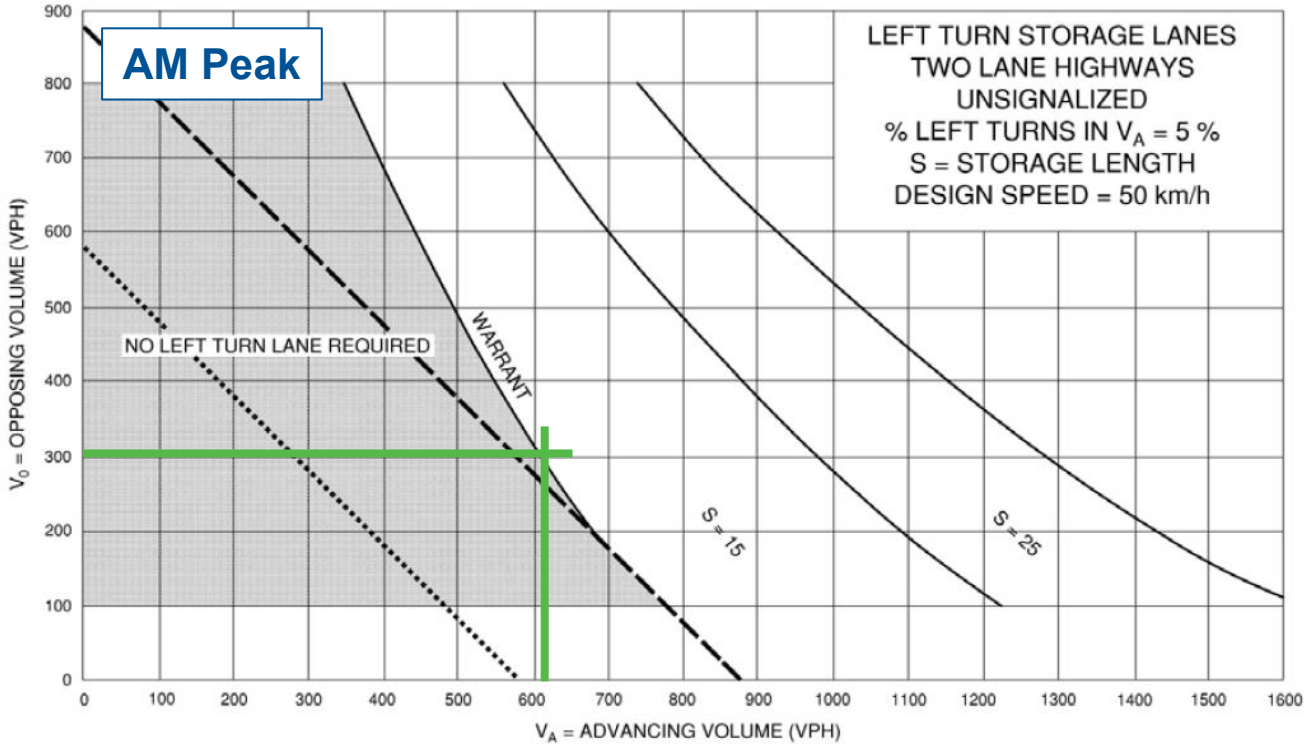
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1196	742	0	0	756	0
Stage 1	742	-	-	-	-	-
Stage 2	454	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	208	419	-	-	864	-
Stage 1	474	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	198	419	-	-	864	-
Mov Cap-2 Maneuver	198	-	-	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	612	-	-	-	-	-

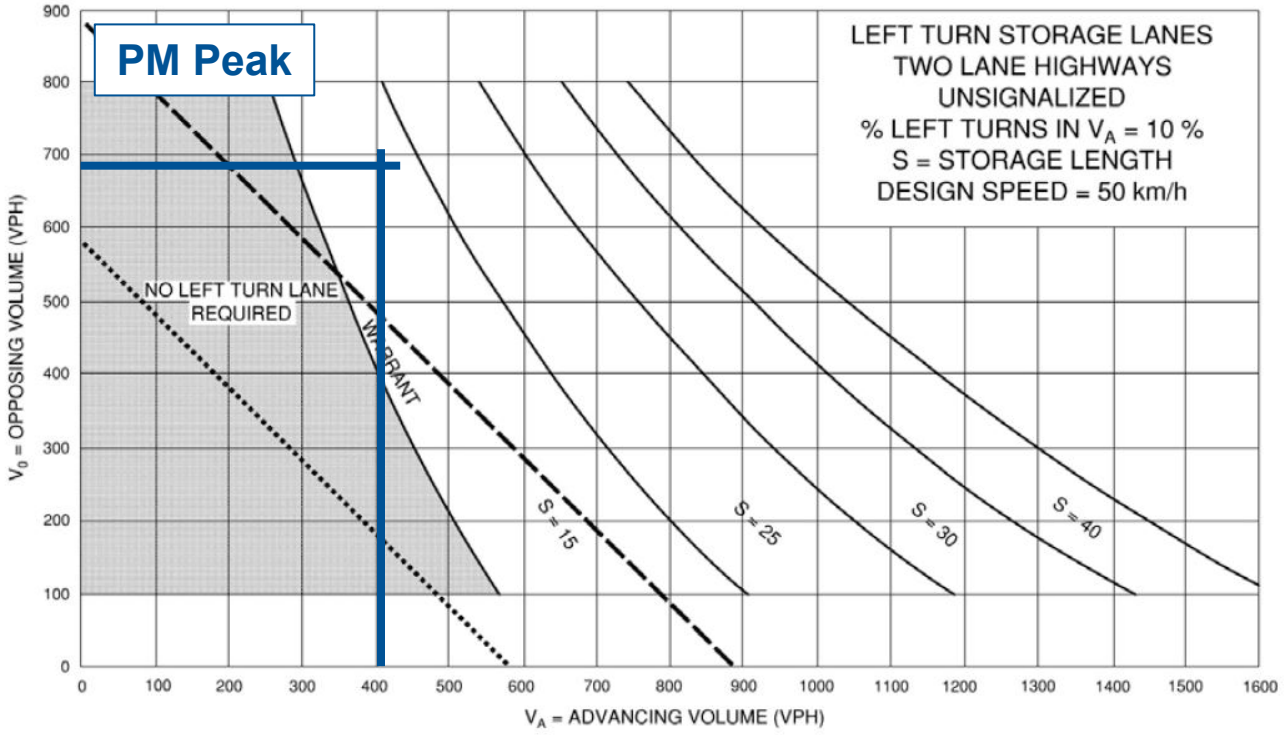
Approach	WB	NB	SB
HCM Control Delay, s	19.9	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	278	864	-
HCM Lane V/C Ratio	-	-	0.129	0.039	-
HCM Control Delay (s)	-	-	19.9	9.3	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

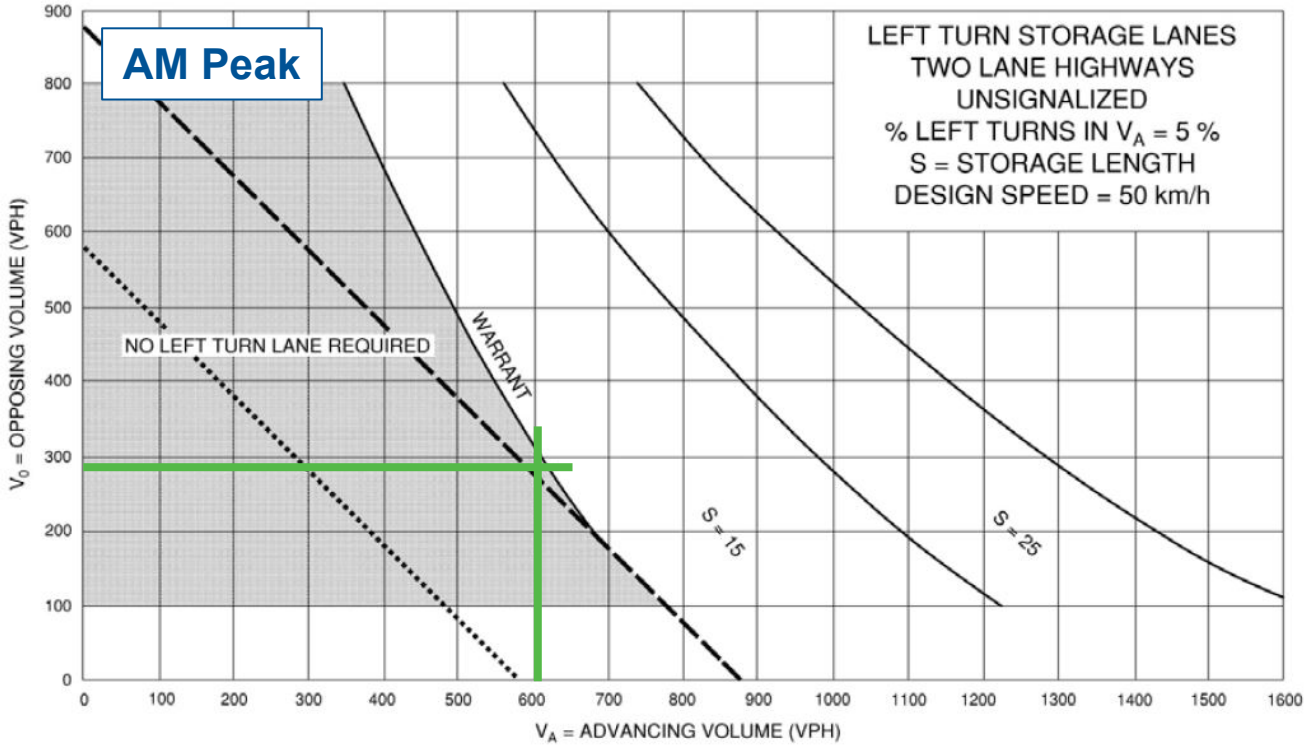
Appendix I

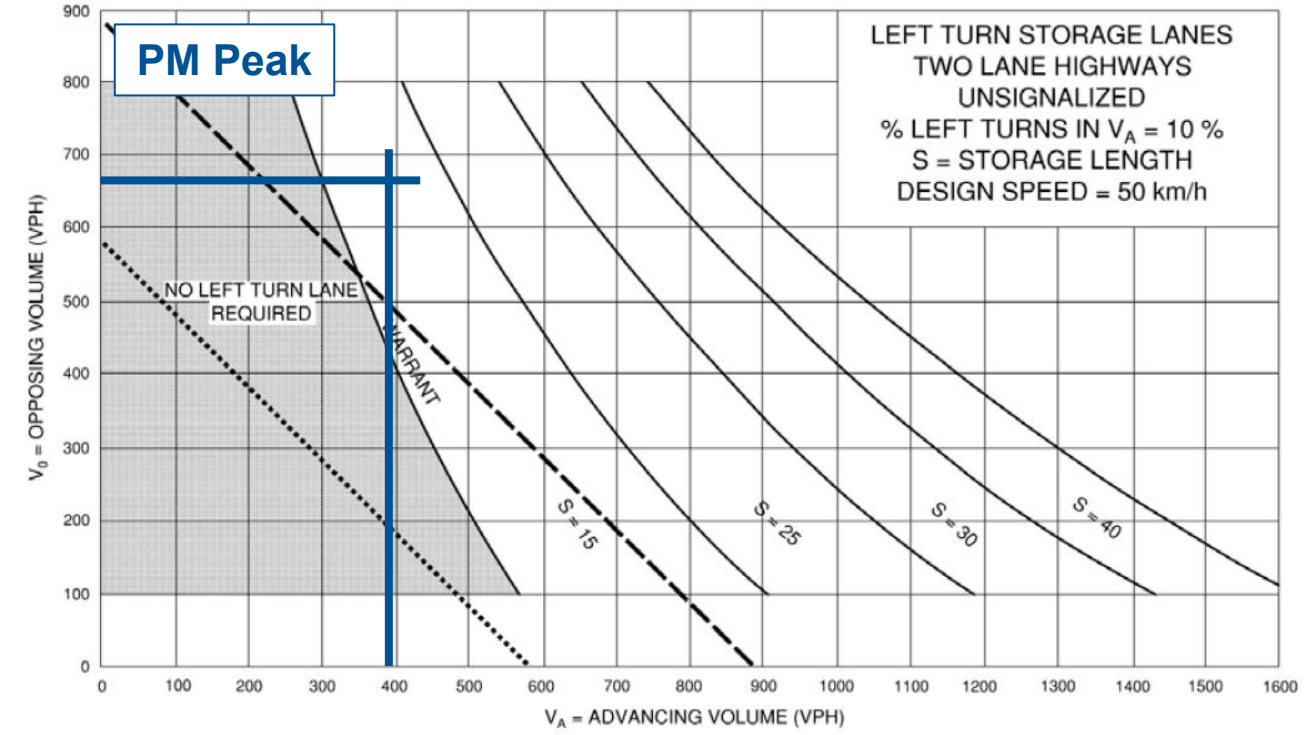
Left-Turn Lane Warrants



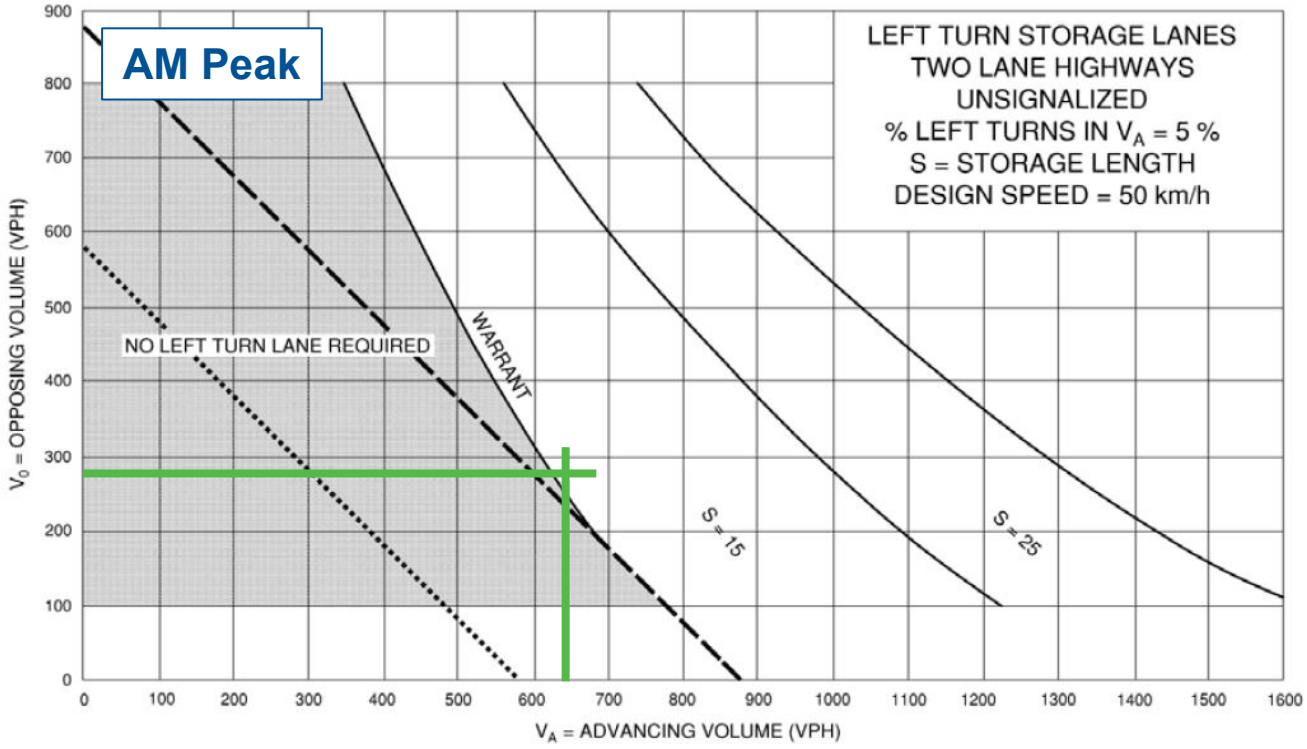


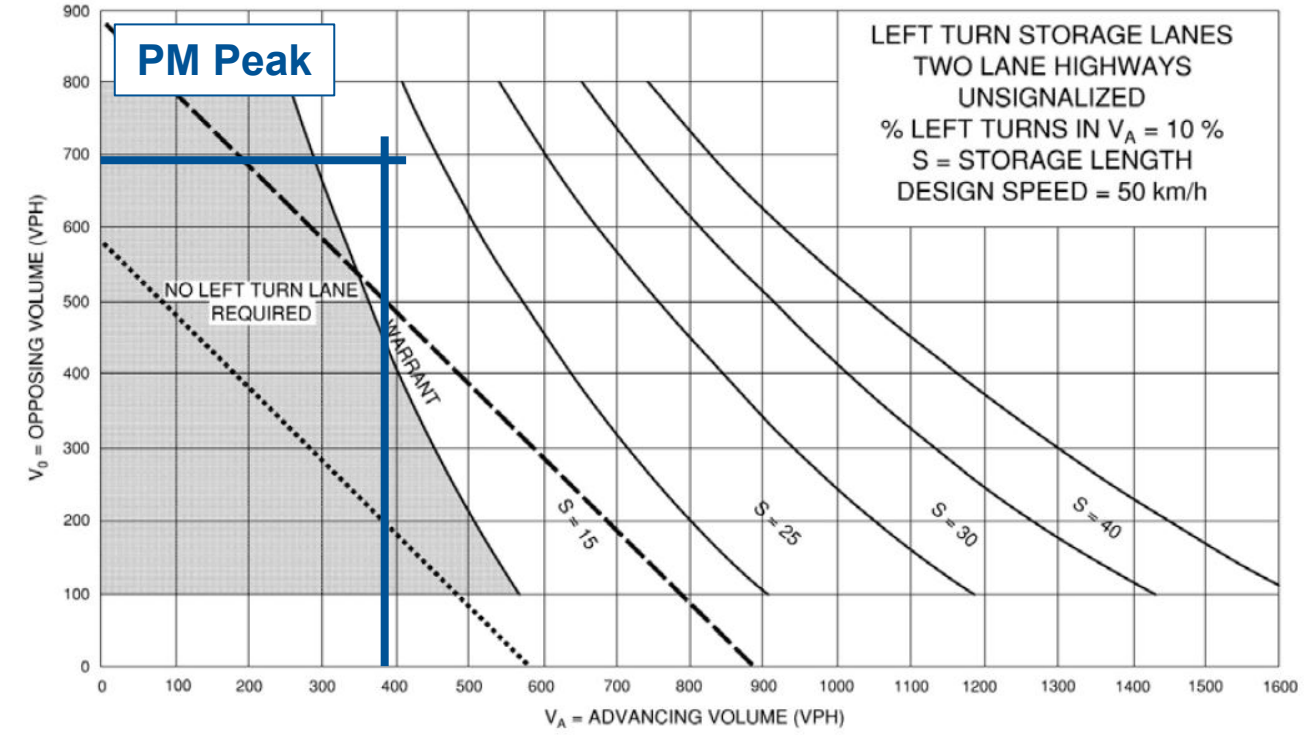
Southbound Left-Turn Lane Warrants
2039 Total Traffic
Ida Street & Driveway A



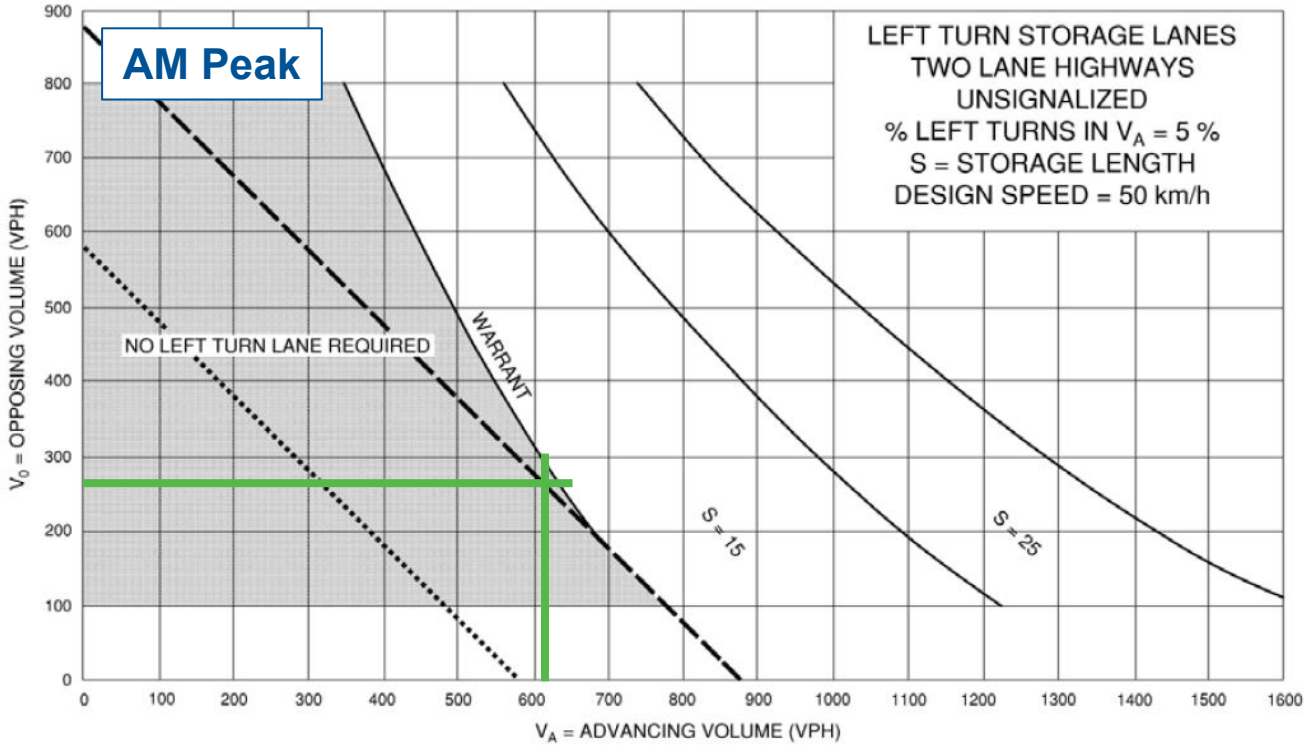


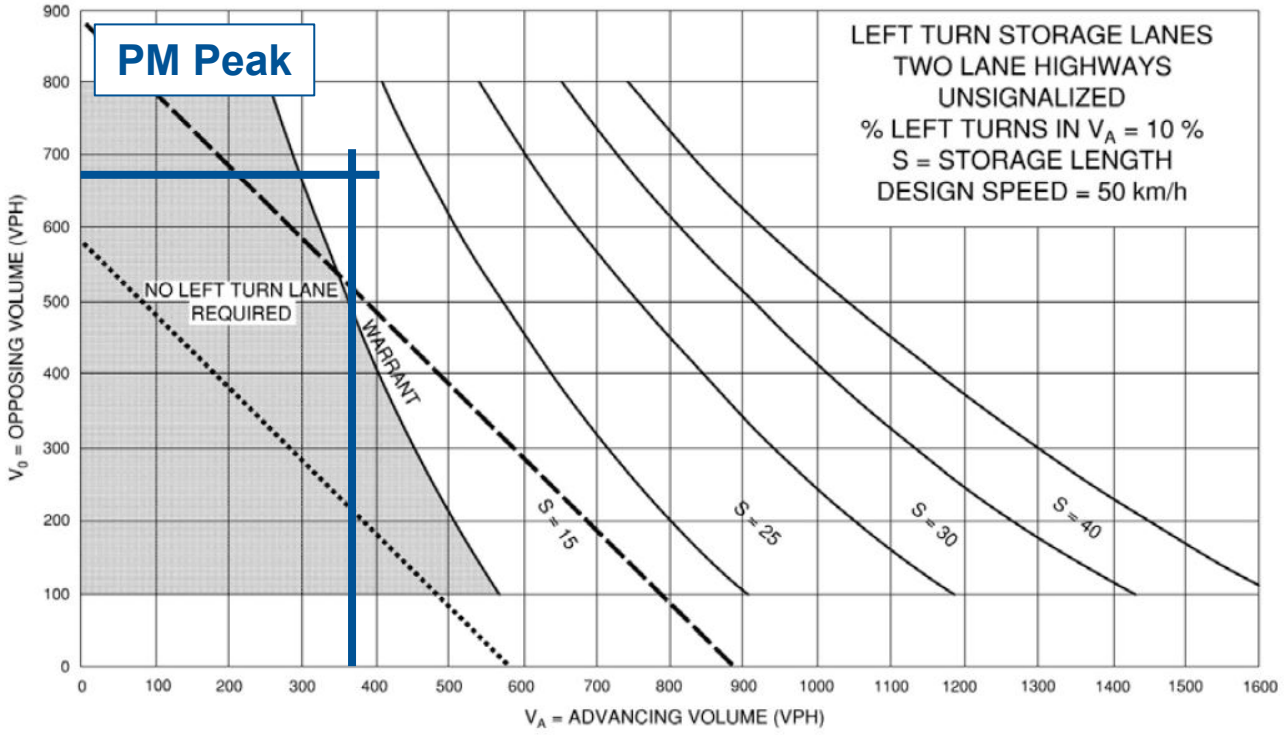
Southbound Left-Turn Lane Warrants
2034 Total Traffic
Ida Street & Driveway A





Southbound Left-Turn Lane Warrants
2039 Total Traffic
Ida Street & Driveway B





Southbound Left-Turn Lane Warrants
2034 Total Traffic
Ida Street & Driveway B

Appendix J

Signal Warrants

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

Horizon Year: 2039 Background
Region/City/Township: Southgate/Grey

Major Street: Grey Road 9
Minor Street: Ida Street

North/South?: N

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						
	Grey Road 9						Ida Street						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	39	166	331	117	189	27	160	48	57	33	149	79	
PM Peak Hour	83	250	214	70	228	23	361	151	132	16	56	54	
verage Hourly Volum	31	104	136	47	104	13	130	50	47	12	51	33	0

Warrant	AHV
1A - All	758
1B - Minor	324
2A - Major	434
2B - Cross	194

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	758
					% Fulfilled	105.3%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	324
					% Fulfilled	190.6%

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	434
					% Fulfilled	60.3%

	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	194
					% Fulfilled	258.3%

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

Horizon Year: 2039 Total
Region/City/Township: Southgate/Grey

Major Street: Grey Road 9
Minor Street: Ida Street

North/South?: N

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						
	Grey Road 9						Ida Street						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	39	166	336	127	189	27	176	59	88	33	152	79	
PM Peak Hour	83	250	232	103	228	23	371	158	152	16	68	54	
verage Hourly Volum	31	104	142	58	104	13	137	54	60	12	55	33	0

Warrant	AHV
1A - All	802
1B - Minor	352
2A - Major	451
2B - Cross	204

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	802
					% Fulfilled	111.4%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	352
					% Fulfilled	206.8%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	451
					% Fulfilled	62.6%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	204
					% Fulfilled	272.0%

Appendix K

2039 Total Traffic Operations Reports – Remedial Measures

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	166	336	127	189	27	176	59	88	33	152	79
Future Volume (vph)	39	166	336	127	189	27	176	59	88	33	152	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		25.0	35.0		0.0	100.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		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	1.00		0.98	1.00	1.00			0.98			1.00	
Frt			0.850		0.981			0.910			0.960	
Flt Protected	0.950			0.950			0.950				0.994	
Satd. Flow (prot)	1421	1810	1170	1530	1683	0	1271	1430	0	0	1640	0
Flt Permitted	0.542			0.644			0.624				0.954	
Satd. Flow (perm)	808	1810	1144	1035	1683	0	835	1430	0	0	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			365		10			96			38	
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)	2		1	1		2			4	4		
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 (%)	27%	5%	38%	18%	3%	63%	42%	5%	28%	5%	10%	14%
Adj. Flow (vph)	42	180	365	138	205	29	191	64	96	36	165	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	180	365	138	234	0	191	160	0	0	287	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)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

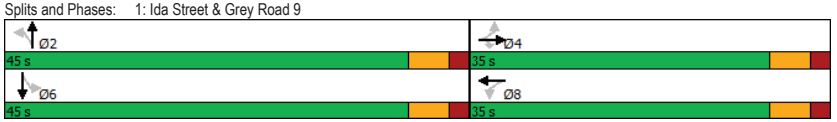
Lanes, Volumes, Timings
1: Ida Street & Grey Road 9

2039 Total AM - RM Signalized
Briarwood, Dundalk TIS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	35.0	35.0	35.0	35.0	35.0		45.0	45.0		45.0	45.0	
Total Split (%)	43.8%	43.8%	43.8%	43.8%	43.8%		56.3%	56.3%		56.3%	56.3%	
Maximum Green (s)	29.0	29.0	29.0	29.0	29.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	14.2	14.2	14.2	14.2	14.2		39.2	39.2			39.2	
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.60	0.60			0.60	
v/c Ratio	0.24	0.46	0.68	0.62	0.63		0.38	0.18			0.30	
Control Delay	24.1	25.8	10.0	35.4	29.9		10.9	3.9			7.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	24.1	25.8	10.0	35.4	29.9		10.9	3.9			7.4	
LOS	C	C	B	D	C		B	A			A	
Approach Delay		15.9			31.9			7.7			7.4	
Approach LOS		B			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 65.4			
Natural Cycle: 50			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 65.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Ida Street & Grey Road 9





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	42	180	365	138	234	191	160	287
v/c Ratio	0.24	0.46	0.68	0.62	0.63	0.38	0.18	0.30
Control Delay	24.1	25.8	10.0	35.4	29.9	10.9	3.9	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	25.8	10.0	35.4	29.9	10.9	3.9	7.4
Queue Length 50th (m)	4.4	20.0	0.0	15.9	25.9	10.9	2.9	13.0
Queue Length 95th (m)	12.1	36.3	21.0	32.5	45.9	31.1	12.6	32.9
Internal Link Dist (m)		153.2			128.0		614.7	216.3
Turn Bay Length (m)	25.0		25.0	35.0		100.0		
Base Capacity (vph)	360	806	712	461	755	500	895	957
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.22	0.51	0.30	0.31	0.38	0.18	0.30

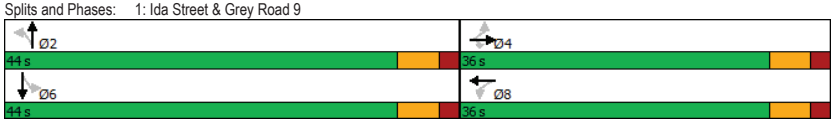
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	250	232	103	228	23	371	158	152	16	68	54
Future Volume (vph)	83	250	232	103	228	23	371	158	152	16	68	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		25.0	35.0		0.0	100.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		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								0.99			1.00	
Frt			0.850		0.986			0.927			0.947	
Flt Protected	0.950			0.950			0.950				0.994	
Satd. Flow (prot)	1805	1900	1242	1752	1809	0	1433	1680	0	0	1584	0
Flt Permitted	0.472			0.474			0.662				0.952	
Satd. Flow (perm)	897	1900	1242	874	1809	0	998	1680	0	0	1517	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			252		7			82			56	
Link Speed (k/h)		80			40			40			40	
Link Distance (m)		177.2			152.0			638.7			240.3	
Travel Time (s)		8.0			13.7			57.5			21.6	
Confl. Peds. (#/hr)									2	2		
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 (%)	0%	0%	30%	3%	3%	9%	26%	7%	0%	0%	15%	14%
Adj. Flow (vph)	90	272	252	112	248	25	403	172	165	17	74	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	272	252	112	273	0	403	337	0	0	150	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)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
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)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	36.0	36.0	36.0	36.0	36.0		44.0	44.0		44.0	44.0	
Total Split (%)	45.0%	45.0%	45.0%	45.0%	45.0%		55.0%	55.0%		55.0%	55.0%	
Maximum Green (s)	30.0	30.0	30.0	30.0	30.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	14.7	14.7	14.7	14.7	14.7		38.1	38.1			38.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23		0.59	0.59			0.59	
v/c Ratio	0.44	0.63	0.53	0.57	0.66		0.69	0.33			0.16	
Control Delay	28.5	29.4	7.5	33.7	30.0		18.9	6.8			5.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	28.5	29.4	7.5	33.7	30.0		18.9	6.8			5.3	
LOS	C	C	A	C	C		B	A			A	
Approach Delay		20.3			31.1			13.4			5.3	
Approach LOS		C			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 64.9			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 67.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Ida Street & Grey Road 9





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	90	272	252	112	273	403	337	150
v/c Ratio	0.44	0.63	0.53	0.57	0.66	0.69	0.33	0.16
Control Delay	28.5	29.4	7.5	33.7	30.0	18.9	6.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	29.4	7.5	33.7	30.0	18.9	6.8	5.3
Queue Length 50th (m)	9.8	31.0	0.0	12.6	30.6	30.9	13.8	4.6
Queue Length 95th (m)	22.2	52.6	15.7	27.4	52.4	#91.7	34.0	14.5
Internal Link Dist (m)		153.2			128.0		614.7	216.3
Turn Bay Length (m)	25.0		25.0	35.0		100.0		
Base Capacity (vph)	415	881	711	405	842	586	1020	914
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.31	0.35	0.28	0.32	0.69	0.33	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Grey Rd 9 & Ida.arc8
Path: C:\Users\MattBrouwer\Paradigm\Projects - (230576) Grey Rd 9 & Ida\2 Analysis\Arcady
Report generation date: 2024-11-07 2:55:11 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2039 Total						
Leg North	0.47	~1	5.87	0.30	A	7.25	A
Leg West	1.54	1.25	9.39	0.55	A		
Leg South	0.59	1.24	5.99	0.32	A		
Leg East	0.64	1.20	6.13	0.35	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2039 Total, AM " model duration: 8:00 AM - 9:30 AM
"D2 - 2039 Total, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2024-11-07 2:55:10 PM

File summary

Title	Grey Road 9 & Ida Street
Location	
Site Number	
Date	2024-11-07
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	230576
Analyst	MattBrouwer
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2039 Total, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2039 Total, AM	2039 Total	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				7.25	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Ida Street	Southbound
West	West	Grey Road 9	Eastbound
South	South	Ida Street	Northbound
East	East	Main St W	Westbound

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	5.00	20.00	40.00	25.00	
West	3.50	4.50	5.00	20.00	40.00	25.00	
South	3.50	4.50	5.00	15.00	40.00	25.00	
East	3.50	4.50	5.00	15.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.561	1266.861
West		(calculated)	(calculated)	0.561	1266.861
South		(calculated)	(calculated)	0.552	1246.564
East		(calculated)	(calculated)	0.552	1246.564

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	264.00	100.000
West	ONE HOUR	✓	541.00	100.000
South	ONE HOUR	✓	323.00	100.000
East	ONE HOUR	✓	343.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	79.000	152.000	33.000
	West	39.000	0.000	336.000	166.000
	South	59.000	176.000	0.000	88.000
	East	27.000	189.000	127.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.30	0.58	0.13
	West	0.07	0.00	0.62	0.31
	South	0.18	0.54	0.00	0.27
	East	0.08	0.55	0.37	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.140	1.080	1.070
	West	1.270	1.000	1.290	1.170
	South	1.100	1.280	1.000	1.280
	East	1.440	1.180	1.180	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	14.0	8.0	7.0
	West	27.0	0.0	29.0	17.0
	South	10.0	28.0	0.0	28.0
	East	44.0	18.0	18.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.30	5.87	0.47	~1	A	242.25	363.38	31.50	5.20	0.35	31.50	5.20
West	0.55	9.39	1.54	1.25	A	496.43	744.65	94.98	7.65	1.06	94.99	7.65
South	0.32	5.99	0.59	1.24	A	296.39	444.59	40.33	5.44	0.45	40.33	5.44
East	0.35	6.13	0.64	1.20	A	314.74	472.11	43.28	5.50	0.48	43.29	5.50

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Grey Rd 9 & Ida.arc8
Path: C:\Users\MattBrouwer\Paradigm\Projects - (230576) Grey Rd 9 & Ida\2 Analysis\Arcady
Report generation date: 2024-11-07 2:56:15 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2039 Total						
Leg North	0.25	~1	5.94	0.18	A	9.83	A
Leg West	1.36	?	7.93	0.54	A		
Leg South	2.66	6.22	13.05	0.72	B		
Leg East	0.87	1.10	8.15	0.45	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2039 Total, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2039 Total, PM " model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2024-11-07 2:56:15 PM

File summary

Title	Grey Road 9 & Ida Street
Location	
Site Number	
Date	2024-11-07
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	230576
Analyst	MattBrouwer
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2039 Total, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2039 Total, PM	2039 Total	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				9.83	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Ida Street	Southbound
West	West	Grey Road 9	Eastbound
South	South	Ida Street	Northbound
East	East	Main St W	Westbound

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	5.00	20.00	40.00	25.00	
West	3.50	4.50	5.00	20.00	40.00	25.00	
South	3.50	4.50	5.00	15.00	40.00	25.00	
East	3.50	4.50	5.00	15.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.561	1266.861
West		(calculated)	(calculated)	0.561	1266.861
South		(calculated)	(calculated)	0.552	1246.564
East		(calculated)	(calculated)	0.552	1246.564

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	138.00	100.000
West	ONE HOUR	✓	565.00	100.000
South	ONE HOUR	✓	681.00	100.000
East	ONE HOUR	✓	354.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	54.000	68.000	16.000
	West	83.000	0.000	232.000	250.000
	South	158.000	371.000	0.000	152.000
	East	23.000	228.000	103.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.39	0.49	0.12
	West	0.15	0.00	0.41	0.44
	South	0.23	0.54	0.00	0.22
	East	0.06	0.64	0.29	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.140	1.120	1.090
	West	1.000	1.000	1.350	1.090
	South	1.040	1.050	1.000	1.000
	East	1.130	1.130	1.030	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	14.0	12.0	9.0
	West	0.0	0.0	35.0	9.0
	South	4.0	5.0	0.0	0.0
	East	13.0	13.0	3.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.18	5.94	0.25	~1	A	126.63	189.95	16.71	5.28	0.19	16.72	5.28
West	0.54	7.93	1.36	?	A	518.45	777.68	86.00	6.63	0.96	86.01	6.64
South	0.72	13.05	2.66	6.22	B	624.90	937.35	143.98	9.22	1.60	144.01	9.22
East	0.45	8.15	0.87	1.10	A	324.84	487.25	54.51	6.71	0.61	54.52	6.71