961 St. David Street North, Fergus ON
Transportation Impact Study

Paradigm Transportation Solutions Limited

June 2022
210066

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Project Summary

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961 St. David Street North, Fergus, ON
Transportation Impact Study

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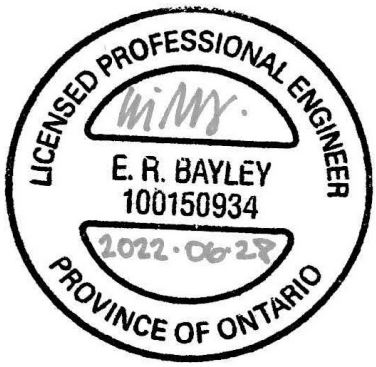

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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study for a proposed residential development at 961 St. David Street North (Highway 6) in Fergus, Township of Centre Wellington, Ontario.

This Transportation Impact Study (TIS) includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for an opening year horizon (2023), five-year horizon (2028) from full build-out, and ten-year horizon (2033) from full build-out, and any recommendations required to improve future traffic conditions.

Development Concept

The subject site is located at 961 St. David Street North (Highway 6). The property owner is proposing to construct 13 single family and 37 townhome residential units with assumed full-build-out by 2023.

Vehicle access is proposed via a single all-moves access to St. David Street North (Highway 6).

Conclusions

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

- **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service with no critical movements during the AM and PM peak hours.
- **Development Trip Generation:** The residential development is forecast to generate approximately 27 and 34 trips during the AM and PM peak hours upon full build-out.
- **2023 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- **2023 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- The addition of the site generated traffic does not increase the overall delay at the study area intersections during the AM and PM peak hours.

- **2028 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- **2028 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- The addition of the site generated traffic increases the overall delay at the study area intersections by one second or less during the AM and PM peak hours.
- **2033 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hours with the following critical movement noted:
  - The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.63 during the PM peak hour. The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.
- **2033 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hours with the following critical movement noted:
  - The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.65 during the PM peak hour. The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.
- The addition of the site generated traffic does not increase the overall delay at the study area intersections during the AM and PM peak hours.
- **Remedial Measures:** A northbound left-turn lane on St. David Street North at the proposed site driveway is not warranted due to the forecast left-turn volumes being less than 2% of the advancing volumes during the AM and PM peak hours.
- Traffic control signals are not warranted under 2033 total traffic conditions at the St. David Street North (Highway 6) intersections with Sideroad 18 and Sideroad 19.

Recommendations

Based on the findings of this study, it is recommended that the development be approved with no requirement for off-site transportation improvements.

It is also recommended that the MTO and Township of Centre Wellington monitor the future traffic volumes to ensure appropriate forms of traffic control are in place at the intersections of St. David Street North at Sideroad 18 and St. David Street North at Sideroad 19

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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study for a residential development located at municipal address 961 St. David Street North, Fergus, Township of Centre Wellington, Ontario. **Figure 1.1** illustrates the location of the subject site.

This study determines the impacts of the additional traffic on the surrounding road network, and the remedial measures necessary (if any) to accommodate future traffic in a satisfactory manner. The scope of the study includes:

- Assessment of the current traffic and site conditions within the study area;
- Estimates of background traffic growth;
- Estimates of additional traffic generated by the subject site;
- Analysis of the impact of the future traffic on the surrounding road network for opening year (year 2023), five-years after full build-out (year 2028) and ten-years after full build-out (year 2033) horizon years; and
- Recommendations necessary to mitigate this future traffic in a satisfactory manner.

The study scope was developed in consultation with the Ministry of Transportation (MTO) in March 2021. **Appendix A** contains the pre-study consultation material and response from the MTO.

1.2 Study Area

The intersections assessed in this study include:

- St. David Street North (Highway 6) and Sideroad 18 (unsignalized);
- St. David Street North (Highway 6) and Sideroad 19 (unsignalized); and
- St. David Street North (Highway 6) and the proposed site driveway.

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Location of Subject Site

961 St David Street North, Fergus TIS
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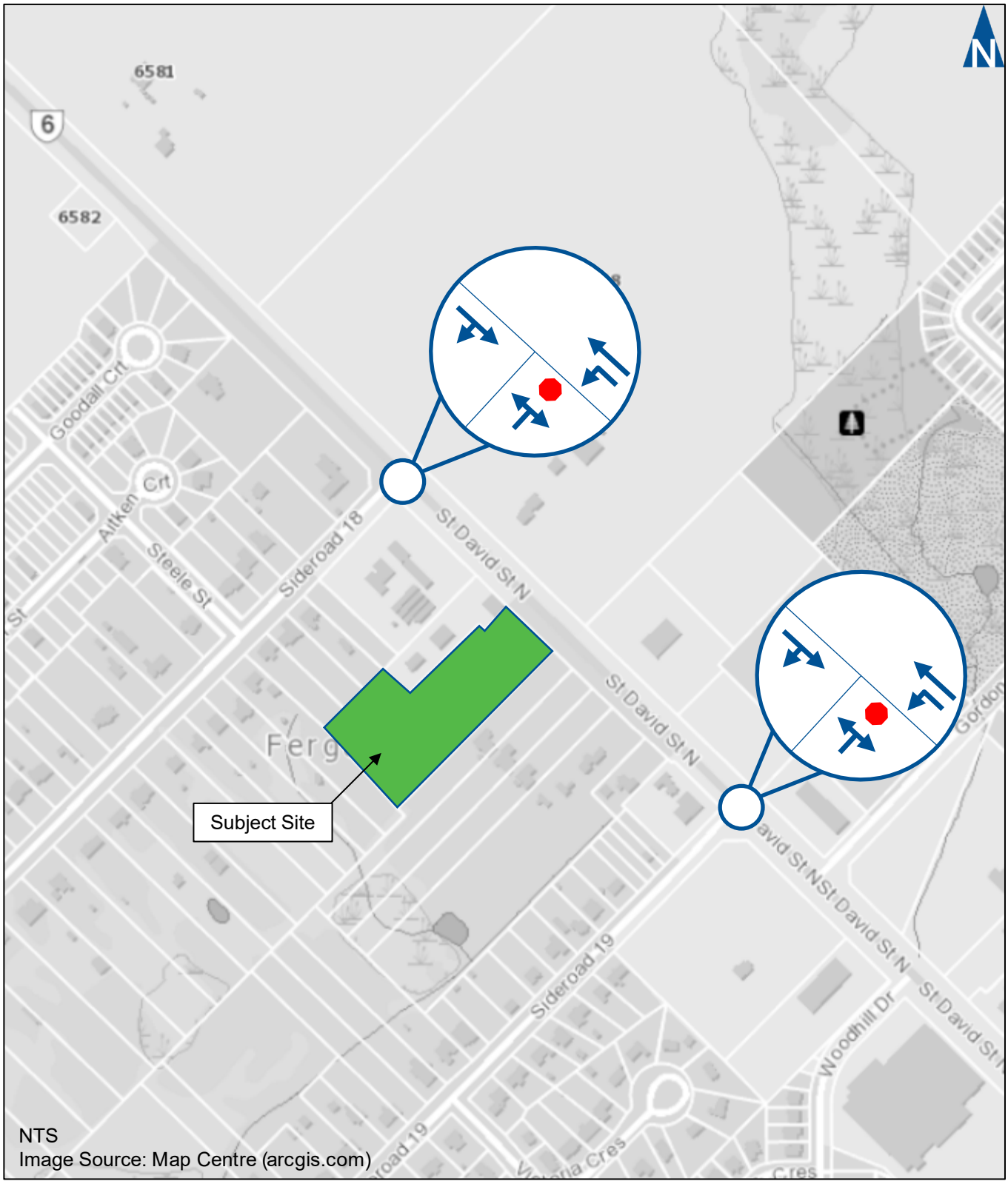
Figure 1.1

2.1 Road Characteristics

The roadways of interest within the study area include St. David Street North (Highway 6), Sideroad 18, and Sideroad 19. These roadways are under the jurisdiction of the MTO and Township of Centre Wellington and are generally described as follows:

- **St. David Street North (Highway 6)** is designated as Provincial Highway withing the study area. The connecting link starts immediately south of the Sideroad 19 intersection. It is a paved two-lane arterial roadway running north-south. There are no sidewalks on St. David Street north of Sideroad 19. The posted speed limit in the study area is 60 km/h. It transitions to 80 km/h north of Sideroad 18 and to 50 km/h south of Sideroad 19.
- **Sideroad 18** is an east-west local roadway with a two-lane cross-section. The posted speed limit is 50 kilometres per hour. A sidewalk is provided on both sides of the road between St. David Street North and Steele Street.
- **Sideroad 19** is an east-west local roadway with a two-lane cross-section. The posted speed limit is 50 kilometres per hour. A sidewalk is provided on the south side of the roadway.

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



NTS
Image Source: Map Centre (arcgis.com)

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Existing Lane Configuration & Traffic Control

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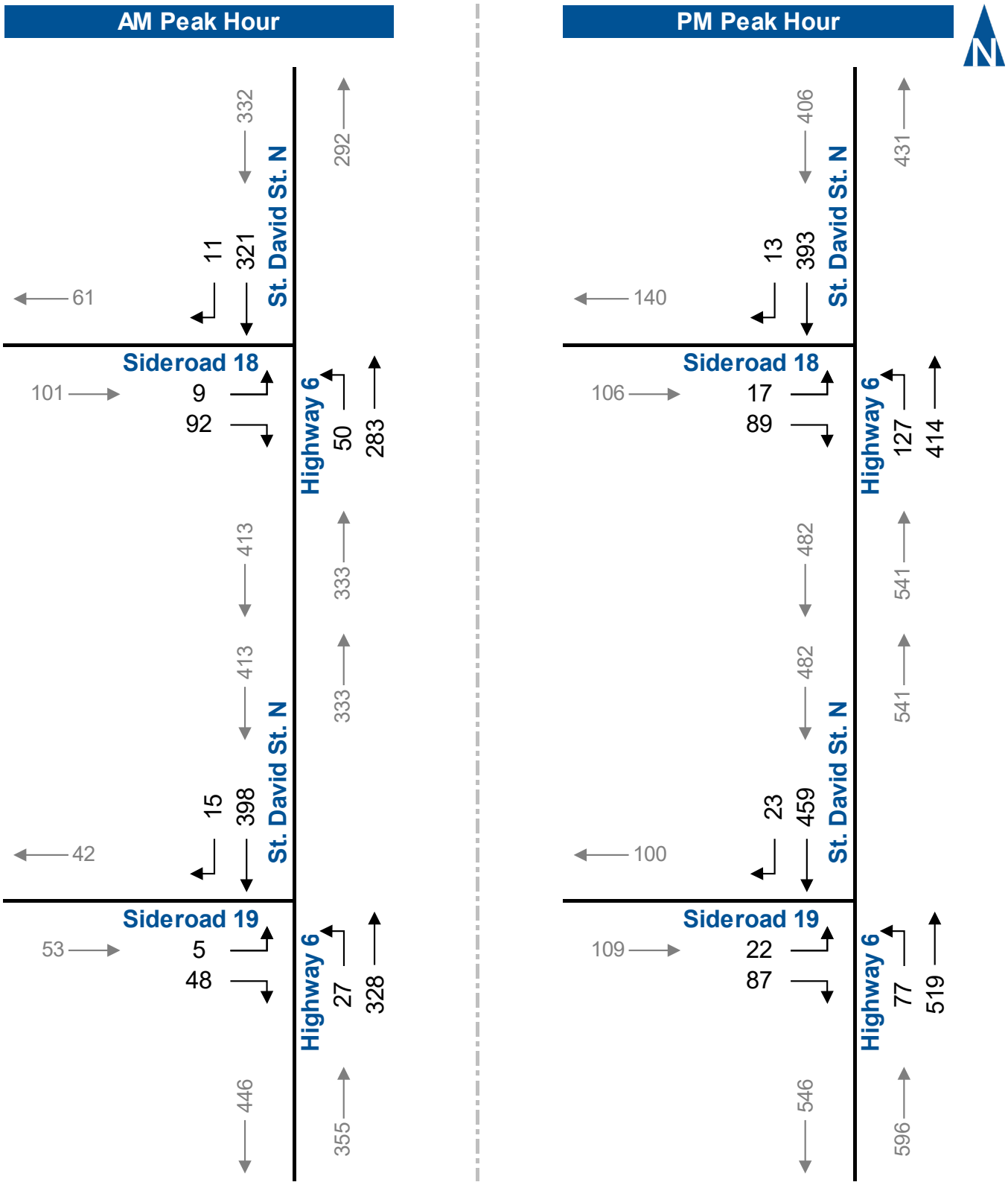
Figure 2.1

2.2 Traffic Volumes

Turning movement counts at the study area intersections were conducted in March 2021 to capture the weekday AM and PM peak hours. The turning movement counts were provided to, and subsequently approved by, the MTO for use in this study[1].

Figure 2.2 displays the existing weekday AM and PM peak hour traffic volumes. **Appendix B** contains the detailed turning movement counts for the study area intersections.

[1] Appendix A – Pre-Study Consultation



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Existing Traffic Volumes

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Figure 2.2

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 the various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

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

The operations of the study intersections were evaluated using the existing lane configurations, traffic controls, and the existing traffic peak volumes.

The level of service conditions on the existing road network have been assessed using Synchro 10. As noted in the MTO TIS guidelines[2], movements are considered critical under the following conditions:

- V/C ratios for dedicated turning movements of 0.85 or greater.

Table 2.1 summarizes the existing intersection operations. The entries in the table indicating the AM and PM peak hour level of service (LOS), volume to capacity ratios (V/C), and 95th percentile queues experienced.

The study area intersections are currently operating with acceptable levels of service with no specific problem movements.

Appendix C contains the detailed Synchro reports.

[2] Ministry Transportation Traffic Impact Study Guideline, September 2014

TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												
				Eastbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	12		>	**12**	8	0		**1**		0	>	**0**	**2**
			V/C	0.17		>		0.05	0.18				0.21	>		
			Q	5		>		1	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		109	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	12		>	**12**	9	0		**1**		0	>	**0**	**1**
			V/C	0.10		>		0.03	0.21				0.26	>		
			Q	3		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	16		>	**16**	9	0		**2**		0	>	**0**	**3**
			V/C	0.25		>		0.13	0.26				0.26	>		
			Q	8		>		4	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		107	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	19		>	**19**	9	0		**1**		0	>	**0**	**2**
			V/C	0.32		>		0.08	0.33				0.31	>		
			Q	11		>		2	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		28	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

3 Development Concept

3.1 Development Description

The subject site is located at 961 St. David Street North in Fergus. The property owner is proposing to construct approximately 50 residential units (13 single-family and 37 townhouse units) with assumed full-build-out by 2023.

Vehicle access is proposed via a single all-moves access to St. David Street North approximately 170 metres south of Sideroad 18 (CL to CL) and 240 metres north of Sideroad 19 (CL to CL)

Figure 3.1 shows the proposed development concept.

3.1.1 Sight Distance

St. David Street North (Highway 6) is relatively straight and flat at the proposed driveway location. Sightlines for the new driveway connection are unimpeded to the north and south with clear sightlines exceeding 200 metres.

In the pre-study consultation, the MTO requested that the design speed should be 20 km/h over the posted speed limit. An 80 km/h design speed requires:

- Minimum stopping sight distance[3] – 130 m:
- Intersection sight distance:
  - Left-turn from stop[4] – 170 m: and
  - Right-turn from stop[5]. – 145 m.

The sightline from the proposed driveway exceeds the minimum sight distance requirements for a design speed of 80 km/h to the north and south. The sight distance should not be a concern.

[3] TAC Table 2.5.2. Stopping Sight Distance on level roadways for Automobiles
[4] TAC Table 9.9.4. Design Intersection Sight Distance – Case B1, Left-Turn from Stop
[5] TAC Table 9.9.6. Design Intersection Sight Distance – Case B2, Right-Turn from Stop

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Concept Plan

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Figure 3.1

3.2 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation[6] methods predict the site trip generation. The following Land Use Code (LUC) were used to estimate the site trip generation:

- LUC 210 Single-Family, Detached Housing (Dwelling Units); and
- LUC 220 Multifamily Housing, Low-Rise (Dwelling Units).

The regression equation and average rates were used to calculate the site trips. **Table 3.1** summarizes the estimated trip generation. The site's trip generation upon full build-out is estimated to be approximately 27 AM peak hour trips and 34 PM peak hour trips. No reductions for alternative modes of transportation were used in the calculation.

TABLE 3.1: TRIP GENERATION

ITE Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
210 - Single-Family Detached Housing	13	3	9	**12**	9	6	**15**
220 - Multifamily Housing, Low-Rise	37	4	11	**15**	12	7	**19**
Total Trip Generation	**50**	**7**	**20**	**27**	**21**	**13**	**34**

210: AM Ln(T) = 0.91Ln(X) + 0.12 | PM Ln(T) = 0.94 Ln(X) + 0.27

220: AM Average Rate 0.40 | PM Average Rate 0.51

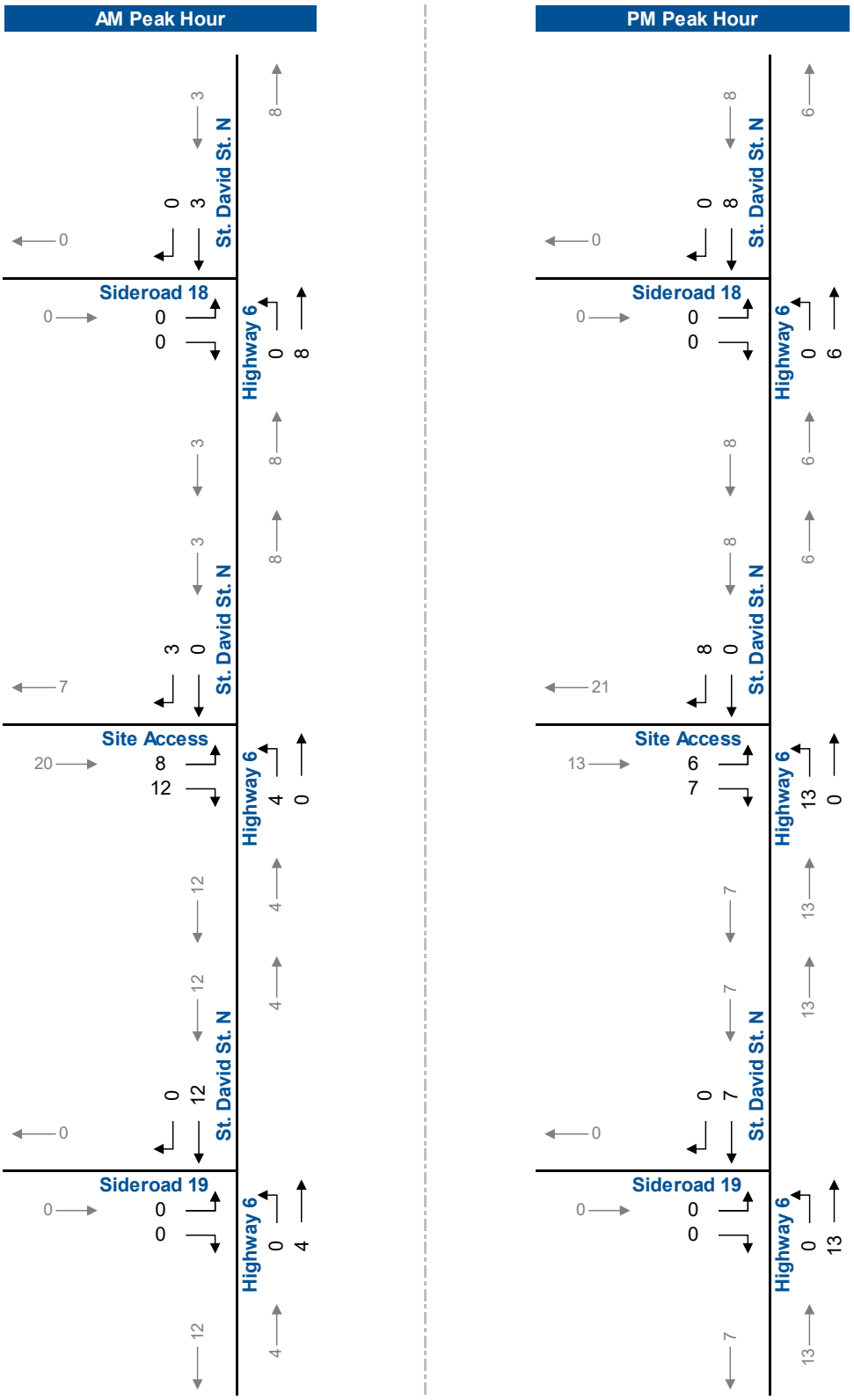
The trip distribution used for this study was based on the existing distribution as the subject site is residential and will have similar travel characteristics of the existing traffic patterns. The trip distribution is shown in **Table 3.2**.

TABLE 3.2: TRIP DISTRIBUTION

Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
North	48%	39%	39%	43%
South	52%	61%	61%	57%
Total	**100%**	**100%**	**100%**	**100%**

Figure 3.2 contains the AM and PM peak hour trip assignment.

[6] *Trip Generation Tenth Edition*, Institute of Transportation Engineers, Washington D.C., 2017



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Site Generated Traffic Volumes

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Figure 3.2

4 Evaluation of Future Traffic Conditions

The assessment of the future traffic conditions contained in this section includes the future traffic forecasts as well as the level of service analysis. An opening year (2023), five-year horizon (2028) following full build-out, and ten-year horizon (2033) following the full build-out of the subject site has been assessed to determine the impact of the site-generated traffic volumes.

4.1 Forecast Traffic Volumes

The likely future traffic volumes are estimated to consist of:

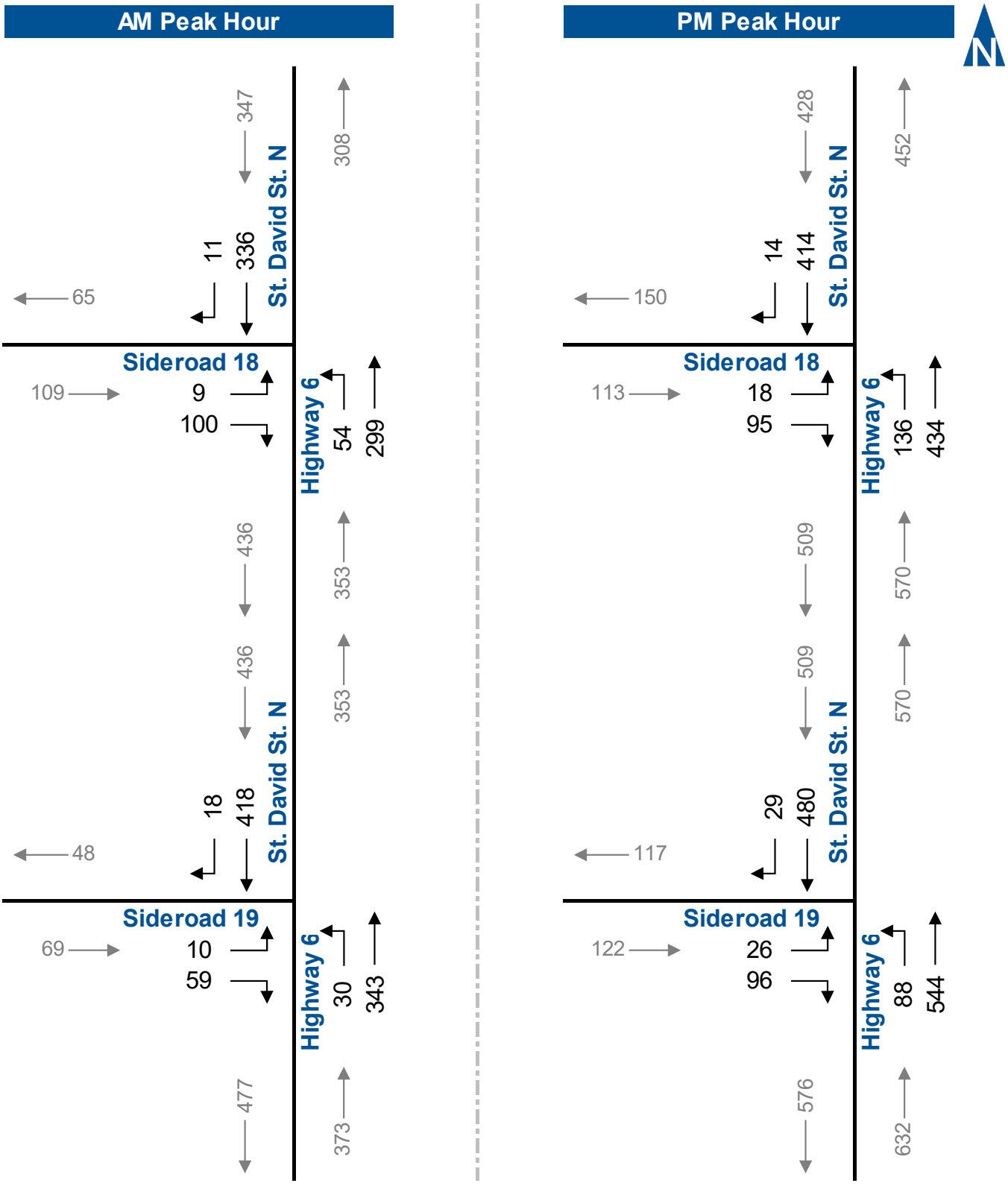
- Increased non-site traffic (generalized background traffic growth) estimated to be 1.00 percent per annum[7] ;
- Traffic generated by adjacent future developments including:
  - 6552,6554,6556 & 6558 Beatty Line North, Fergus[8]: a residential development with 1 single detached dwelling, 16 semi-detached dwellings, and 71 unit apartment building;
  - Wrighthaven Homes Sideroad 19 development with 19 single detached dwellings; and
- Traffic generated by the subject site.

The background development traffic volumes were derived by using the associated ITE trip generation rates and the trip distribution in **Section 3.2** or their associated traffic studies, where available. **Appendix D** contains the detailed traffic forecast for the adjacent development applications.

Figure 4.1 details the forecast 2023 background traffic volumes. **Figure 4.2** details the forecast 2028 background traffic volumes. **Figure 4.3** details the forecast 2033 background traffic volumes.

Figure 4.4 details the forecast 2023 total traffic volumes (background + site traffic). **Figure 4.5** details the forecast 2028 total traffic volumes. **Figure 4.6** details the forecast to 2033 total traffic volumes.

[7] Appendix A – Pre-Study Consultation
[8] Beatty Line North, Fergus, Transportation Impact Study, Paradigm Transportation Solutions Limited, July 2018 (180135)



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2023 Background Traffic Volumes

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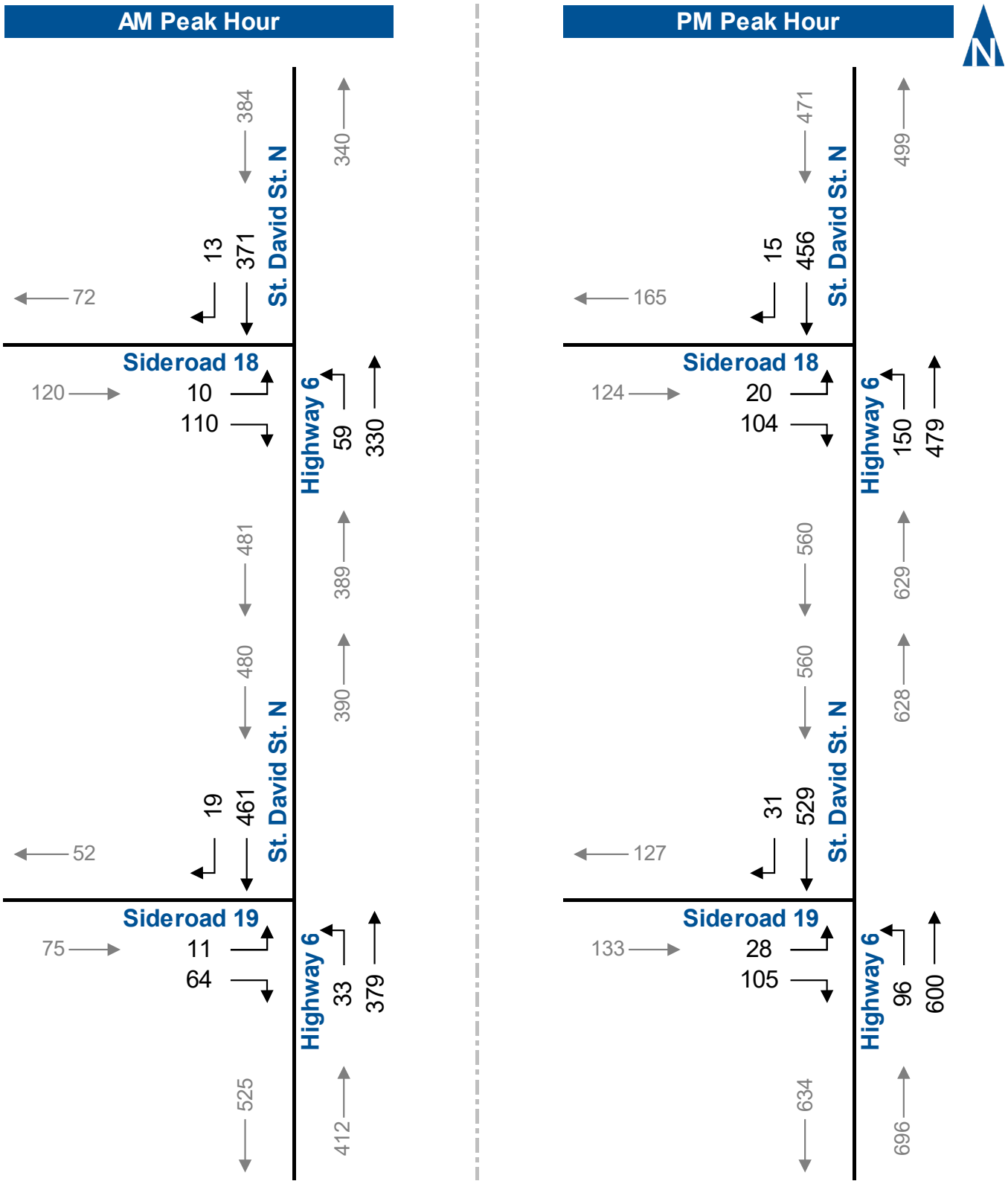
Figure 4.1



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2028 Background Traffic Volumes

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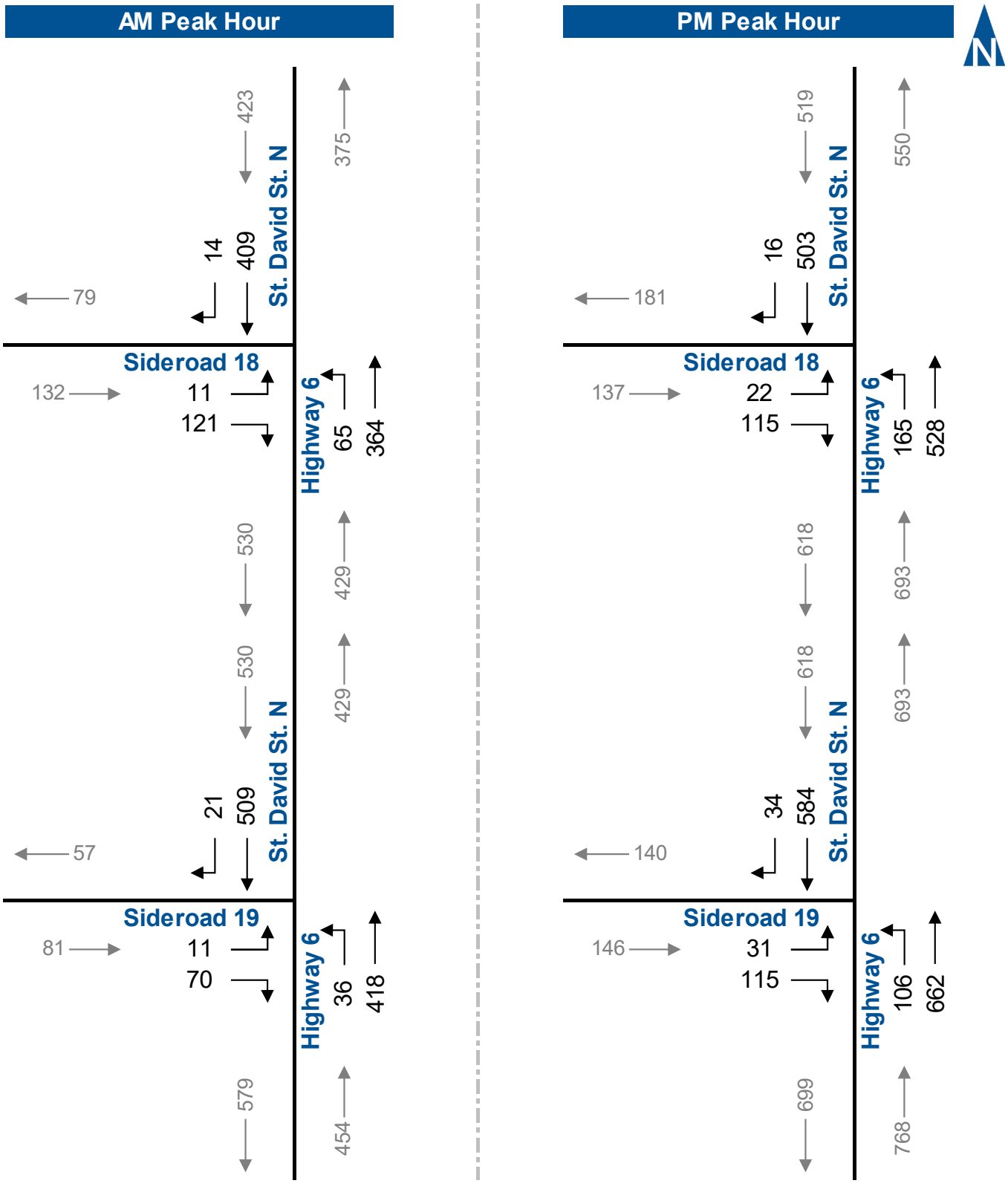
Figure 4.2



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2033 Background Traffic Volumes

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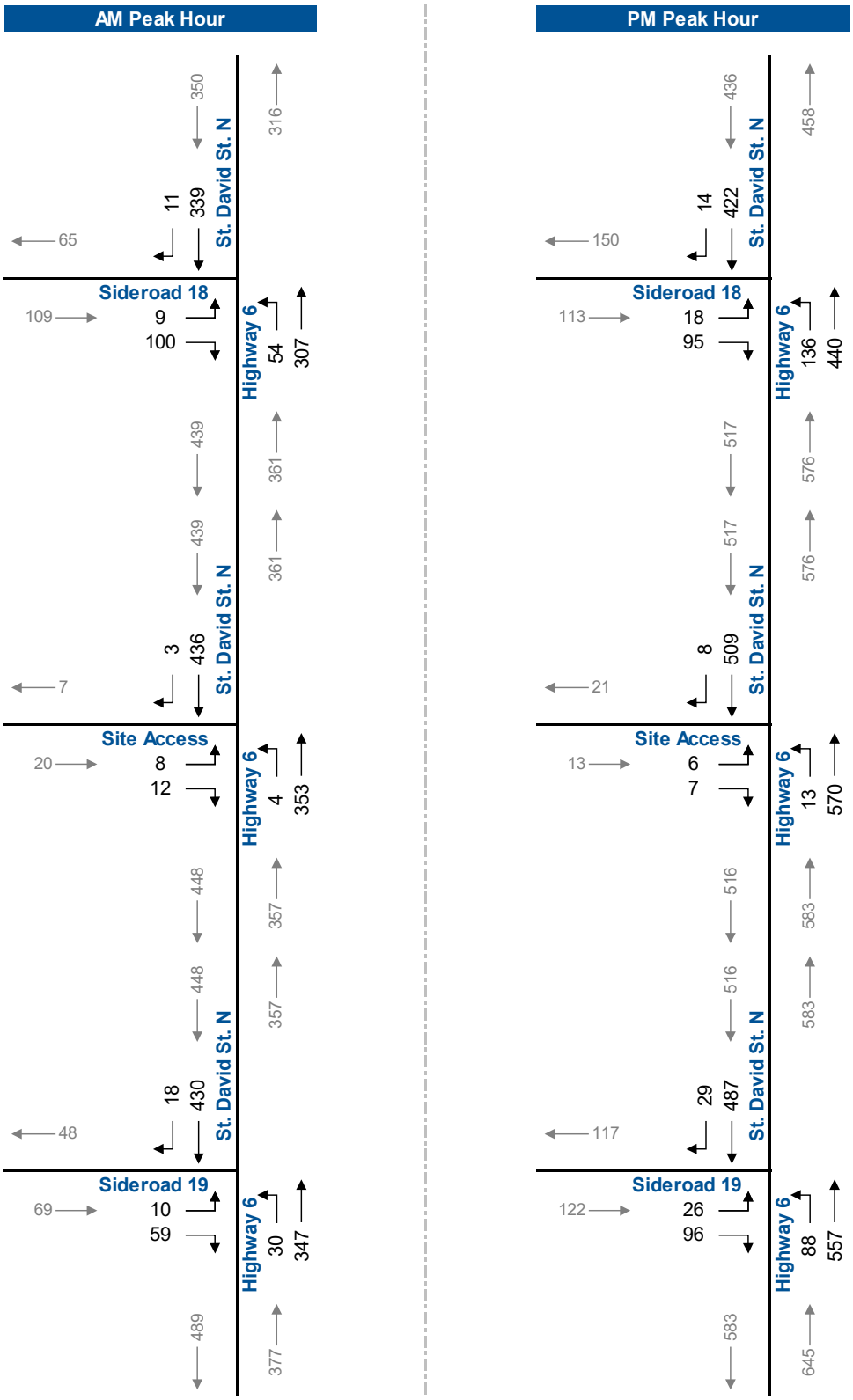
Figure 4.3



2023 Total Traffic Volumes

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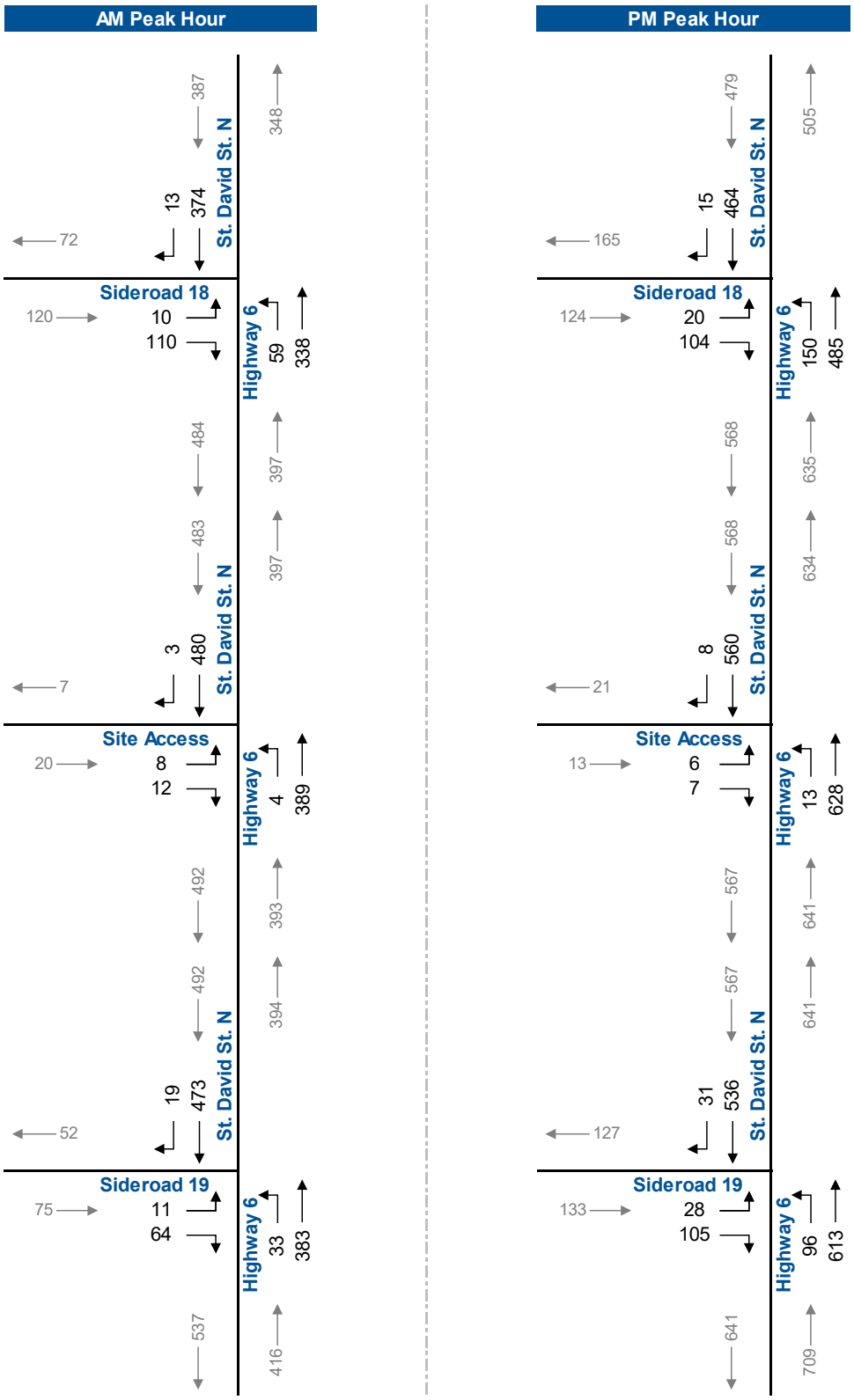
Figure 4.4



2028 Total Traffic Volumes

961 St David Street North, Fergus TIS
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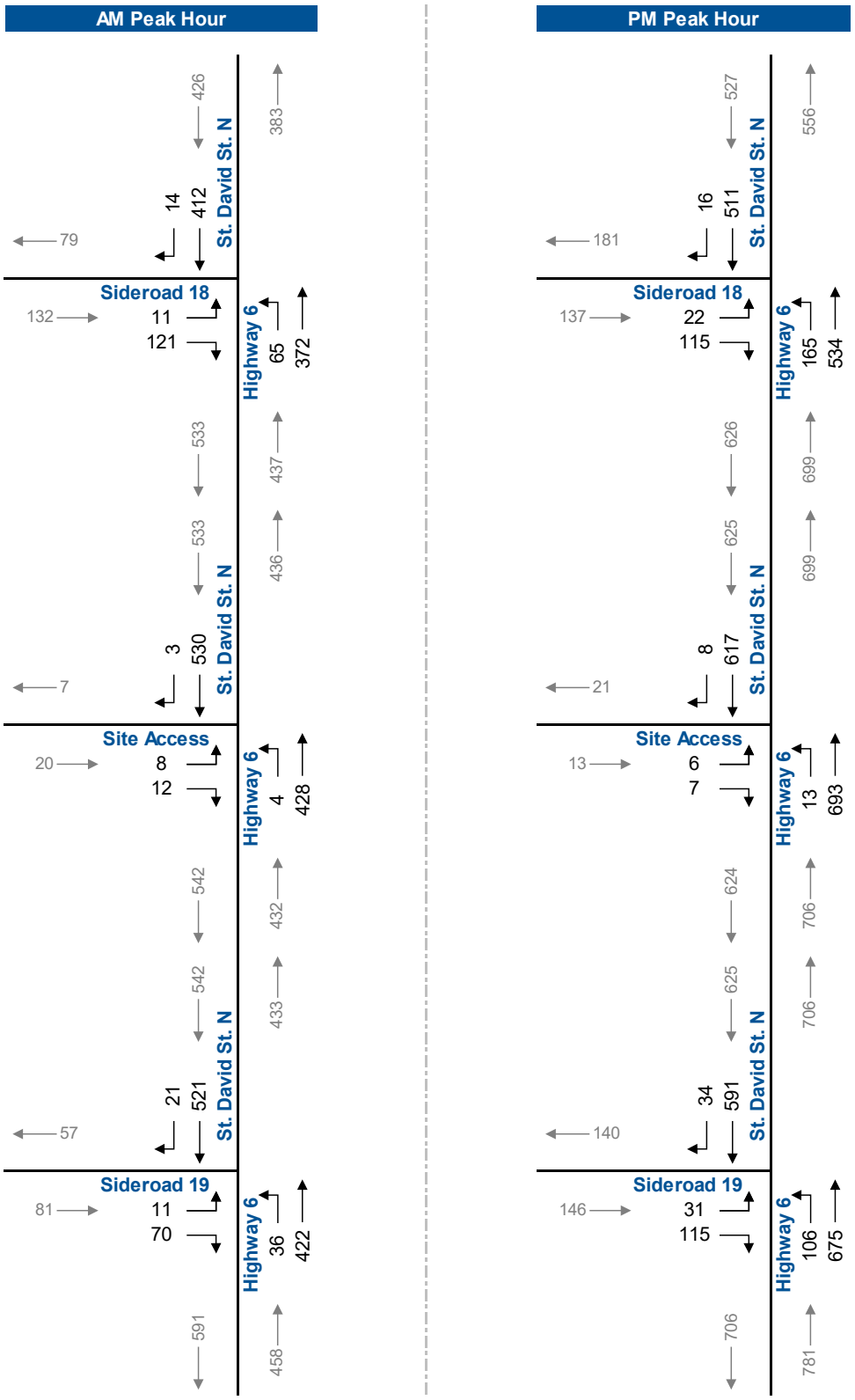
Figure 4.5



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2033 Total Traffic Volumes

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Figure 4.6

4.2 Forecast Traffic Operations

The study area intersection operations analysis for the future background and future total traffic forecast followed the same methodology used for existing conditions.

4.2.1 2023 Background Operations

Table 4.1 details the level of service conditions. The study area intersections are forecast to operate with acceptable levels of service with no specific problem movements during the weekday AM and PM peak hours.

Appendix E1 contains the supporting detailed Synchro 10 reports.

TABLE 4.1: 2023 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												
				Eastbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	12		>	**12**	8	0		**1**		0	>	**0**	**2**
			V/C	0.19		>		0.05	0.19				0.22	>		
			Q	6		>		1	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		109	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	13		>	**13**	9	0		**1**		0	>	**0**	**1**
			V/C	0.15		>		0.03	0.22				0.28	>		
			Q	4		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	17		>	**17**	9	0		**2**		0	>	**0**	**3**
			V/C	0.29		>		0.14	0.28				0.27	>		
			Q	10		>		4	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		106	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	22		>	**22**	9	0		**1**		0	>	**0**	**3**
			V/C	0.39		>		0.09	0.35				0.33	>		
			Q	14		>		3	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		28	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

4.2.2 2028 Background Operations

Table 4.2 details the level of service conditions. The study area intersections are forecast to operate with acceptable levels of service with no specific problem movements during the weekday AM and PM peak hours.

Appendix E2 contains the supporting detailed Synchro 10 reports.

TABLE 4.2: 2028 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												
				Eastbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	13		>	**13**	8	0		**1**		0	>	**0**	**2**
			V/C	0.23		>		0.06	0.21				0.25	>		
			Q	7		>		2	0				0	>		
			Ex	--		>		110	--				--	>		
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	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	9	0		**1**		0	>	**0**	**1**
			V/C	0.17		>		0.04	0.24				0.31	>		
			Q	5		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	20		>	**20**	9	0		**2**		0	>	**0**	**3**
			V/C	0.36		>		0.16	0.31				0.30	>		
			Q	13		>		5	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		106	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	D		>	**D**	A	A		**A**		A	>	**A**	**A**
			Delay	28		>	**28**	9	0		**1**		0	>	**0**	**3**
			V/C	0.48		>		0.11	0.38				0.36	>		
			Q	20		>		3	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		27	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

4.2.3 2033 Background Operations

Table 4.3 details the level of service conditions. The study area intersections are forecast to operate with acceptable levels of service with the following critical movements noted:

- The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.63 during the PM peak hour. The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.

Appendix E3 contains the supporting detailed Synchro 10 reports.

TABLE 4.3: 2033 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												
				Eastbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	9	0		**1**		0	>	**0**	**3**
			V/C	0.27		>		0.07	0.23				0.27	>		
			Q	9		>		2	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		108	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	15		>	**15**	9	0		**1**		0	>	**0**	**2**
			V/C	0.20		>		0.04	0.27				0.34	>		
			Q	6		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	25		>	**25**	10	0		**2**		0	>	**0**	**4**
			V/C	0.46		>		0.18	0.34				0.33	>		
			Q	18		>		5	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		105	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	E		>	**E**	A	A		**A**		A	>	**A**	**A**
			Delay	41		>	**41**	10	0		**1**		0	>	**0**	**5**
			V/C	0.63		>		0.12	0.42				0.40	>		
			Q	31		>		3	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		27	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

4.2.4 2023 Total Traffic Operations

Table 4.4 details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hour with no specific problem movements.

With the addition of the site generated traffic volumes, the overall intersection delays at the study area intersections does not increase from 2023 background conditions during the AM and PM peak hours.

Appendix F1 contains the supporting detailed Synchro 10 reports.

TABLE 4.4: 2023 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												Overall
				Eastbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	12		>	**12**	8	0		**1**		0	>	**0**	**2**
			V/C	0.19		>		0.05	0.20				0.22	>		
			Q	5		>		1	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		109	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	13		>	**13**	9	0		**1**		0	>	**0**	**1**
			V/C	0.15		>		0.03	0.22				0.29	>		
			Q	4		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	B		>	**B**	<	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	<	0		**0**		0	>	**0**	**0**
			V/C	0.05		>		<	0.00				0.28	>		
			Q	1		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	17		>	**17**	9	0		**2**		0	>	**0**	**3**
			V/C	0.30		>		0.14	0.28				0.28	>		
			Q	9		>		4	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		106	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	23		>	**23**	9	0		**1**		0	>	**0**	**3**
			V/C	0.39		>		0.09	0.36				0.33	>		
			Q	14		>		2	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		28	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	C		>	**C**	<	A		**A**		A	>	**A**	**A**
			Delay	17		>	**17**	<	0		**0**		0	>	**0**	**0**
			V/C	0.05		>		<	0.01				0.33	>		
			Q	1		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

4.2.5 2028 Total Traffic Operations

Table 4.5 details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hour with no specific problem movements.

With the addition of the site generated traffic volumes, the overall intersection delays at the study area intersections increase by one second or less from 2028 background conditions during the AM and PM peak hours.

Appendix F2 contains the supporting detailed Synchro 10 reports.

TABLE 4.5: 2028 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												Overall
				Eastbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	13		>	**13**	9	0		**1**		0	>	**0**	**2**
			V/C	0.23		>		0.06	0.22				0.25	>		
			Q	7		>		1	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		109	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	9	0		**1**		0	>	**0**	**1**
			V/C	0.18		>		0.04	0.24				0.32	>		
			Q	5		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	B		>	**B**	<	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	<	0		**0**		0	>	**0**	**0**
			V/C	0.05		>		<	0.00				0.31	>		
			Q	1		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	20		>	**20**	9	0		**2**		0	>	**0**	**3**
			V/C	0.37		>		0.16	0.31				0.31	>		
			Q	13		>		4	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		106	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	D		>	**D**	A	A		**A**		A	>	**A**	**A**
			Delay	28		>	**28**	9	0		**1**		0	>	**0**	**3**
			V/C	0.49		>		0.11	0.39				0.36	>		
			Q	19		>		3	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		27	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	C		>	**C**	<	A		**A**		A	>	**A**	**A**
			Delay	20		>	**20**	<	0		**0**		0	>	**0**	**0**
			V/C	0.06		>		<	0.01				0.36	>		**j2**
			Q	1		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

4.2.6 2033 Total Traffic Operations

Table 4.6 details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hour with the following critical movement noted:

- The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.65 during the PM peak hour. The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.

The above noted problem movement is present under the 2033 background horizon year and is not triggered by the addition of the site-generated traffic volumes.

With the addition of the site generated traffic volumes, the overall intersection delays at the study area intersections do not increase from 2033 background conditions during the AM and PM peak hours.

Appendix F3 contains the supporting detailed Synchro 10 reports.

TABLE 4.6: 2033 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach												Overall
				Eastbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	B		>	**B**	A	A		**A**		A	>	**A**	**A**
			Delay	14		>	**14**	9	0		**1**		0	>	**0**	**2**
			V/C	0.27		>		0.07	0.24				0.27	>		
			Q	8		>		2	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		108	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	C		>	**C**	A	A		**A**		A	>	**A**	**A**
			Delay	16		>	**16**	9	0		**1**		0	>	**0**	**2**
			V/C	0.21		>		0.04	0.27				0.35	>		
			Q	6		>		1	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		29	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	C		>	**C**	<	A		**A**		A	>	**A**	**A**
			Delay	16		>	**16**	<	0		**0**		0	>	**0**	**0**
			V/C	0.06		>		<	0.00				0.34	>		
			Q	2		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		
PM Peak Hour	St David Street North (Hwy 6) & Sideroad 18	TWSC	LOS	D		>	**D**	A	A		**A**		A	>	**A**	**A**
			Delay	26		>	**26**	10	0		**2**		0	>	**0**	**4**
			V/C	0.46		>		0.18	0.34				0.34	>		
			Q	18		>		5	0				0	>		
			Ex	--		>		110	--				--	>		
			Avail.	--		>		105	--				--	>		
	St David Street North (Hwy 6) & Sideroad 19	TWSC	LOS	E		>	**E**	A	A		**A**		A	>	**A**	**A**
			Delay	43		>	**43**	10	0		**1**		0	>	**0**	**5**
			V/C	0.65		>		0.13	0.43				0.40	>		
			Q	30		>		3	0				0	>		
			Ex	--		>		30	--				--	>		
			Avail.	--		>		27	--				--	>		
	St David Street North (Hwy 6) & Site Driveway	TWSC	LOS	C		>	**C**	<	A		**A**		A	>	**A**	**A**
			Delay	22		>	**22**	<	0		**0**		0	>	**0**	**0**
			V/C	0.07		>		<	0.02				0.40	>		
			Q	2		>		<	0				0	>		
			Ex	--		>		<	--				--	>		
			Avail.	--		>		<	--				--	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TWSC - Two-Way Stop Control
< - Shared Left-Turn
> - Shared Right-Turn

5 Remedial Measures

5.1 Left-Turn Lanes

The intersection of St. David Street North (Highway 6) and the proposed site driveway was assessed to determine if the projected traffic volumes warrant installation of left-turn lanes. The warrants for left-turn lanes follow the requirements in the Ministry of Transportation's (MTO) Geometric Design Standards[9]. A design speed of 80 km/h (20 km/h over the posted speed limit) was used for St. David Street North (Highway 6).

The percentages of left-turning vehicles in the approaching volume is 2% or less for all horizon years. The percentage of left-turning vehicles does not meet the minimum requirement of 5% for calculating a left-turn lane, based on the nomographs for 5% increments.

The proposed intersection of St. David Street North (Highway 6) and the site driveway is forecast to operate with very good level of service. The forecast left-turn volumes are generally very low and represent less than 1% of the future AM peak hour approaching traffic volume and less than 2% of the PM peak hour traffic volumes.

The proposed development is in a low-speed urban area with the northbound through traffic forecast to operate with excellent level of service without a left-turn lane.

5.2 Traffic Control Improvements

The traffic analysis in **Section 4** of the report indicates that traffic control improvements are not required to accommodate forecast traffic volumes. However, the minor street approaches at Sideroad 18 and Sideroad 19 are approaching capacity during the 2033 horizon year.

The intersections of St. David Street North (Highway 6) at Sideroad 18 and at Sideroad 19 were assessed using the Ontario Traffic Manual (OTM Book 12 – Justification 7) procedures[10]. **Appendix G** contains the detailed analysis. **Table 5.1** summarizes the results. It indicates that traffic control signals are not justified at the intersections of St. David Street North (Highway 6) at Sideroad 18 and St. David Street North at Sideroad 19 under 2033 horizon year.

[9] Design Supplement for TAC Geometric Design Guide for Canadian Roads, Ministry of Transportation Ontario, June 2017

[10] Ontario Traffic Manual Book 12, Ministry of Transportation of Ontario, July 2001.

TABLE 5.1: TRAFFIC SIGNAL WARRANT SUMMARY

St. David Street North (Highway 6)	Horizon Year	OTM Warrants				
		1A	1B	2A	2B	120%
Sideroad 18	2033 Total	81.8%	26.4%	72.5%	11.0%	No
Sideroad 19	2033 Total	91.5%	22.3%	83.6%	14.0%	No

As traffic volumes increase over time, actual traffic volumes may satisfy the minimum warrant criteria post 2033 horizon year. It is recommended that the MTO and Township of Centre Wellington monitor the future traffic volumes to ensure appropriate forms of traffic control are in place.

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 currently operating within acceptable levels of service and not critical movements during the AM and PM peak hours.
- **Development Trip Generation:** The residential development is forecast to generate approximately 27 and 34 trips during the AM and PM peak hours upon full build-out.
- **2023 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- **2023 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- The addition of the site generated traffic does not increase the overall delay at the study area intersections during the AM and PM peak hours.
- **2028 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- **2028 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service with no specific problem movements during the AM and PM peak hours.
- The addition of the site generated traffic increases the overall delay at the study area intersections by one second or less during the AM and PM peak hours.
- **2033 Background Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hours with the following critical movement noted:
  - The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.63 during the PM peak hour.

The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.

- **2033 Total Traffic Conditions:** The study area intersections are forecast to operate within acceptable levels of service during the AM and PM peak hours with the following critical movement noted:
  - The eastbound left/right-turn movement at St. David Street North and Sideroad 19 is forecast to operate with delays in the LOS E range and v/c ratio 0.65 during the PM peak hour. The v/c ratio indicates that while there is delay, there remains excess capacity for this movement.
- The addition of the site generated traffic does not increase the overall delay at the study area intersections during the AM and PM peak hours.
- **Remedial Measures:** A northbound left-turn lane on St. David Street North at the proposed site driveway is not warranted due to the forecast left-turn volumes being less than 2% of the advancing volumes during the AM and PM peak hours.
- Traffic control signals are not warranted under 2033 total traffic conditions at the St. David Street North (Highway 6) intersections with Sideroad 18 and Sideroad 19.

6.2 Recommendations

Based on the findings of this study, it is recommended that the development be approved with no requirement for off-site transportation improvements.

It is also recommended that the MTO and Township of Centre Wellington monitor the future traffic volumes to ensure appropriate forms of traffic control are in place at the intersections of St. David Street North at Sideroad 18 and St. David Street North at Sideroad 19.

Appendix A

Pre-Study Consultation

From:	Santos, Paul (MTO)
To:	Andrew Evans
Cc:	Erica Bayley; Hodgins, Allan (MTO)
Subject:	RE: (210066) 961 St. David Street North (Hwy 6), Fergus TIS Scope of Work
Date:	April 7, 2021 10:16:20 AM
Attachments:	image001.png

Hi Andrew,

The 2021 data is acceptable for use in the study. If you have any questions, please contact us

Regards,

Paul

Paul Santos
Senior Project Manager
Corridor Management Section
MTO West Operations Division, London.
Tel.: (226) 559-9113, Fax.:(519) 873-4228

From: Andrew Evans <aevans@ptsl.com>
Sent: April-05-21 9:08 AM
To: Santos, Paul (MTO) <Paul.Santos@ontario.ca>
Cc: Erica Bayley <ebayley@ptsl.com>
Subject: RE: (210066) 961 St. David Street North (Hwy 6), Fergus TIS Scope of Work

Hi Paul

As requested, please find attached our recent turning movement counts on Hwy 6 at Sideroad 18 and Sideroad 19 for Ministry review and approval.

Note that the recent turning movement counts were done with no lockdown restrictions in place. The AM peak hour is approximately 1% higher and the PM peak hour is 22% higher than then 2014 turning movement count at Sideroad 18.

Thank you and regards.

Andrew Evans, M.Sc.
Transportation Planner

Paradigm Transportation Solutions Limited
p: 905.381.2229 x **305**
m: 519.497.3239

From: Santos, Paul (MTO) <Paul.Santos@ontario.ca>
Sent: March 2, 2021 8:33 AM
To: Andrew Evans <aevans@ptsl.com>
Cc: Erica Bayley <ebayley@ptsl.com>; Luisa Vacondio <lvacondio@mhbcplan.com>; Pierre Chauvin <pchauvin@mhbcplan.com>; david@remaxcentre.ca; CBaker@centrewellington.ca; SRossi@centrewellington.ca; Hodgins, Allan (MTO) <Allan.Hodgins@ontario.ca>; Luker, Michele (MTO) <Michele.Luker@ontario.ca>
Subject: RE: (210066) 961 St. David Street North (Hwy 6), Fergus TIS Scope of Work

Hi Andrew,

We had not previously provided fulsome comments for this proposal because we were not prepared to support the proposed access/private road location on Highway 6. As noted, the proposed access does not meet the minimum intersection spacing requirements nor the existing frontage requirements on Highway 6 to support a severance that would intensify the use of one access point.

However, given the built-up nature of this section of Highway 6 and reduced posted speed, we will agree to review a Traffic Impact Study (TIS) in support of this access connection. Please see the TIS scope of work comments noted below in red font.

In light of the above, should the proposed access connection be supported by the TIS upon MTO review and approval, we offer the following additional comments regarding the proposed concept plan:

The proponents should be advised that given the high volumes of traffic for this area, the TIS may indicate that if a new access can be supported, a new left-turn-lane or other improvements may be required on Highway 6. The constrained highway right-of-way width may require additional property acquisition and/or utility relocations etc. by the proponent to facilitate the construction of these improvements.

Developer driven highway improvements such as new left-turn-lanes would require preliminary and detailed design, including pre-engineering activities such as undertaking an MTO Class EA, geotechnical reports etc. A legal agreement would be required whereby the proponent would assume financial responsibility for the design and construction of any highway improvements identified in the TIS.

Should the proposed access connection be supported by the TIS upon MTO review and approval, the proponents should also be aware of the following additional preliminary comments:

- The submission of a Stormwater Management Report will be required for review and approval to ensure that any post-development flows currently directed towards Highway 6 do not exceed pre-development levels.
- Daylighting triangles will be required on both sides of the proposed access to be dedicated as a highway widening.

- A 0.3m reserve may be required along the entire highway frontage to preclude any additional access in the future.
- All new buildings and structures integral to the development (including stormwater management facilities, parking areas, and septic beds etc.) must be set back a minimum of 14m from the Highway 6 property limit. As such, the proposed lots adjacent to the highway should be sized accordingly.
- The subject lands are within the MTO limits of permit control as defined in the *Public Transportation and Highway Improvement Act* (PTHIA). Permits are required from MTO prior to any construction, grading or other installations can take place, including signs.
- As a condition of MTO permits, applicants will be required to submit site plans, site-servicing plans, grading plans, drainage plans etc. for the proposed development to MTO for review and approval.

Additional comments will be provided upon review of a more detailed submission, should this proposal proceed through to the next stages of approval.

If you have any questions or concerns with any of the above, please contact us.

Regards,

Paul

Paul Santos
Senior Project Manager
Corridor Management Section
MTO West Operations Division, London.
Tel.: (226) 559-9113, Fax.:(519) 873-4228

From: Andrew Evans < aevans@ptsl.com >
Sent: February-24-21 1:21 PM
To: Santos, Paul (MTO) <Paul.Santos@ontario.ca>
Cc: Erica Bayley <ebayley@ptsl.com>
Subject: (210066) 961 St. David Street North (Hwy 6), Fergus TIS Scope of Work

Hi Paul

As noted in our meeting Paradigm was retained to undertake transportation engineering services for a proposed residential development at 961 St. David Street North (Hwy 6) in Fergus.

The property owner is proposed to construct 20 condominium single-detached units with vehicle access proposed via a single all-moves access to St. David Street North.

Below is our scope of work for your review and approval.

Study Area:

- St. David Street North and Side Road 18 (unsignalized);

- St. Davis Street North and Side Road 19 (unsignalized); and
- New site access connection to St. David Street North (assumed unsignalized).

Planning Horizons:

- Full Build-out year (Assumed 2023), Five years from full build-out (assumed Year 2028), and Ten years from full build-out (2032).

Analysis Periods:

- Weekday AM and PM peak hours.

Existing Traffic:

- Derived from Turning Movement Counts at study area intersections
- We will compare and adjust (if needed) to historic turning movement counts due to current pandemic
- The ministry does not have recent traffic volumes in the study area. The ministry will allow the use of data collected during the pandemic, as long as it is collected when full lockdown restrictions are in not place. The data to be used in this study needs to be pre-approved by the ministry. 2014 turning movement counts for the intersection of Hwy 6 – Nichol Twp Rd 18 are attached for reference only.

Background Traffic:

- A background growth rate consistent with Township studies. Use 1% Growth Rate.
- We will contact the Township for any background development to be included as future background traffic.

Site Generated Traffic:

- ITE Trip Generation Manual (10^{th} Edition) Use number of units as the independent variable and the fitted equation to calculate the trip generation.
- Trip Distribution based on Existing Traffic Patterns and/or TTS

Traffic Analysis

- We will analyze the operation of the study area intersections for the Existing, Future Background (without the development) and Future Total (with the development) traffic conditions for each analysis period using Synchro v10 software. Volume to capacity (v/c) rations, Level of Service (LOS) and 95^{th} percentile queueing will be assessed.
- Based on the analysis results, we will identify any operational deficiencies as well as the net impact of the proposed development on the study area road network. The need for road improvements (e.g. auxiliary turn lanes) and/or other mitigating measures (e.g. traffic control device modifications) to address deficiencies (if any) will be determined. A sensitivity analysis will be conducted to determine what increase in traffic can be accommodated before network improvements are warranted. We will asses whether these measures are

required due to non-site traffic (i.e. Existing for Future Background) or the increase in volumes resulting from the proposed development.
- We will access the potential impact and requirements for the site for non-auto modes of transportation. This will include identifying existing and planned transit, walking, and cycling routes and facilities that would enhance connectivity both within the subdivision and with the rest of the municipality for these modes.
- When evaluating impacts at intersections please refer to the TAC's Geometric Design Guide for Canadian Roads, MTO Design Supplement for TAC's Geometric Design Guide for Canadian Roads and the OTM Books.
- Submit digital Synchro files
- Design speed: 20 km/h above the posted speed limit

Access and Circulation Review

- To ensure compliance of the proposed development plan with Township requirements and industry guidelines using AutoTURN on a suitable design vehicle (e.g. fire truck, garbage truck).

Thank you and regards.

Andrew Evans, M.Sc.
Transportation Planner

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road Cambridge ON N1R 8J8
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Appendix B

Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021

Turning Movement Data

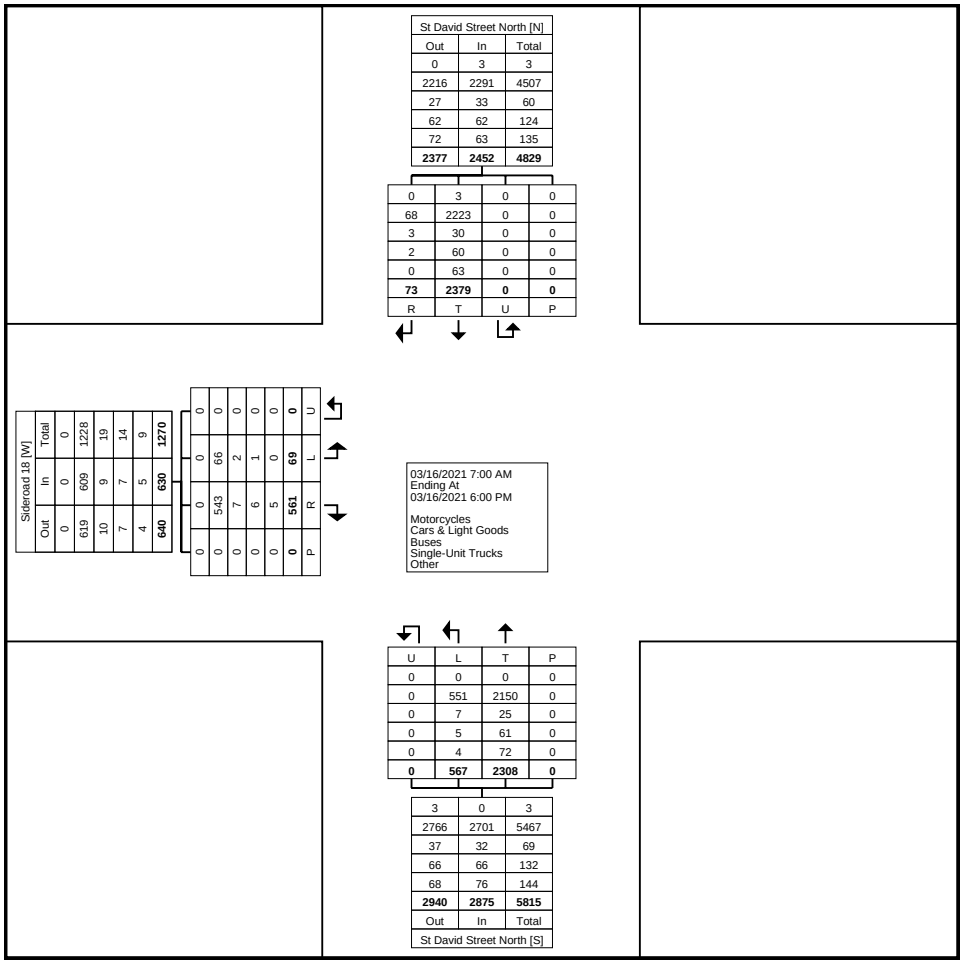
Start Time	Sideroad 18 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	1	15	0	0	16	3	48	0	0	51	60	2	0	0	62	129
7:15 AM	4	14	0	0	18	11	69	0	0	80	56	2	0	0	58	156
7:30 AM	1	21	0	0	22	10	87	0	0	97	91	5	0	0	96	215
7:45 AM	2	17	0	0	19	10	68	0	0	78	76	1	0	0	77	174
Hourly Total	8	67	0	0	75	34	272	0	0	306	283	10	0	0	293	674
8:00 AM	5	26	0	0	31	19	72	0	0	91	73	1	0	0	74	196
8:15 AM	1	28	0	0	29	10	52	0	0	62	81	4	0	0	85	176
8:30 AM	1	33	0	0	34	26	37	0	0	63	79	4	0	0	83	180
8:45 AM	1	17	0	0	18	17	49	0	0	66	89	3	0	0	92	176
Hourly Total	8	104	0	0	112	72	210	0	0	282	322	12	0	0	334	728
9:00 AM	0	21	0	0	21	23	49	0	0	72	67	1	0	0	68	161
9:15 AM	3	6	0	0	9	10	54	0	0	64	66	1	0	0	67	140
9:30 AM	0	9	0	0	9	4	62	0	0	66	65	0	0	0	65	140
9:45 AM	2	12	0	0	14	13	49	0	0	62	83	0	0	0	83	159
Hourly Total	5	48	0	0	53	50	214	0	0	264	281	2	0	0	283	600
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM	0	11	0	0	11	19	61	0	0	80	48	2	0	0	50	141
12:15 PM	3	23	0	0	26	19	67	0	0	86	51	2	0	0	53	165
12:30 PM	0	18	0	0	18	11	62	0	0	73	77	0	0	0	77	168
12:45 PM	3	22	0	0	25	26	58	0	0	84	57	1	0	0	58	167
Hourly Total	6	74	0	0	80	75	248	0	0	323	233	5	0	0	238	641
1:00 PM	0	12	0	0	12	15	59	0	0	74	72	0	0	0	72	158
1:15 PM	1	12	0	0	13	3	65	0	0	68	55	3	0	0	58	139
1:30 PM	2	12	0	0	14	9	54	0	0	63	50	0	0	0	50	127
1:45 PM	1	11	0	0	12	17	49	0	0	66	72	3	0	0	75	153
Hourly Total	4	47	0	0	51	44	227	0	0	271	249	6	0	0	255	577
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	3	16	0	0	19	10	75	0	0	85	82	2	0	0	84	188
3:15 PM	1	16	0	0	17	20	86	0	0	106	85	3	0	0	88	211
3:30 PM	4	15	0	0	19	14	97	0	0	111	87	0	0	0	87	217
3:45 PM	3	21	0	0	24	29	87	0	0	116	106	6	0	0	112	252
Hourly Total	11	68	0	0	79	73	345	0	0	418	360	11	0	0	371	868
4:00 PM	2	15	0	0	17	28	118	0	0	146	98	3	0	0	101	264
4:15 PM	2	24	0	0	26	35	88	0	0	123	72	1	0	0	73	222
4:30 PM	10	23	0	0	33	31	109	0	0	140	90	3	0	0	93	266
4:45 PM	4	27	0	0	31	27	90	0	0	117	76	4	0	0	80	228

Hourly Total	18	89	0	0	107	121	405	0	0	526	336	11	0	0	347	980
5:00 PM	2	19	0	0	21	25	119	0	0	144	87	2	0	0	89	254
5:15 PM	4	20	0	0	24	25	100	0	0	125	90	7	0	0	97	246
5:30 PM	1	13	0	0	14	24	86	0	0	110	74	1	0	0	75	199
5:45 PM	2	12	0	0	14	24	82	0	0	106	64	6	0	0	70	190
Hourly Total	9	64	0	0	73	98	387	0	0	485	315	16	0	0	331	889
Grand Total	69	561	0	0	630	567	2308	0	0	2875	2379	73	0	0	2452	5957
Approach %	11.0	89.0	0.0	-	-	19.7	80.3	0.0	-	-	97.0	3.0	0.0	-	-	-
Total %	1.2	9.4	0.0	-	10.6	9.5	38.7	0.0	-	48.3	39.9	1.2	0.0	-	41.2	-
Motorcycles	0	0	0	-	0	0	0	0	-	0	3	0	0	-	3	3
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1	0.0	-	-	0.1	0.1
Cars & Light Goods	66	543	0	-	609	551	2150	0	-	2701	2223	68	0	-	2291	5601
% Cars & Light Goods	95.7	96.8	-	-	96.7	97.2	93.2	-	-	93.9	93.4	93.2	-	-	93.4	94.0
Buses	2	7	0	-	9	7	25	0	-	32	30	3	0	-	33	74
% Buses	2.9	1.2	-	-	1.4	1.2	1.1	-	-	1.1	1.3	4.1	-	-	1.3	1.2
Single-Unit Trucks	1	6	0	-	7	5	61	0	-	66	60	2	0	-	62	135
% Single-Unit Trucks	1.4	1.1	-	-	1.1	0.9	2.6	-	-	2.3	2.5	2.7	-	-	2.5	2.3
Articulated Trucks	0	2	0	-	2	2	72	0	-	74	63	0	0	-	63	139
% Articulated Trucks	0.0	0.4	-	-	0.3	0.4	3.1	-	-	2.6	2.6	0.0	-	-	2.6	2.3
Bicycles on Road	0	3	0	-	3	2	0	0	-	2	0	0	0	-	0	5
% Bicycles on Road	0.0	0.5	-	-	0.5	0.4	0.0	-	-	0.1	0.0	0.0	-	-	0.0	0.1
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: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021



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: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021

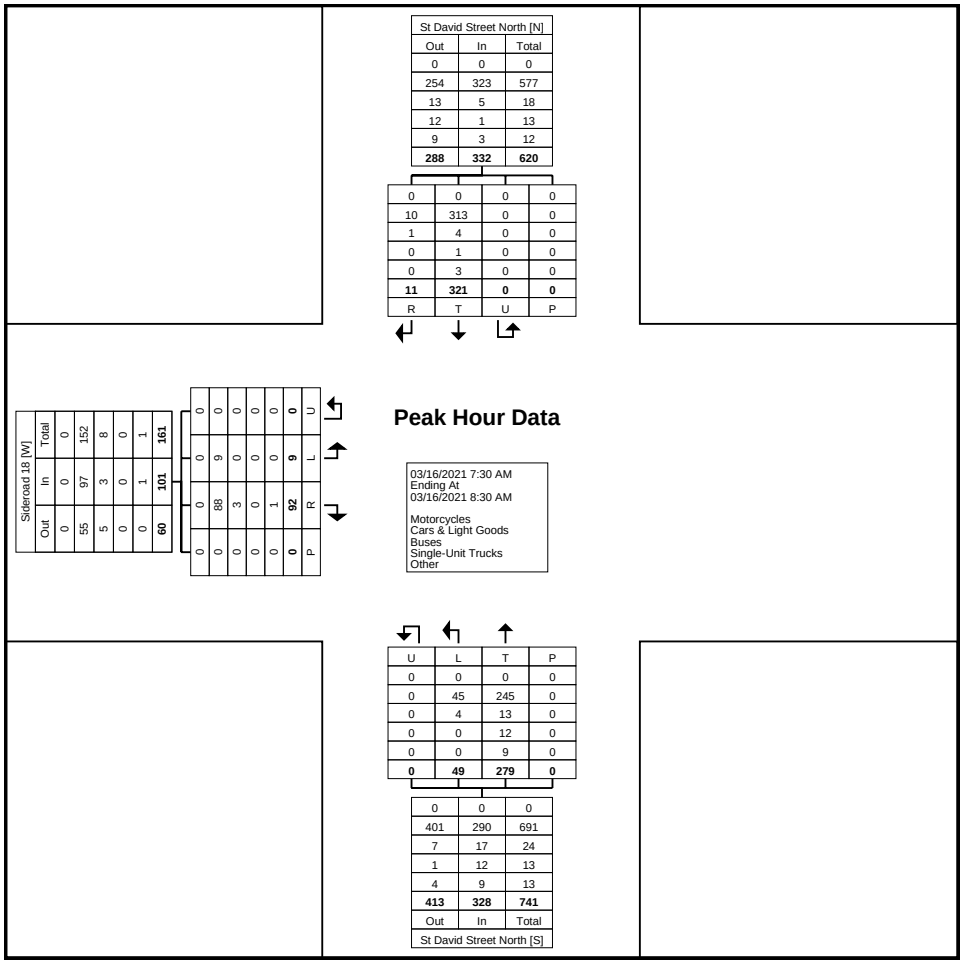
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Sideroad 18 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	1	21	0	0	22	10	87	0	0	97	91	5	0	0	96	215
7:45 AM	2	17	0	0	19	10	68	0	0	78	76	1	0	0	77	174
8:00 AM	5	26	0	0	31	19	72	0	0	91	73	1	0	0	74	196
8:15 AM	1	28	0	0	29	10	52	0	0	62	81	4	0	0	85	176
Total	9	92	0	0	101	49	279	0	0	328	321	11	0	0	332	761
Approach %	8.9	91.1	0.0	-	-	14.9	85.1	0.0	-	-	96.7	3.3	0.0	-	-	-
Total %	1.2	12.1	0.0	-	13.3	6.4	36.7	0.0	-	43.1	42.2	1.4	0.0	-	43.6	-
PHF	0.450	0.821	0.000	-	0.815	0.645	0.802	0.000	-	0.845	0.882	0.550	0.000	-	0.865	0.885
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	9	88	0	-	97	45	245	0	-	290	313	10	0	-	323	710
% Cars & Light Goods	100.0	95.7	-	-	96.0	91.8	87.8	-	-	88.4	97.5	90.9	-	-	97.3	93.3
Buses	0	3	0	-	3	4	13	0	-	17	4	1	0	-	5	25
% Buses	0.0	3.3	-	-	3.0	8.2	4.7	-	-	5.2	1.2	9.1	-	-	1.5	3.3
Single-Unit Trucks	0	0	0	-	0	0	12	0	-	12	1	0	0	-	1	13
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	4.3	-	-	3.7	0.3	0.0	-	-	0.3	1.7
Articulated Trucks	0	1	0	-	1	0	9	0	-	9	3	0	0	-	3	13
% Articulated Trucks	0.0	1.1	-	-	1.0	0.0	3.2	-	-	2.7	0.9	0.0	-	-	0.9	1.7
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
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: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021



Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Sideroad 18 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
12:15 PM	3	23	0	0	26	19	67	0	0	86	51	2	0	0	53	165
12:30 PM	0	18	0	0	18	11	62	0	0	73	77	0	0	0	77	168
12:45 PM	3	22	0	0	25	26	58	0	0	84	57	1	0	0	58	167
1:00 PM	0	12	0	0	12	15	59	0	0	74	72	0	0	0	72	158
Total	6	75	0	0	81	71	246	0	0	317	257	3	0	0	260	658
Approach %	7.4	92.6	0.0	-	-	22.4	77.6	0.0	-	-	98.8	1.2	0.0	-	-	-
Total %	0.9	11.4	0.0	-	12.3	10.8	37.4	0.0	-	48.2	39.1	0.5	0.0	-	39.5	-
PHF	0.500	0.815	0.000	-	0.779	0.683	0.918	0.000	-	0.922	0.834	0.375	0.000	-	0.844	0.979
Motorcycles	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.4	0.0	-	-	0.4	0.2
Cars & Light Goods	6	71	0	-	77	69	225	0	-	294	236	2	0	-	238	609
% Cars & Light Goods	100.0	94.7	-	-	95.1	97.2	91.5	-	-	92.7	91.8	66.7	-	-	91.5	92.6
Buses	0	0	0	-	0	0	0	0	-	0	2	0	0	-	2	2
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.8	0.0	-	-	0.8	0.3
Single-Unit Trucks	0	2	0	-	2	0	7	0	-	7	10	1	0	-	11	20
% Single-Unit Trucks	0.0	2.7	-	-	2.5	0.0	2.8	-	-	2.2	3.9	33.3	-	-	4.2	3.0
Articulated Trucks	0	0	0	-	0	0	14	0	-	14	8	0	0	-	8	22
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	5.7	-	-	4.4	3.1	0.0	-	-	3.1	3.3
Bicycles on Road	0	2	0	-	2	2	0	0	-	2	0	0	0	-	0	4
% Bicycles on Road	0.0	2.7	-	-	2.5	2.8	0.0	-	-	0.6	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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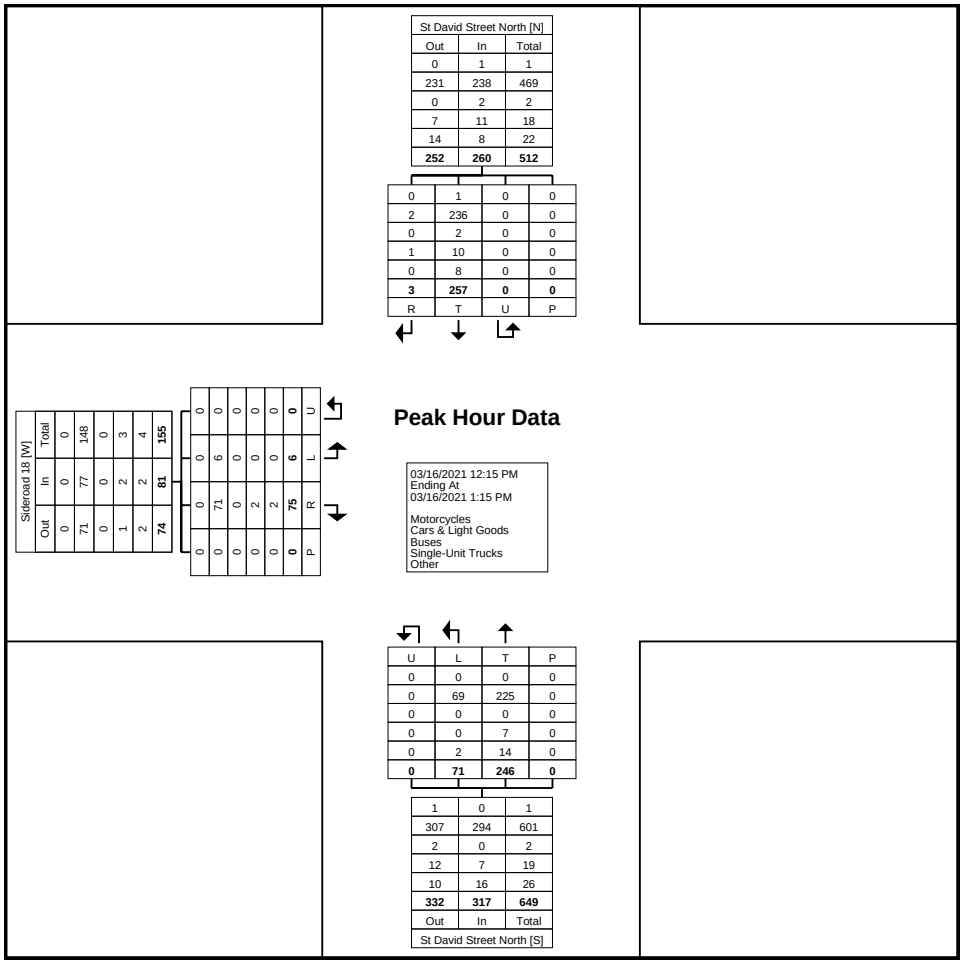
Count Name: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021

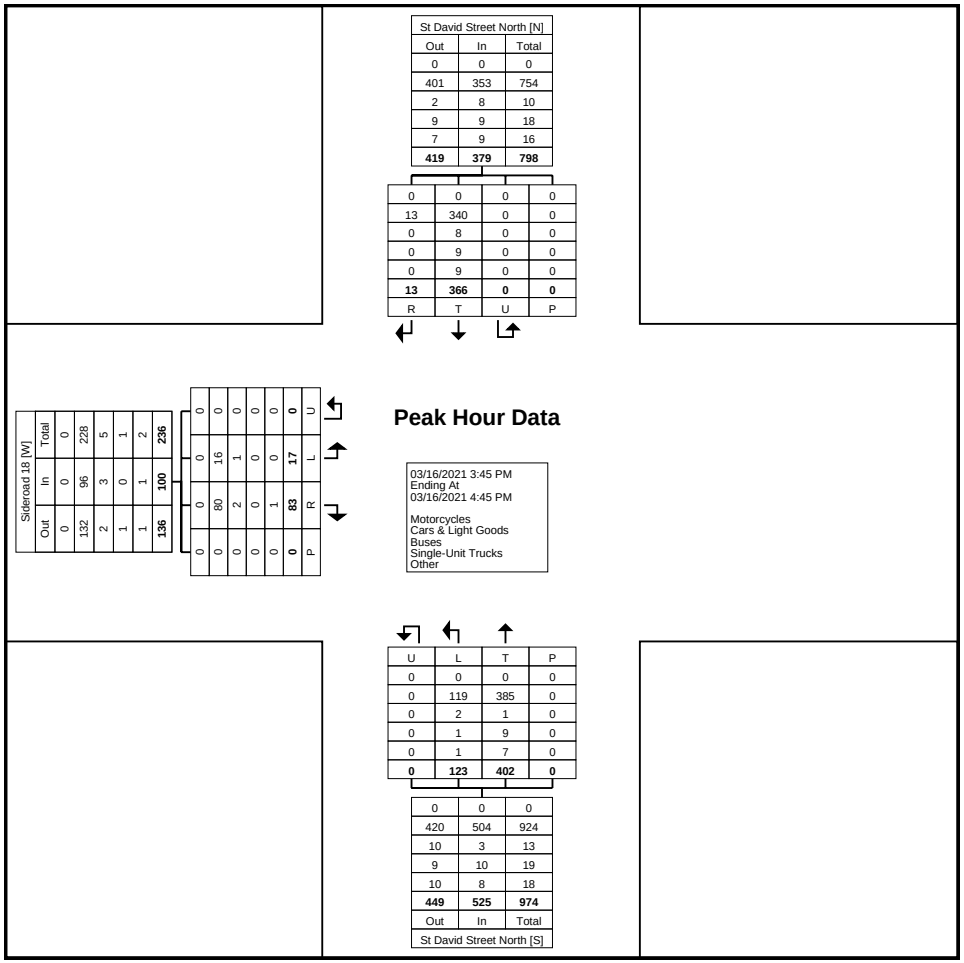
Turning Movement Peak Hour Data (3:45 PM)

Start Time	Sideroad 18 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
3:45 PM	3	21	0	0	24	29	87	0	0	116	106	6	0	0	112	252
4:00 PM	2	15	0	0	17	28	118	0	0	146	98	3	0	0	101	264
4:15 PM	2	24	0	0	26	35	88	0	0	123	72	1	0	0	73	222
4:30 PM	10	23	0	0	33	31	109	0	0	140	90	3	0	0	93	266
Total	17	83	0	0	100	123	402	0	0	525	366	13	0	0	379	1004
Approach %	17.0	83.0	0.0	-	-	23.4	76.6	0.0	-	-	96.6	3.4	0.0	-	-	-
Total %	1.7	8.3	0.0	-	10.0	12.3	40.0	0.0	-	52.3	36.5	1.3	0.0	-	37.7	-
PHF	0.425	0.865	0.000	-	0.758	0.879	0.852	0.000	-	0.899	0.863	0.542	0.000	-	0.846	0.944
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	16	80	0	-	96	119	385	0	-	504	340	13	0	-	353	953
% Cars & Light Goods	94.1	96.4	-	-	96.0	96.7	95.8	-	-	96.0	92.9	100.0	-	-	93.1	94.9
Buses	1	2	0	-	3	2	1	0	-	3	8	0	0	-	8	14
% Buses	5.9	2.4	-	-	3.0	1.6	0.2	-	-	0.6	2.2	0.0	-	-	2.1	1.4
Single-Unit Trucks	0	0	0	-	0	1	9	0	-	10	9	0	0	-	9	19
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.8	2.2	-	-	1.9	2.5	0.0	-	-	2.4	1.9
Articulated Trucks	0	0	0	-	0	1	7	0	-	8	9	0	0	-	9	17
% Articulated Trucks	0.0	0.0	-	-	0.0	0.8	1.7	-	-	1.5	2.5	0.0	-	-	2.4	1.7
Bicycles on Road	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Bicycles on Road	0.0	1.2	-	-	1.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1
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: St David Street North & Sideroad 18
Site Code: 210066
Start Date: 03/16/2021



Turning Movement Peak Hour Data Plot (3:45 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021

Turning Movement Data

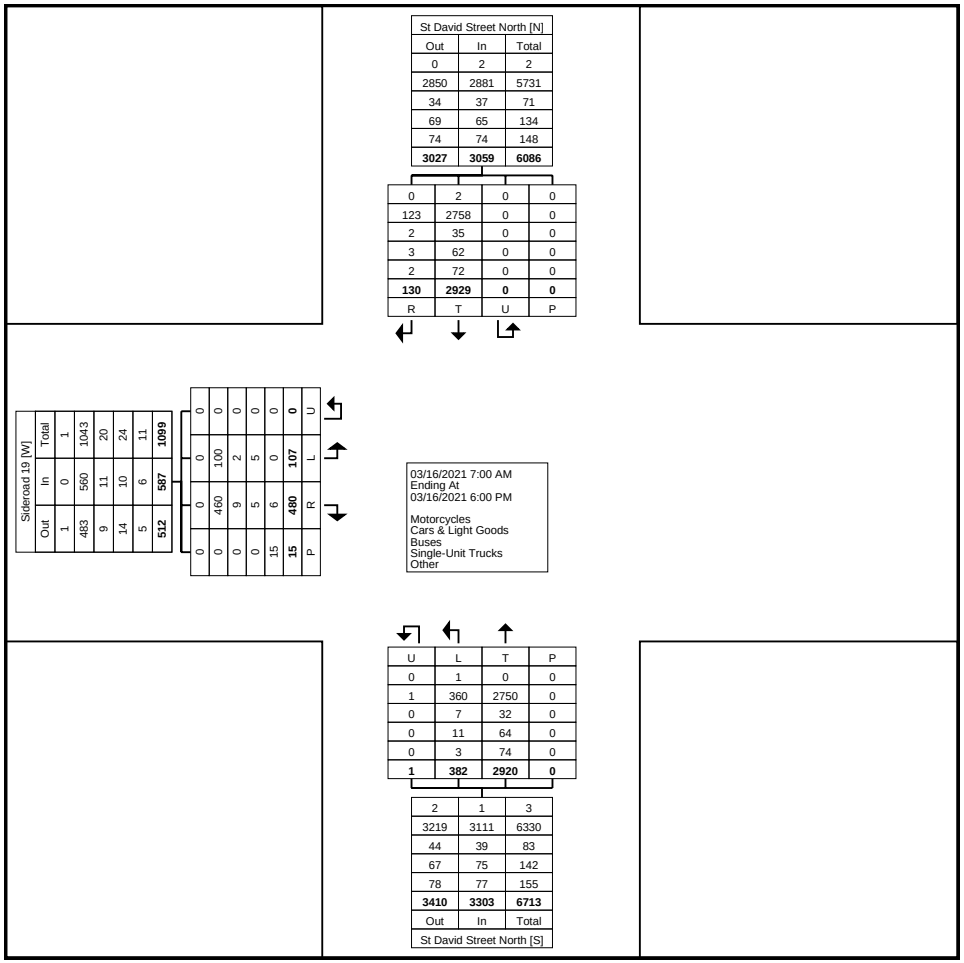
Start Time	Sideroad 19 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	1	7	0	0	8	7	60	0	0	67	76	0	0	0	76	151
7:15 AM	0	10	0	0	10	4	75	0	0	79	67	0	0	0	67	156
7:30 AM	0	10	0	0	10	4	95	0	0	99	107	1	0	0	108	217
7:45 AM	0	11	0	2	11	6	78	0	0	84	90	2	0	0	92	187
Hourly Total	1	38	0	2	39	21	308	0	0	329	340	3	0	0	343	711
8:00 AM	1	15	0	0	16	7	92	1	0	100	97	5	0	0	102	218
8:15 AM	4	12	0	0	16	10	63	0	0	73	104	7	0	0	111	200
8:30 AM	1	13	0	0	14	5	65	0	0	70	114	3	0	0	117	201
8:45 AM	0	11	0	0	11	14	71	0	0	85	102	4	0	0	106	202
Hourly Total	6	51	0	0	57	36	291	1	0	328	417	19	0	0	436	821
9:00 AM	3	16	0	0	19	11	73	0	0	84	88	1	0	0	89	192
9:15 AM	1	9	0	0	10	4	66	0	0	70	74	0	0	0	74	154
9:30 AM	3	10	0	0	13	11	70	0	0	81	65	5	0	0	70	164
9:45 AM	1	11	0	0	12	7	64	0	0	71	88	6	0	0	94	177
Hourly Total	8	46	0	0	54	33	273	0	0	306	315	12	0	0	327	687
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM	6	20	0	0	26	10	83	0	0	93	66	2	0	0	68	187
12:15 PM	4	12	0	0	16	14	91	0	0	105	76	5	0	0	81	202
12:30 PM	1	13	0	0	14	9	83	0	0	92	99	6	0	0	105	211
12:45 PM	1	11	0	1	12	12	91	0	0	103	88	4	0	0	92	207
Hourly Total	12	56	0	1	68	45	348	0	0	393	329	17	0	0	346	807
1:00 PM	4	12	0	0	16	13	78	0	0	91	83	5	0	0	88	195
1:15 PM	3	17	0	0	20	17	74	0	0	91	66	5	0	0	71	182
1:30 PM	4	18	0	0	22	10	69	0	0	79	70	4	0	0	74	175
1:45 PM	2	14	0	2	16	9	74	0	0	83	85	5	0	0	90	189
Hourly Total	13	61	0	2	74	49	295	0	0	344	304	19	0	0	323	741
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	8	19	0	0	27	15	87	0	0	102	99	5	0	0	104	233
3:15 PM	9	18	0	2	27	15	100	0	0	115	109	3	0	0	112	254
3:30 PM	2	20	0	0	22	16	116	0	0	132	102	4	0	0	106	260
3:45 PM	5	19	0	1	24	20	117	0	0	137	136	10	0	0	146	307
Hourly Total	24	76	0	3	100	66	420	0	0	486	446	22	0	0	468	1054
4:00 PM	4	23	0	1	27	22	146	0	0	168	115	4	0	0	119	314
4:15 PM	6	23	0	2	29	18	120	0	0	138	89	8	0	0	97	264
4:30 PM	7	22	0	1	29	17	136	0	0	153	119	1	0	0	120	302
4:45 PM	5	27	0	0	32	22	115	0	0	137	84	7	0	0	91	260

Hourly Total	22	95	0	4	117	79	517	0	0	596	407	20	0	0	427	1140
5:00 PM	2	12	0	1	14	10	148	0	0	158	111	6	0	0	117	289
5:15 PM	9	19	0	1	28	15	118	0	0	133	108	6	0	0	114	275
5:30 PM	8	16	0	1	24	11	96	0	0	107	80	3	0	0	83	214
5:45 PM	2	10	0	0	12	17	106	0	0	123	72	3	0	0	75	210
Hourly Total	21	57	0	3	78	53	468	0	0	521	371	18	0	0	389	988
Grand Total	107	480	0	15	587	382	2920	1	0	3303	2929	130	0	0	3059	6949
Approach %	18.2	81.8	0.0	-	-	11.6	88.4	0.0	-	-	95.8	4.2	0.0	-	-	-
Total %	1.5	6.9	0.0	-	8.4	5.5	42.0	0.0	-	47.5	42.1	1.9	0.0	-	44.0	-
Motorcycles	0	0	0	-	0	1	0	0	-	1	2	0	0	-	2	3
% Motorcycles	0.0	0.0	-	-	0.0	0.3	0.0	0.0	-	0.0	0.1	0.0	-	-	0.1	0.0
Cars & Light Goods	100	460	0	-	560	360	2750	1	-	3111	2758	123	0	-	2881	6552
% Cars & Light Goods	93.5	95.8	-	-	95.4	94.2	94.2	100.0	-	94.2	94.2	94.6	-	-	94.2	94.3
Buses	2	9	0	-	11	7	32	0	-	39	35	2	0	-	37	87
% Buses	1.9	1.9	-	-	1.9	1.8	1.1	0.0	-	1.2	1.2	1.5	-	-	1.2	1.3
Single-Unit Trucks	5	5	0	-	10	11	64	0	-	75	62	3	0	-	65	150
% Single-Unit Trucks	4.7	1.0	-	-	1.7	2.9	2.2	0.0	-	2.3	2.1	2.3	-	-	2.1	2.2
Articulated Trucks	0	6	0	-	6	3	73	0	-	76	71	2	0	-	73	155
% Articulated Trucks	0.0	1.3	-	-	1.0	0.8	2.5	0.0	-	2.3	2.4	1.5	-	-	2.4	2.2
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	1	0	0	-	1	2
% 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	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	15	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021



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: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021

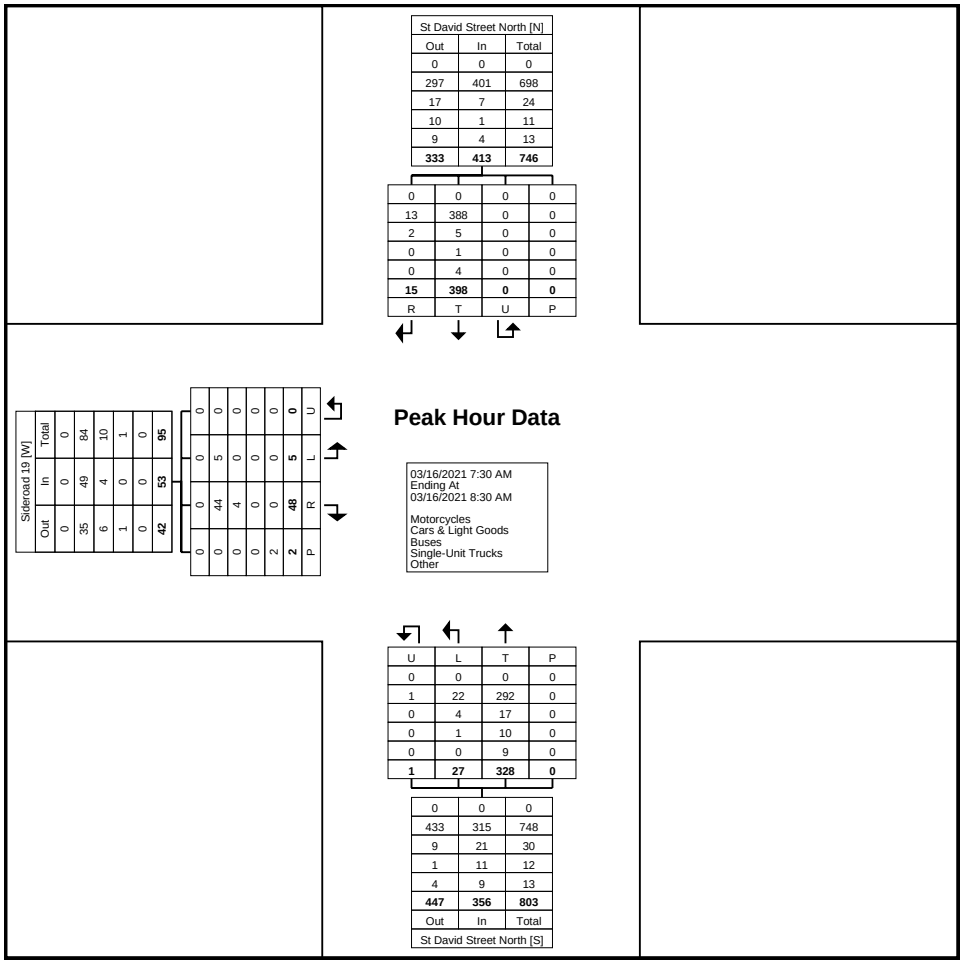
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Sideroad 19 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	0	10	0	0	10	4	95	0	0	99	107	1	0	0	108	217
7:45 AM	0	11	0	2	11	6	78	0	0	84	90	2	0	0	92	187
8:00 AM	1	15	0	0	16	7	92	1	0	100	97	5	0	0	102	218
8:15 AM	4	12	0	0	16	10	63	0	0	73	104	7	0	0	111	200
Total	5	48	0	2	53	27	328	1	0	356	398	15	0	0	413	822
Approach %	9.4	90.6	0.0	-	-	7.6	92.1	0.3	-	-	96.4	3.6	0.0	-	-	-
Total %	0.6	5.8	0.0	-	6.4	3.3	39.9	0.1	-	43.3	48.4	1.8	0.0	-	50.2	-
PHF	0.313	0.800	0.000	-	0.828	0.675	0.863	0.250	-	0.890	0.930	0.536	0.000	-	0.930	0.943
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	5	44	0	-	49	22	292	1	-	315	388	13	0	-	401	765
% Cars & Light Goods	100.0	91.7	-	-	92.5	81.5	89.0	100.0	-	88.5	97.5	86.7	-	-	97.1	93.1
Buses	0	4	0	-	4	4	17	0	-	21	5	2	0	-	7	32
% Buses	0.0	8.3	-	-	7.5	14.8	5.2	0.0	-	5.9	1.3	13.3	-	-	1.7	3.9
Single-Unit Trucks	0	0	0	-	0	1	10	0	-	11	1	0	0	-	1	12
% Single-Unit Trucks	0.0	0.0	-	-	0.0	3.7	3.0	0.0	-	3.1	0.3	0.0	-	-	0.2	1.5
Articulated Trucks	0	0	0	-	0	0	9	0	-	9	4	0	0	-	4	13
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	2.7	0.0	-	2.5	1.0	0.0	-	-	1.0	1.6
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	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021



Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021

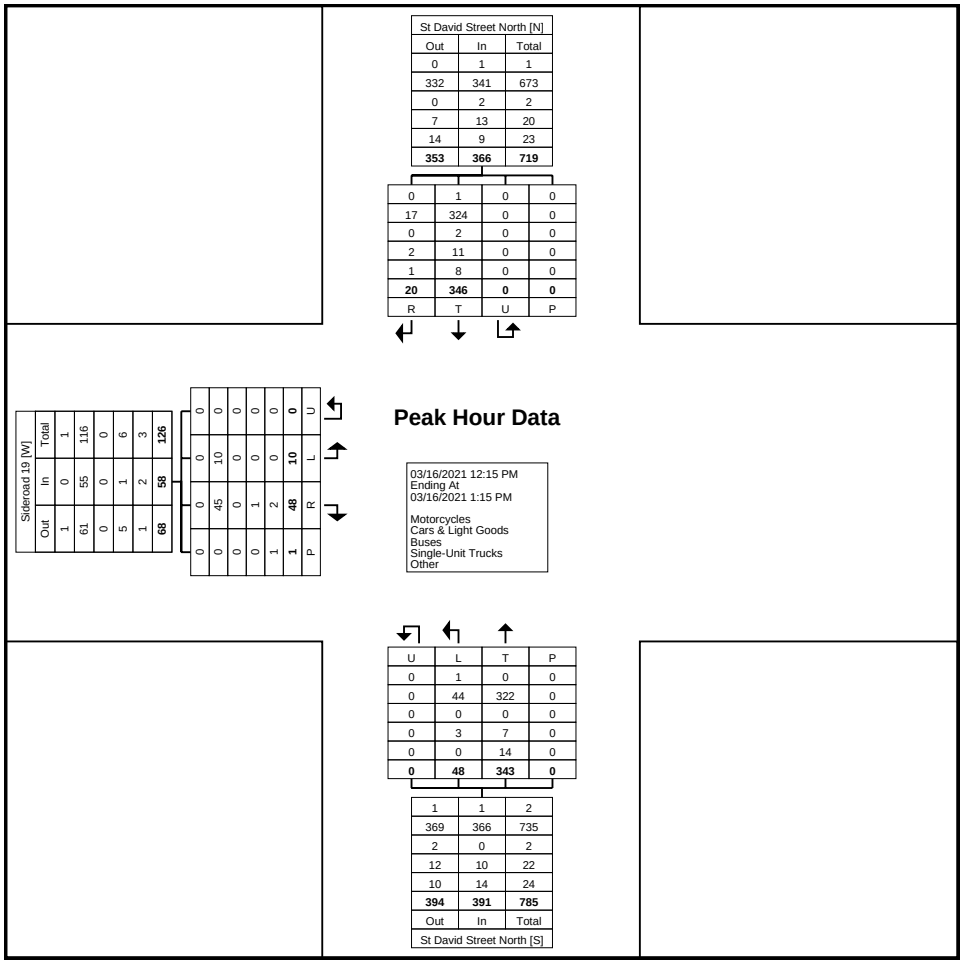
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Sideroad 19 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
12:15 PM	4	12	0	0	16	14	91	0	0	105	76	5	0	0	81	202
12:30 PM	1	13	0	0	14	9	83	0	0	92	99	6	0	0	105	211
12:45 PM	1	11	0	1	12	12	91	0	0	103	88	4	0	0	92	207
1:00 PM	4	12	0	0	16	13	78	0	0	91	83	5	0	0	88	195
Total	10	48	0	1	58	48	343	0	0	391	346	20	0	0	366	815
Approach %	17.2	82.8	0.0	-	-	12.3	87.7	0.0	-	-	94.5	5.5	0.0	-	-	-
Total %	1.2	5.9	0.0	-	7.1	5.9	42.1	0.0	-	48.0	42.5	2.5	0.0	-	44.9	-
PHF	0.625	0.923	0.000	-	0.906	0.857	0.942	0.000	-	0.931	0.874	0.833	0.000	-	0.871	0.966
Motorcycles	0	0	0	-	0	1	0	0	-	1	1	0	0	-	1	2
% Motorcycles	0.0	0.0	-	-	0.0	2.1	0.0	-	-	0.3	0.3	0.0	-	-	0.3	0.2
Cars & Light Goods	10	45	0	-	55	44	322	0	-	366	324	17	0	-	341	762
% Cars & Light Goods	100.0	93.8	-	-	94.8	91.7	93.9	-	-	93.6	93.6	85.0	-	-	93.2	93.5
Buses	0	0	0	-	0	0	0	0	-	0	2	0	0	-	2	2
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.6	0.0	-	-	0.5	0.2
Single-Unit Trucks	0	1	0	-	1	3	7	0	-	10	11	2	0	-	13	24
% Single-Unit Trucks	0.0	2.1	-	-	1.7	6.3	2.0	-	-	2.6	3.2	10.0	-	-	3.6	2.9
Articulated Trucks	0	2	0	-	2	0	14	0	-	14	8	1	0	-	9	25
% Articulated Trucks	0.0	4.2	-	-	3.4	0.0	4.1	-	-	3.6	2.3	5.0	-	-	2.5	3.1
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	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021

Turning Movement Peak Hour Data (3:45 PM)

Start Time	Sideroad 19 Eastbound					St David Street North Northbound					St David Street North Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
3:45 PM	5	19	0	1	24	20	117	0	0	137	136	10	0	0	146	307
4:00 PM	4	23	0	1	27	22	146	0	0	168	115	4	0	0	119	314
4:15 PM	6	23	0	2	29	18	120	0	0	138	89	8	0	0	97	264
4:30 PM	7	22	0	1	29	17	136	0	0	153	119	1	0	0	120	302
Total	22	87	0	5	109	77	519	0	0	596	459	23	0	0	482	1187
Approach %	20.2	79.8	0.0	-	-	12.9	87.1	0.0	-	-	95.2	4.8	0.0	-	-	-
Total %	1.9	7.3	0.0	-	9.2	6.5	43.7	0.0	-	50.2	38.7	1.9	0.0	-	40.6	-
PHF	0.786	0.946	0.000	-	0.940	0.875	0.889	0.000	-	0.887	0.844	0.575	0.000	-	0.825	0.945
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	19	85	0	-	104	77	500	0	-	577	429	23	0	-	452	1133
% Cars & Light Goods	86.4	97.7	-	-	95.4	100.0	96.3	-	-	96.8	93.5	100.0	-	-	93.8	95.5
Buses	2	1	0	-	3	0	1	0	-	1	9	0	0	-	9	13
% Buses	9.1	1.1	-	-	2.8	0.0	0.2	-	-	0.2	2.0	0.0	-	-	1.9	1.1
Single-Unit Trucks	1	0	0	-	1	0	11	0	-	11	12	0	0	-	12	24
% Single-Unit Trucks	4.5	0.0	-	-	0.9	0.0	2.1	-	-	1.8	2.6	0.0	-	-	2.5	2.0
Articulated Trucks	0	1	0	-	1	0	7	0	-	7	9	0	0	-	9	17
% Articulated Trucks	0.0	1.1	-	-	0.9	0.0	1.3	-	-	1.2	2.0	0.0	-	-	1.9	1.4
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	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	5	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
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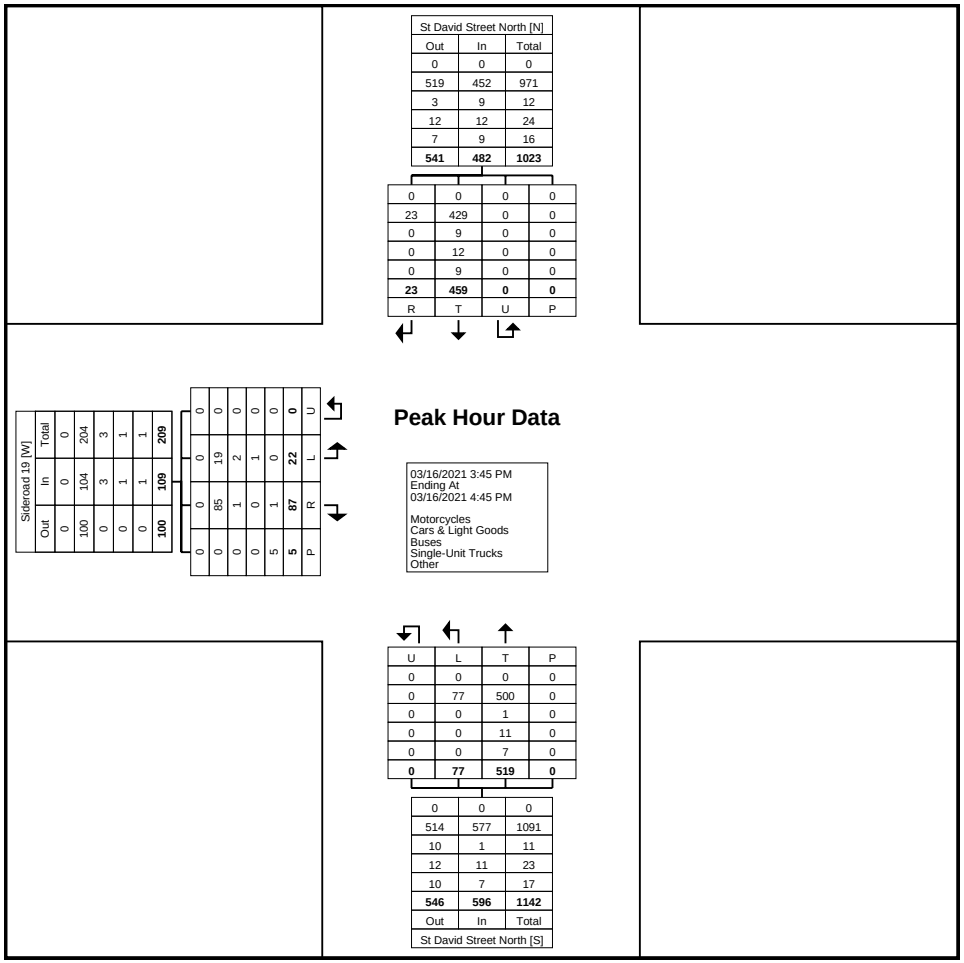
Count Name: St David Street North & Sideroad 19
Site Code: 210066
Start Date: 03/16/2021



Turning Movement Peak Hour Data Plot (3:45 PM)

Appendix C

Existing Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	92	50	283	321	11
Future Volume (vph)	9	92	50	283	321	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.877				0.996	
Flt Protected	0.995		0.950			
Satd. Flow (prot)	1600	0	1671	1681	1851	0
Flt Permitted	0.995		0.950			
Satd. Flow (perm)	1600	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	10	100	54	308	349	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	0	54	308	361	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	92	50	283	321	11
Future Volume (Veh/h)	9	92	50	283	321	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	100	54	308	349	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	771	355	361			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	771	355	361			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	85	95			
cM capacity (veh/h)	354	684	1165			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	110	54	308	361
Volume Left	10	54	0	0
Volume Right	100	0	0	12
cSH	631	1165	1700	1700
Volume to Capacity	0.17	0.05	0.18	0.21
Queue Length 95th (m)	5.0	1.2	0.0	0.0
Control Delay (s)	11.9	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.9	1.2		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.1		
Intersection Capacity Utilization		37.1%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	48	27	328	398	15
Future Volume (vph)	5	48	27	328	398	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.877				0.995	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1547	0	1517	1712	1829	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1547	0	1517	1712	1829	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	5	52	29	357	433	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	0	29	357	449	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	48	27	328	398	15
Future Volume (Veh/h)	5	48	27	328	398	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	52	29	357	433	16
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	858	443	451			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	858	443	451			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	98	91	97			
cM capacity (veh/h)	320	601	1024			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	57	29	357	449
Volume Left	5	29	0	0
Volume Right	52	0	0	16
cSH	558	1024	1700	1700
Volume to Capacity	0.10	0.03	0.21	0.26
Queue Length 95th (m)	2.7	0.7	0.0	0.0
Control Delay (s)	12.2	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.2	0.6		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	32.4%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	17	89	127	414	393	13
Future Volume (vph)	17	89	127	414	393	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.886				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1601	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1601	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	18	97	138	450	427	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	115	0	138	450	441	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	89	127	414	393	13
Future Volume (Veh/h)	17	89	127	414	393	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	97	138	450	427	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1160	434	441			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1160	434	441			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	90	84	87			
cM capacity (veh/h)	185	618	1088			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	115	138	450	441
Volume Left	18	138	0	0
Volume Right	97	0	0	14
cSH	452	1088	1700	1700
Volume to Capacity	0.25	0.13	0.26	0.26
Queue Length 95th (m)	8.0	3.5	0.0	0.0
Control Delay (s)	15.6	8.8	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.6	2.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		2.6		
Intersection Capacity Utilization		44.9%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	22	87	77	519	459	23
Future Volume (vph)	22	87	77	519	459	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.892				0.994	
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1607	0	1805	1827	1771	0
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1607	0	1805	1827	1771	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	24	95	84	564	499	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	119	0	84	564	524	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

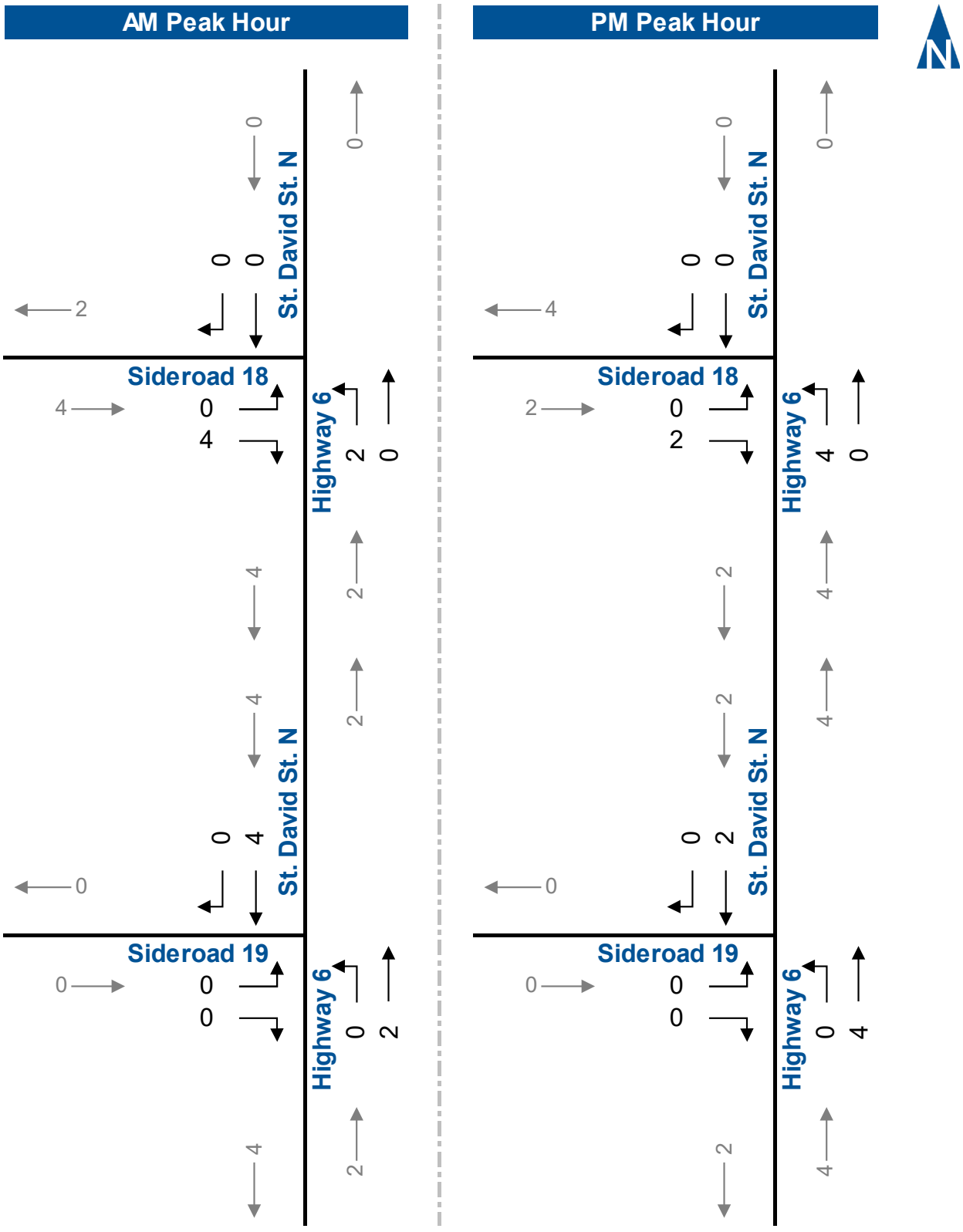
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	87	77	519	459	23
Future Volume (Veh/h)	22	87	77	519	459	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	95	84	564	499	25
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1248	516	529			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1248	516	529			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	85	83	92			
cM capacity (veh/h)	165	556	1044			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	119	84	564	524
Volume Left	24	84	0	0
Volume Right	95	0	0	25
cSH	377	1044	1700	1700
Volume to Capacity	0.32	0.08	0.33	0.31
Queue Length 95th (m)	10.6	2.1	0.0	0.0
Control Delay (s)	18.9	8.7	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	18.9	1.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization		46.4%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix D

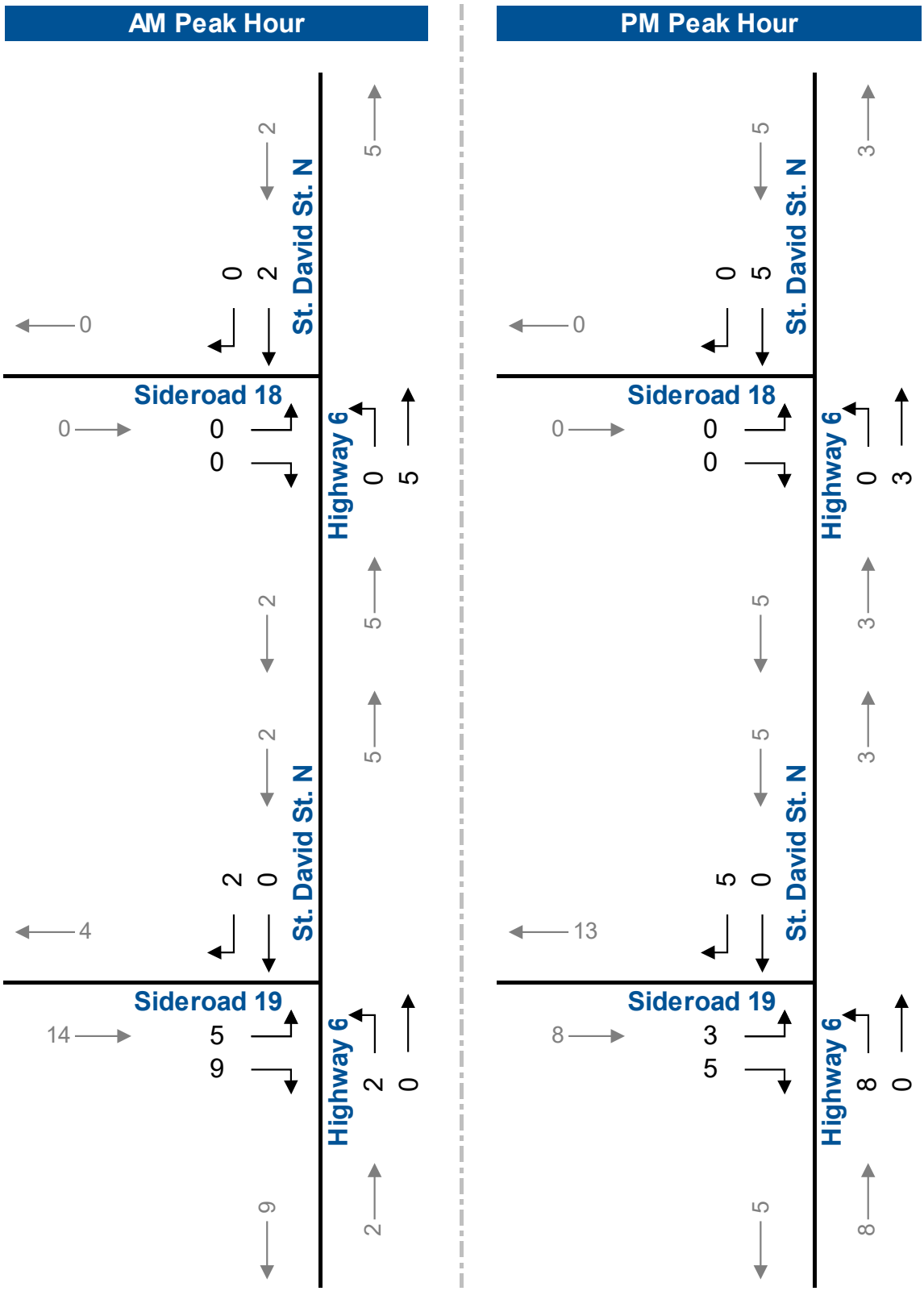
Background Development Traffic Assignment



6552, 6554, 6556 & 6558 Beatty Line
Traffic Volumes

961 St David Street North, Fergus TIS
210066

Figure A



paradigm TRANSPORTATION SOLUTIONS LIMITED

Wrighthaven Homes Sideroad 19 Traffic Volumes

961 St David Street North, Fergus TIS
210066

Figure B

Appendix E1

2023 Background Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	100	54	299	336	11
Future Volume (vph)	9	100	54	299	336	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.996	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1851	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	10	109	59	325	365	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	119	0	59	325	377	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	100	54	299	336	11
Future Volume (Veh/h)	9	100	54	299	336	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	109	59	325	365	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	814	371	377			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	814	371	377			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	84	95			
cM capacity (veh/h)	332	670	1149			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	119	59	325	377
Volume Left	10	59	0	0
Volume Right	109	0	0	12
cSH	618	1149	1700	1700
Volume to Capacity	0.19	0.05	0.19	0.22
Queue Length 95th (m)	5.7	1.3	0.0	0.0
Control Delay (s)	12.2	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.2	1.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.2		
Intersection Capacity Utilization		38.4%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	59	30	343	418	18
Future Volume (vph)	10	59	30	343	418	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885				0.994	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1563	0	1517	1712	1826	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1563	0	1517	1712	1826	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	11	64	33	373	454	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	75	0	33	373	474	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	59	30	343	418	18
Future Volume (Veh/h)	10	59	30	343	418	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	64	33	373	454	20
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	905	466	476			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	905	466	476			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	96	89	97			
cM capacity (veh/h)	299	583	1001			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	75	33	373	474
Volume Left	11	33	0	0
Volume Right	64	0	0	20
cSH	512	1001	1700	1700
Volume to Capacity	0.15	0.03	0.22	0.28
Queue Length 95th (m)	4.1	0.8	0.0	0.0
Control Delay (s)	13.2	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.2	0.7		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	35.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	18	95	136	434	414	14
Future Volume (vph)	18	95	136	434	414	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1603	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1603	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	20	103	148	472	450	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	123	0	148	472	465	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	95	136	434	414	14
Future Volume (Veh/h)	18	95	136	434	414	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	103	148	472	450	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1226	458	465			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1226	458	465			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	88	83	86			
cM capacity (veh/h)	167	599	1066			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	123	148	472	465
Volume Left	20	148	0	0
Volume Right	103	0	0	15
cSH	421	1066	1700	1700
Volume to Capacity	0.29	0.14	0.28	0.27
Queue Length 95th (m)	9.6	3.9	0.0	0.0
Control Delay (s)	17.0	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	17.0	2.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		2.8		
Intersection Capacity Utilization		47.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	26	96	88	544	480	29
Future Volume (vph)	26	96	88	544	480	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.894				0.992	
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1609	0	1805	1827	1768	0
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1609	0	1805	1827	1768	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	28	104	96	591	522	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	132	0	96	591	554	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	96	88	544	480	29
Future Volume (Veh/h)	26	96	88	544	480	29
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	104	96	591	522	32
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1326	543	559			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	543	559			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	81	81	91			
cM capacity (veh/h)	146	537	1018			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	132	96	591	554
Volume Left	28	96	0	0
Volume Right	104	0	0	32
cSH	342	1018	1700	1700
Volume to Capacity	0.39	0.09	0.35	0.33
Queue Length 95th (m)	14.1	2.5	0.0	0.0
Control Delay (s)	22.0	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	22.0	1.2		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		2.7		
Intersection Capacity Utilization		49.3%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix E2

2028 Background Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	110	59	330	371	13
Future Volume (vph)	10	110	59	330	371	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.995	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1849	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1849	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	11	120	64	359	403	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	0	64	359	417	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	110	59	330	371	13
Future Volume (Veh/h)	10	110	59	330	371	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	120	64	359	403	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	897	410	417			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897	410	417			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	96	81	94			
cM capacity (veh/h)	295	637	1110			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	131	64	359	417
Volume Left	11	64	0	0
Volume Right	120	0	0	14
cSH	581	1110	1700	1700
Volume to Capacity	0.23	0.06	0.21	0.25
Queue Length 95th (m)	6.9	1.5	0.0	0.0
Control Delay (s)	13.0	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.0	1.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization		41.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	64	33	379	461	19
Future Volume (vph)	11	64	33	379	461	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885				0.995	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1563	0	1517	1712	1828	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1563	0	1517	1712	1828	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	12	70	36	412	501	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	36	412	522	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	64	33	379	461	19
Future Volume (Veh/h)	11	64	33	379	461	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	70	36	412	501	21
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	998	514	524			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	998	514	524			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	95	87	96			
cM capacity (veh/h)	262	548	960			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	82	36	412	522
Volume Left	12	36	0	0
Volume Right	70	0	0	21
cSH	473	960	1700	1700
Volume to Capacity	0.17	0.04	0.24	0.31
Queue Length 95th (m)	5.0	0.9	0.0	0.0
Control Delay (s)	14.2	8.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.2	0.7		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		1.4		
Intersection Capacity Utilization		38.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	104	150	479	456	15
Future Volume (vph)	20	104	150	479	456	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1602	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1602	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	22	113	163	521	496	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	135	0	163	521	512	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	104	150	479	456	15
Future Volume (Veh/h)	20	104	150	479	456	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	113	163	521	496	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1351	504	512			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1351	504	512			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	84	80	84			
cM capacity (veh/h)	137	564	1023			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	135	163	521	512
Volume Left	22	163	0	0
Volume Right	113	0	0	16
cSH	373	1023	1700	1700
Volume to Capacity	0.36	0.16	0.31	0.30
Queue Length 95th (m)	12.9	4.5	0.0	0.0
Control Delay (s)	20.0	9.2	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.0	2.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	105	96	600	529	31
Future Volume (vph)	28	105	96	600	529	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.893				0.992	
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1607	0	1805	1827	1768	0
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1607	0	1805	1827	1768	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	30	114	104	652	575	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	144	0	104	652	609	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	105	96	600	529	31
Future Volume (Veh/h)	28	105	96	600	529	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	114	104	652	575	34
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1457	597	614			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1457	597	614			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	75	77	89			
cM capacity (veh/h)	119	501	971			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	144	104	652	609
Volume Left	30	104	0	0
Volume Right	114	0	0	34
cSH	301	971	1700	1700
Volume to Capacity	0.48	0.11	0.38	0.36
Queue Length 95th (m)	19.6	2.9	0.0	0.0
Control Delay (s)	27.5	9.2	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	27.5	1.3		0.0
Approach LOS	D			

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization		53.1%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix E3

2033 Background Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	121	65	364	409	14
Future Volume (vph)	11	121	65	364	409	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.996	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1851	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	12	132	71	396	445	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	144	0	71	396	460	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	121	65	364	409	14
Future Volume (Veh/h)	11	121	65	364	409	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	132	71	396	445	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	990	452	460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	990	452	460			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	95	78	93			
cM capacity (veh/h)	257	603	1070			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	144	71	396	460
Volume Left	12	71	0	0
Volume Right	132	0	0	15
cSH	542	1070	1700	1700
Volume to Capacity	0.27	0.07	0.23	0.27
Queue Length 95th (m)	8.5	1.7	0.0	0.0
Control Delay (s)	14.0	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.0	1.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.5		
Intersection Capacity Utilization		44.1%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	70	36	418	509	21
Future Volume (vph)	11	70	36	418	509	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.883				0.995	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1558	0	1517	1712	1828	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1558	0	1517	1712	1828	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	12	76	39	454	553	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	88	0	39	454	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	70	36	418	509	21
Future Volume (Veh/h)	11	70	36	418	509	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	76	39	454	553	23
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1098	566	578			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1098	566	578			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	95	85	96			
cM capacity (veh/h)	227	511	915			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	88	39	454	576
Volume Left	12	39	0	0
Volume Right	76	0	0	23
cSH	437	915	1700	1700
Volume to Capacity	0.20	0.04	0.27	0.34
Queue Length 95th (m)	6.0	1.1	0.0	0.0
Control Delay (s)	15.3	9.1	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.3	0.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		1.5		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	22	115	165	528	503	16
Future Volume (vph)	22	115	165	528	503	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1603	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1603	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			415.1	474.5	
Travel Time (s)	34.9			24.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	24	125	179	574	547	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	0	179	574	564	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	115	165	528	503	16
Future Volume (Veh/h)	22	115	165	528	503	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	125	179	574	547	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1488	556	564			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1488	556	564			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	78	76	82			
cM capacity (veh/h)	109	527	978			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	149	179	574	564
Volume Left	24	179	0	0
Volume Right	125	0	0	17
cSH	326	978	1700	1700
Volume to Capacity	0.46	0.18	0.34	0.33
Queue Length 95th (m)	18.3	5.3	0.0	0.0
Control Delay (s)	25.0	9.5	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	25.0	2.3		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	31	115	106	662	584	34
Future Volume (vph)	31	115	106	662	584	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.894				0.993	
Flt Protected	0.989		0.950			
Satd. Flow (prot)	1607	0	1805	1827	1770	0
Flt Permitted	0.989		0.950			
Satd. Flow (perm)	1607	0	1805	1827	1770	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	415.1	
Travel Time (s)	30.1			6.9	24.9	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	34	125	115	720	635	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	159	0	115	720	672	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	115	106	662	584	34
Future Volume (Veh/h)	31	115	106	662	584	34
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	125	115	720	635	37
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1608	658	677			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1608	658	677			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	64	73	88			
cM capacity (veh/h)	94	462	920			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	159	115	720	672
Volume Left	34	115	0	0
Volume Right	125	0	0	37
cSH	252	920	1700	1700
Volume to Capacity	0.63	0.12	0.42	0.40
Queue Length 95th (m)	30.9	3.4	0.0	0.0
Control Delay (s)	41.0	9.5	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	41.0	1.3		0.0
Approach LOS	E			

Intersection Summary				
Average Delay		4.6		
Intersection Capacity Utilization		57.5%	ICU Level of Service	B
Analysis Period (min)		15		

Appendix F1

2023 Total Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	100	54	307	339	11
Future Volume (vph)	9	100	54	307	339	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.996	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1851	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			166.2	474.5	
Travel Time (s)	34.9			10.0	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	10	109	59	334	368	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	119	0	59	334	380	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	100	54	307	339	11
Future Volume (Veh/h)	9	100	54	307	339	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	109	59	334	368	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	826	374	380			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	374	380			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	84	95			
cM capacity (veh/h)	327	668	1146			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	119	59	334	380
Volume Left	10	59	0	0
Volume Right	109	0	0	12
cSH	614	1146	1700	1700
Volume to Capacity	0.19	0.05	0.20	0.22
Queue Length 95th (m)	5.4	1.2	0.0	0.0
Control Delay (s)	12.3	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	1.2		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.2		
Intersection Capacity Utilization		38.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	59	30	347	430	18
Future Volume (vph)	10	59	30	347	430	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885				0.994	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1563	0	1517	1712	1826	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1563	0	1517	1712	1826	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	248.9	
Travel Time (s)	30.1			6.9	14.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	11	64	33	377	467	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	75	0	33	377	487	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	59	30	347	430	18
Future Volume (Veh/h)	10	59	30	347	430	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	64	33	377	467	20
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	922	479	489			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	922	479	489			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	96	89	97			
cM capacity (veh/h)	292	574	990			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	75	33	377	487
Volume Left	11	33	0	0
Volume Right	64	0	0	20
cSH	502	990	1700	1700
Volume to Capacity	0.15	0.03	0.22	0.29
Queue Length 95th (m)	4.0	0.8	0.0	0.0
Control Delay (s)	13.4	8.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.4	0.7		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	35.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	12	4	353	436	3
Future Volume (vph)	8	12	4	353	436	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.920				0.999	
Flt Protected	0.980			0.999		
Satd. Flow (prot)	1713	0	0	1861	1861	0
Flt Permitted	0.980			0.999		
Satd. Flow (perm)	1713	0	0	1861	1861	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	182.7			248.9	166.2	
Travel Time (s)	13.2			14.9	10.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	9	13	4	384	474	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	0	388	477	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	12	4	353	436	3
Future Volume (Veh/h)	8	12	4	353	436	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	13	4	384	474	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	868	476	477			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	868	476	477			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	100			
cM capacity (veh/h)	324	593	1096			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	388	477
Volume Left	9	4	0
Volume Right	13	0	3
cSH	443	1096	1700
Volume to Capacity	0.05	0.00	0.28
Queue Length 95th (m)	1.2	0.1	0.0
Control Delay (s)	13.5	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	13.5	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	18	95	136	440	422	14
Future Volume (vph)	18	95	136	440	422	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1603	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1603	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			164.8	474.5	
Travel Time (s)	34.9			9.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	20	103	148	478	459	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	123	0	148	478	474	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	95	136	440	422	14
Future Volume (Veh/h)	18	95	136	440	422	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	103	148	478	459	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1240	466	474			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1240	466	474			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	88	83	86			
cM capacity (veh/h)	163	592	1057			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	123	148	478	474
Volume Left	20	148	0	0
Volume Right	103	0	0	15
cSH	415	1057	1700	1700
Volume to Capacity	0.30	0.14	0.28	0.28
Queue Length 95th (m)	9.3	3.7	0.0	0.0
Control Delay (s)	17.3	9.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	17.3	2.1		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	26	96	88	557	487	29
Future Volume (vph)	26	96	88	557	487	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.894				0.992	
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1609	0	1805	1827	1768	0
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1609	0	1805	1827	1768	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	250.3	
Travel Time (s)	30.1			6.9	15.0	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	28	104	96	605	529	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	132	0	96	605	561	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	96	88	557	487	29
Future Volume (Veh/h)	26	96	88	557	487	29
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	104	96	605	529	32
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1347	550	566			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1347	550	566			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	80	80	91			
cM capacity (veh/h)	142	533	1012			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	132	96	605	561
Volume Left	28	96	0	0
Volume Right	104	0	0	32
cSH	336	1012	1700	1700
Volume to Capacity	0.39	0.09	0.36	0.33
Queue Length 95th (m)	13.8	2.4	0.0	0.0
Control Delay (s)	22.5	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	22.5	1.2		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	49.7%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	6	7	13	570	509	8
Future Volume (vph)	6	7	13	570	509	8
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	0.928				0.998	
Flt Protected	0.977			0.999		
Satd. Flow (prot)	1723	0	0	1862	1860	0
Flt Permitted	0.977			0.999		
Satd. Flow (perm)	1723	0	0	1862	1860	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	210.3			250.3	164.8	
Travel Time (s)	15.1			15.0	9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	7	8	14	620	553	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	0	634	562	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	7	13	570	509	8
Future Volume (Veh/h)	6	7	13	570	509	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	8	14	620	553	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1206	558	562			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1206	558	562			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	202	533	1019			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	634	562
Volume Left	7	14	0
Volume Right	8	0	9
cSH	302	1019	1700
Volume to Capacity	0.05	0.01	0.33
Queue Length 95th (m)	1.2	0.3	0.0
Control Delay (s)	17.5	0.4	0.0
Lane LOS	C	A	
Approach Delay (s)	17.5	0.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F2

2028 Total Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	110	59	338	374	13
Future Volume (vph)	10	110	59	338	374	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.996	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1851	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			166.2	474.5	
Travel Time (s)	34.9			10.0	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	11	120	64	367	407	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	0	64	367	421	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	110	59	338	374	13
Future Volume (Veh/h)	10	110	59	338	374	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	120	64	367	407	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	909	414	421			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909	414	421			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	96	81	94			
cM capacity (veh/h)	290	634	1107			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	131	64	367	421
Volume Left	11	64	0	0
Volume Right	120	0	0	14
cSH	577	1107	1700	1700
Volume to Capacity	0.23	0.06	0.22	0.25
Queue Length 95th (m)	6.6	1.4	0.0	0.0
Control Delay (s)	13.1	8.5	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.1	1.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization		41.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	64	33	383	473	19
Future Volume (vph)	11	64	33	383	473	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885				0.995	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1563	0	1517	1712	1828	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1563	0	1517	1712	1828	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	248.9	
Travel Time (s)	30.1			6.9	14.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	12	70	36	416	514	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	36	416	535	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	64	33	383	473	19
Future Volume (Veh/h)	11	64	33	383	473	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	70	36	416	514	21
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1014	526	537			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1014	526	537			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	95	87	96			
cM capacity (veh/h)	256	539	949			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	82	36	416	535
Volume Left	12	36	0	0
Volume Right	70	0	0	21
cSH	464	949	1700	1700
Volume to Capacity	0.18	0.04	0.24	0.31
Queue Length 95th (m)	4.8	0.9	0.0	0.0
Control Delay (s)	14.4	8.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.4	0.7		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		1.4		
Intersection Capacity Utilization		38.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	12	4	389	480	3
Future Volume (vph)	8	12	4	389	480	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.920				0.999	
Flt Protected	0.980					
Satd. Flow (prot)	1713	0	0	1863	1861	0
Flt Permitted	0.980					
Satd. Flow (perm)	1713	0	0	1863	1861	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	182.7			248.9	166.2	
Travel Time (s)	13.2			14.9	10.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	9	13	4	423	522	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	0	427	525	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	12	4	389	480	3
Future Volume (Veh/h)	8	12	4	389	480	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	13	4	423	522	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	954	524	525			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	954	524	525			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	100			
cM capacity (veh/h)	288	558	1052			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	427	525
Volume Left	9	4	0
Volume Right	13	0	3
cSH	403	1052	1700
Volume to Capacity	0.05	0.00	0.31
Queue Length 95th (m)	1.3	0.1	0.0
Control Delay (s)	14.4	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	14.4	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	20	104	150	485	464	15
Future Volume (vph)	20	104	150	485	464	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1602	0	1671	1681	1851	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1602	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			164.8	474.5	
Travel Time (s)	34.9			9.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	22	113	163	527	504	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	135	0	163	527	520	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	104	150	485	464	15
Future Volume (Veh/h)	20	104	150	485	464	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	113	163	527	504	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1365	512	520			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1365	512	520			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	84	80	84			
cM capacity (veh/h)	134	558	1016			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	135	163	527	520
Volume Left	22	163	0	0
Volume Right	113	0	0	16
cSH	368	1016	1700	1700
Volume to Capacity	0.37	0.16	0.31	0.31
Queue Length 95th (m)	12.5	4.3	0.0	0.0
Control Delay (s)	20.4	9.2	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.4	2.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	105	96	613	536	31
Future Volume (vph)	28	105	96	613	536	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.893				0.993	
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1607	0	1805	1827	1770	0
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1607	0	1805	1827	1770	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	250.3	
Travel Time (s)	30.1			6.9	15.0	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	30	114	104	666	583	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	144	0	104	666	617	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	105	96	613	536	31
Future Volume (Veh/h)	28	105	96	613	536	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	114	104	666	583	34
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1479	605	622			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1479	605	622			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	74	77	89			
cM capacity (veh/h)	116	496	965			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	144	104	666	617
Volume Left	30	104	0	0
Volume Right	114	0	0	34
cSH	294	965	1700	1700
Volume to Capacity	0.49	0.11	0.39	0.36
Queue Length 95th (m)	19.3	2.7	0.0	0.0
Control Delay (s)	28.4	9.2	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	28.4	1.2		0.0
Approach LOS	D			

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization		53.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	6	7	13	628	560	8
Future Volume (vph)	6	7	13	628	560	8
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	0.928				0.998	
Flt Protected	0.977			0.999		
Satd. Flow (prot)	1723	0	0	1862	1860	0
Flt Permitted	0.977			0.999		
Satd. Flow (perm)	1723	0	0	1862	1860	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	210.3			250.3	164.8	
Travel Time (s)	15.1			15.0	9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	7	8	14	683	609	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	0	697	618	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	7	13	628	560	8
Future Volume (Veh/h)	6	7	13	628	560	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	8	14	683	609	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1324	614	618			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1324	614	618			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	98	99			
cM capacity (veh/h)	171	496	972			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	697	618
Volume Left	7	14	0
Volume Right	8	0	9
cSH	263	972	1700
Volume to Capacity	0.06	0.01	0.36
Queue Length 95th (m)	1.4	0.3	0.0
Control Delay (s)	19.5	0.4	0.0
Lane LOS	C	A	
Approach Delay (s)	19.5	0.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F3

2033 Total Operation Reports

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	121	65	372	412	14
Future Volume (vph)	11	121	65	372	412	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.876				0.996	
Flt Protected	0.996		0.950			
Satd. Flow (prot)	1599	0	1671	1681	1851	0
Flt Permitted	0.996		0.950			
Satd. Flow (perm)	1599	0	1671	1681	1851	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			166.2	474.5	
Travel Time (s)	34.9			10.0	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	8%	13%	2%	9%
Adj. Flow (vph)	12	132	71	404	448	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	144	0	71	404	463	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	121	65	372	412	14
Future Volume (Veh/h)	11	121	65	372	412	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	132	71	404	448	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1002	456	463			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1002	456	463			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	95	78	93			
cM capacity (veh/h)	253	601	1067			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	144	71	404	463
Volume Left	12	71	0	0
Volume Right	132	0	0	15
cSH	539	1067	1700	1700
Volume to Capacity	0.27	0.07	0.24	0.27
Queue Length 95th (m)	8.1	1.6	0.0	0.0
Control Delay (s)	14.1	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.1	1.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		44.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	70	36	422	521	21
Future Volume (vph)	11	70	36	422	521	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.883				0.995	
Flt Protected	0.993		0.950			
Satd. Flow (prot)	1558	0	1517	1712	1829	0
Flt Permitted	0.993		0.950			
Satd. Flow (perm)	1558	0	1517	1712	1829	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	248.9	
Travel Time (s)	30.1			6.9	14.9	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	19%	11%	3%	13%
Adj. Flow (vph)	12	76	39	459	566	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	88	0	39	459	589	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	70	36	422	521	21
Future Volume (Veh/h)	11	70	36	422	521	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	76	39	459	566	23
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1116	580	591			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116	580	591			
tC, single (s)	6.4	6.3	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.4			
p0 queue free %	95	85	96			
cM capacity (veh/h)	221	503	905			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	88	39	459	589
Volume Left	12	39	0	0
Volume Right	76	0	0	23
cSH	428	905	1700	1700
Volume to Capacity	0.21	0.04	0.27	0.35
Queue Length 95th (m)	5.8	1.0	0.0	0.0
Control Delay (s)	15.6	9.2	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.6	0.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		1.5		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	12	4	428	530	3
Future Volume (vph)	8	12	4	428	530	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.920				0.999	
Flt Protected	0.980					
Satd. Flow (prot)	1713	0	0	1863	1861	0
Flt Permitted	0.980					
Satd. Flow (perm)	1713	0	0	1863	1861	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	182.7			248.9	166.2	
Travel Time (s)	13.2			14.9	10.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	9	13	4	465	576	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	0	469	579	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	12	4	428	530	3
Future Volume (Veh/h)	8	12	4	428	530	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	13	4	465	576	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1050	578	579			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1050	578	579			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	97	100			
cM capacity (veh/h)	253	520	1005			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	469	579
Volume Left	9	4	0
Volume Right	13	0	3
cSH	363	1005	1700
Volume to Capacity	0.06	0.00	0.34
Queue Length 95th (m)	1.5	0.1	0.0
Control Delay (s)	15.6	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	15.6	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	22	115	165	534	511	16
Future Volume (vph)	22	115	165	534	511	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	110.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		65.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887				0.996	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1603	0	1671	1681	1852	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1603	0	1671	1681	1852	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	484.7			164.8	474.5	
Travel Time (s)	34.9			9.9	28.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	8%	13%	2%	9%
Adj. Flow (vph)	24	125	179	580	555	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	0	179	580	572	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
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		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	115	165	534	511	16
Future Volume (Veh/h)	22	115	165	534	511	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	125	179	580	555	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1502	564	572			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1502	564	572			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	78	76	82			
cM capacity (veh/h)	107	522	972			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	149	179	580	572
Volume Left	24	179	0	0
Volume Right	125	0	0	17
cSH	321	972	1700	1700
Volume to Capacity	0.46	0.18	0.34	0.34
Queue Length 95th (m)	17.8	5.1	0.0	0.0
Control Delay (s)	25.5	9.5	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	25.5	2.2		0.0
Approach LOS	D			

Intersection Summary				
Average Delay		3.7		
Intersection Capacity Utilization		55.3%	ICU Level of Service	B
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	31	115	106	675	591	34
Future Volume (vph)	31	115	106	675	591	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		25.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.894				0.993	
Flt Protected	0.989		0.950			
Satd. Flow (prot)	1607	0	1805	1827	1770	0
Flt Permitted	0.989		0.950			
Satd. Flow (perm)	1607	0	1805	1827	1770	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	418.5			96.3	250.3	
Travel Time (s)	30.1			6.9	15.0	
Confl. Peds. (#/hr)			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	2%	0%	4%	7%	0%
Adj. Flow (vph)	34	125	115	734	642	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	159	0	115	734	679	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	115	106	675	591	34
Future Volume (Veh/h)	31	115	106	675	591	34
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	125	115	734	642	37
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1630	666	684			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1630	666	684			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	63	73	87			
cM capacity (veh/h)	91	458	915			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	159	115	734	679
Volume Left	34	115	0	0
Volume Right	125	0	0	37
cSH	246	915	1700	1700
Volume to Capacity	0.65	0.13	0.43	0.40
Queue Length 95th (m)	30.4	3.3	0.0	0.0
Control Delay (s)	42.9	9.5	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	42.9	1.3		0.0
Approach LOS	E			

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		57.9%	ICU Level of Service	B
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	6	7	13	693	617	8
Future Volume (vph)	6	7	13	693	617	8
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	0.928				0.998	
Flt Protected	0.977			0.999		
Satd. Flow (prot)	1723	0	0	1862	1860	0
Flt Permitted	0.977			0.999		
Satd. Flow (perm)	1723	0	0	1862	1860	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	210.3			250.3	164.8	
Travel Time (s)	15.1			15.0	9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	7	8	14	753	671	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	0	767	680	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	7	13	693	617	8
Future Volume (Veh/h)	6	7	13	693	617	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	8	14	753	671	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1456	676	680			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1456	676	680			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	98			
cM capacity (veh/h)	142	457	922			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	767	680
Volume Left	7	14	0
Volume Right	8	0	9
cSH	225	922	1700
Volume to Capacity	0.07	0.02	0.40
Queue Length 95th (m)	1.6	0.4	0.0
Control Delay (s)	22.2	0.4	0.0
Lane LOS	C	A	
Approach Delay (s)	22.2	0.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix G

Traffic Control Signal Warrants

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

Horizon Year: Total (2033)
Region/City/Township: Fergus, Centre Wellington

Major Street: St David St North (Hwy 6)
Minor Street: Sideroad 19
North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? Y
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						
	St David St North (Hwy 6)						Sideroad 19						
	Northbound			Southbound			Eastbound			Westbound			Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	36	422			521	21	11		70				0
PM Peak Hour	106	675			591	34	31		115				0
Average Hourly Volume	36	274	0	0	278	14	11	0	46	0	0	0	0

Warrant	AHV
1A - All	658
1B - Minor	57
2A - Major	602
2B - Cross	11

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	658
					% Fulfilled	91.4%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	57
					% Fulfilled	22.3%

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	602
					% Fulfilled	83.5%

	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	11
					% Fulfilled	14.0%

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

Horizon Year: Total (2033)
Region/City/Township: Fergus, Centre Wellington

Major Street: St David St North (Hwy 6)
Minor Street: Sideroad 18
North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? Y
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						
	St David St North (Hwy 6)						Sideroad 18						
	Northbound			Southbound			Eastbound			Westbound			Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	65	372			412	14	11		121				0
PM Peak Hour	165	534			511	16	22		115				0
Average Hourly Volume	58	227	0	0	231	8	8	0	59	0	0	0	0

Warrant	AHV
1A - All	590
1B - Minor	67
2A - Major	522
2B - Cross	8

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	590
					% Fulfilled	81.9%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	67
					% Fulfilled	26.4%

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	522
					% Fulfilled	72.5%

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	8
					% Fulfilled	11.0%