



**5150 Wellington Road 27,
Rockwood, ON
Traffic Impact Brief**

Paradigm Transportation Solutions Limited

September 2019





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6 September 2019
Project: 190451/180097

Charlie Kuiken
North Rockwood Developments Inc.
143 Dennis Street
Rockwood, ON N0B 2K0

Dear Mr. Kuiken:

RE: TRAFFIC IMPACT BRIEF – PROPOSED RESIDENTIAL DEVELOPMENT, 5150 WELLINGTON ROAD 27, ROCKWOOD, ONTARIO

Paradigm Transportation Solutions Limited (Paradigm) completed a Traffic Impact Brief, in April 2018, in support of Condominium and Zone Change applications by North Rockwood Developments Inc., for a proposed residential development at 5150 Wellington Road 27 (Main Street) in Rockwood, County of Wellington.

Figure 1 (attached) details the location of the subject site.

Following comments on the applications by Council and staff of the Township of Guelph Eramosa, and by Wellington County staff, modifications have been made to the development plan and a revised application is being made based on the revised plan and supporting studies. The Traffic Impact Brief (TIB) prepared earlier has been updated herein based on the revised Site Plan.

Scope & Purpose

The Transportation Impact Brief updated herein corresponds to the revised Site Plan providing for 47 townhome units and 4 semi-detached units. The proposed change in the type of dwelling units results in reducing the previously estimated development trip generation. The resulting traffic impacts on Wellington Road 27 and the Sacred Heart / OPP driveway are reviewed herein.

The concern about the appropriate number of units that can be served by a single driveway in a development is also addressed.

Existing Traffic Conditions

Existing Traffic Volumes

Weekday AM and PM peak period turning movement counts were collected at Wellington Road 27 and Sacred Heart / OPP intersection on Tuesday April 3, 2018. **Figure 2** (attached) summarizes the AM and PM peak hour traffic volumes at the two intersections respectively. The existing turning movement count can be found attached in **Appendix A**.

Existing Traffic Operations

The operation of the current school driveway intersection was assessed for existing peak hour traffic volumes. The findings are summarized in **Table 1**. The intersection analysis considered three separate measures of performance:

- ▶ The level of service (LOS) for each turning movement,
- ▶ The volume to capacity (v/c) ratio for each turning movement, and
- ▶ The 95th percentile queue lengths estimated by Synchro.

Intersection Level of Service (LOS) is a recognized method of quantifying the efficiency of traffic flow 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 desiring 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. 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 at signalized intersections, the movement is classified as LOS F and remedial measures are usually implemented if they are feasible.

The level-of-service conditions were assessed using Synchro 10.0 with HCM 2000 procedures. Movements are considered critical under the following conditions:

- ▶ Volume to capacity ratios for through movements or shared through/turning movements are greater than or equal to 0.85,
- ▶ Volume to capacity ratios for exclusive turning movements are greater than or equal to 0.90, and
- ▶ 95th percentile queue lengths for individual movements that are projected to exceed the available turning lane storage were determined using SimTraffic (5 iterations with 15 minute seeding time and 60 minute evaluation time).

Based on the above criteria and the results in **Table 1**, the intersection of Wellington Road 27 and the School driveway is operating within a good range of Levels of Service (i.e., LOS A or LOS B) with minimal delay and congestion during both the AM and PM peak hours. Detailed Synchro output is provided in **Appendix B**.



TABLE 1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Wellington Road 27 & School Driveway	TWSC	LOS < A > Delay < 10 > V/C < 0.06 > Q < 2 >	< A > 10 >	< B > 11 >	< A > 2 >	< A > 0 >	A 10 A 0	B 11 B 0	< A > 2 >	< A > 0 >	< A > 1 >	< A > 2 >	< A > 0 >	< A > 0 >	< A > 0 >	A 0 A 0	3		
PM Peak Hour	Wellington Road 27 & School Driveway	TWSC	LOS < A > Delay < 9 > V/C < 0.06 > Q < 1 >	< A > 9 >	< B > 11 >	< A > 2 >	< A > 0 >	A 9 A 0	B 11 B 0	< A > 2 >	< A > 0 >	< A > 1 >	< A > 2 >	< A > 0 >	< A > 0 >	< A > 0 >	A 0 A 0	3		

MOE - Measure of Effectiveness
 LOS - Level of Service
 Delay - Average Delay per Vehicle in Seconds
 Q - 95th Percentile Queue Length (m)
 TCS - Traffic Control Signal
 TWSC - Two-Way Stop Control
 < - Shared Left-Turn
 > - Shared Right-Turn

Development Concept

The revised Site Plan includes 47 townhome units and 4 semi-detached residential houses, resulting in 51 dwelling units. **Figure 3** (attached) shows the site plan for the proposed development.

The Institute of Transportation Engineers (ITE) Trip Generation 10th Edition was used to estimate weekday AM and PM peak hour trip generation under ITE’s Land Use Code Single-Family Detached Housing (LUC 210) and Multi-family Housing Low-Rise (LUC 220). The single-family land use codes best represent the semi-detached housing as each half represents a single-family home. **Table 3** contains the forecast trip generation comprising 25 trips in the AM peak hour and 30 trips during the PM peak hour.

TABLE 3: TRIP GENERATION

Land Use Code	Number of Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
210 - Single-Family Detached Housing (Units)	4	0.74	1	2	3	0.99	3	1	4
220 - Multifamily Housing (Low-Rise) (Units)	47	0.46	5	17	22	0.56	16	10	26
Total Trip Generation	51		6	19	25		19	11	30

The site generated trips were assigned to the road network based on the existing distribution of traffic. The primary direction is to/from south, given that Highway 7 and most of the urban area of the community of Rockwood are south of the school location. **Table 4** summarizes the trip distribution used in the assignment of road trips. The development trips are summarized in **Figure 4** (attached).



TABLE 4: TRIP DISTRIBUTION

Direction	Percentage
North	17%
South	83%
Total	100%

Future Traffic Conditions

Background Traffic Forecast and Horizon Year

In order to meet County of Wellington guidelines, a horizon year of 2030 (ten-years beyond completion of the development) was used for future total traffic analyses. The likely future background traffic volumes on Wellington Road 27 at the subject site are estimated to consist of primarily increased non-site traffic (generalized background traffic growth) and traffic generated by near-by developments. The background traffic estimates were derived by applying a conservative growth rate of 2% per annum to the existing through volumes on Wellington Road 27.

The background development traffic includes site traffic generated by the Bonarrow Subdivision¹ and a proposed Child Care / Early ON Centre expansion² at Sacred Heart School. The Sacred Heart School traffic has also been assumed at maximum capacity³. **Figure 5** (attached) illustrates the future background traffic volumes for the 2030 horizon year.

2030 Total Traffic Conditions

The total traffic volumes at the proposed Driveway (the forecast trips added to the background volumes) are shown in **Figure 6** (attached). LOS analyses have been conducted using Synchro for the AM and PM peak hour conditions for the study area intersections with a summary of the LOS conditions provided in **Table 5**. It indicates that even with the addition of the residential trips, the study area intersections and individual movements are forecast to operate with acceptable level of service (LOS A, B or C) during the weekday AM and PM peak hours. Detailed Synchro reports are provided in **Appendix C**.

¹ Bonarrow Meadows Residential Development, Rockwood Traffic Impact Study, Paradigm Transportation Solutions Limited, July 2016

² Traffic Brief – Proposed Child Care Facility and Early ON Child and Family, 5146 Wellington Road 27, Rockwood, Ontario, Paradigm Transportation Solutions Limited, April 6, 2018

³ Peer Review Response, 5146 Wellington Road 27, Rockwood, Paradigm Transportation Solutions Limited, May 7, 2018 (180051)



TABLE 5: 2030 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Wellington Road 27 & School Driveway	TWSC	LOS < B > B	< B > B	< 15 > 15	< 0.36 >	< 23 >	< C > C	< 21 > 21	< 0.02 >	< 6 >	< A > A	< 5 > 5	< 0.15 >	< 27 >	< A > A	< 0 > 0	< 0.00 >	< 2 >	6
	Wellington Road 27 & Bonnarow Access	TWSC	LOS B	< B > B	10	< 0.08 >	14	< C > C	< 1 >	< 0.01 >	< 5 >	< A > A	< 1 > 1	< 0.11 >	< 0 >	< 0 >	< 0 >	< 0 >	2	
	Wellington Road 27 & Site Driveway	TWSC	LOS A	< B > B	10	< 0.03 >	11	< C > C	< 0 >	< 0.00 >	< 2 >	< A > A	< 0 > 0	< 0.14 >	< 0 >	< 0 >	< 0 >	< 0 >	1	
PM Peak Hour	Wellington Road 27 & School Driveway	TWSC	LOS < B > B	< B > B	< 13 > 13	< 0.32 >	< 21 >	< C > C	< 25 > 25	< 0.04 >	< 8 >	< A > A	< 4 > 4	< 0.11 >	< 19 >	< A > A	< 0 > 0	< 0.00 >	< 1 >	5
	Wellington Road 27 & Bonnarow Access	TWSC	LOS B	< B > B	10	< 0.05 >	14	< C > C	< 2 >	< 0.04 >	< 11 >	< A > A	< 2 > 2	< 0.11 >	< 0 >	< 0 >	< 0 >	< 0 >	2	
	Wellington Road 27 & Site Driveway	TWSC	LOS A	< B > B	10	< 0.02 >	10	< C > C	< 1 >	< 0.01 >	< 6 >	< A > A	< 1 > 1	< 0.12 >	< 0 >	< 0 >	< 0 >	< 0 >	1	

MOE - Measure of Effectiveness Q - 95th Percentile Queue Length (m) < - Shared Left-Turn
 LOS - Level of Service TCS - Traffic Control Signal > - Shared Right-Turn
 Delay - Average Delay per Vehicle in Seconds TWSC - Two-Way Stop Control

Auxiliary Turn Lane

The foregoing traffic analyses indicate that the existing configuration and traffic control at the Site Driveway and Wellington Road 27 can accommodate the additional traffic at acceptable Level-of-Service conditions. However, there are specific areas where roadway improvements warrant consideration, such as the need for an auxiliary northbound left-turn lane. This was examined using MTO left-turn warrant procedure.

The warrants for left-turn lanes are based on the MTO design standards for left-turn lane warrants⁴. General traffic engineering practice is to provide for a design speed that is 10

⁴Geometric Design Manual for Ontario Highways, Queen’s Printer for Ontario, 1986

kilometres per hour over the posted speed limit. Therefore, the nomographs for a design speed of 50 kilometres per hour was used for the left turn warrant analysis.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5%, as nomographs are only provided for 5% increments. The left turn lane warrants are included in **Appendix D** and indicate that a northbound left-turn lane is not warranted under 2030 total traffic conditions.

Sight Distance

It is noted that there is a vertical curvature on Wellington Road 27 to the south of the subject Site Driveway that could impact the sight distance at the intersection. The design speed for Wellington Road 27 at the site driveway is 50 kilometres per hour. **Table 6** summarizes the minimum sight distance requirements for a 50 km/h design speed. Based on the Transportation Association of Canada (TAC) guidelines, the minimum stopping sight distance for a road with a design speed of 50 kilometres per hour is 65 metres⁵, the minimum sight distance for a left-turn from stop is 105 metres⁶, and the minimum sight distance for a right-turn from stop is 95 metres⁷.

TABLE 6: TAC & MTO SIGHT DISTANCE REQUIREMENTS

Minimum Requirement	Design Speed
	50 km/h
Stopping sight distance (m)	65
Sight distance for a left-turn from stop (m)	105
Sight distance for a right-turn from stop (m)	95

The available stopping sight distance to the south at the Sacred Heart School Driveway as measured in the field is approximately 150m which exceeds the minimum distance. The turning sight distance from the School Driveway is approximately 170m. As the Site Driveway is approximately 30-35m to the north of the Sacred Heart School Driveway, this would increase the available sight distance for the subject site driveway.

The sight distance to the north of the driveways exceeds the minimum requirements and is not a concern.

Queue Reach

In order to assess the storage requirements on Wellington Road 27 to accommodate the site driveway, a review of queueing was conducted on the southbound movements at the Sacred Heart / OPP driveway and the northbound movements at the proposed Bonarrow Access Road to further review the extent of possible queue reach extending past the propose site driveway.

⁵ TAC Table 2.5.2. Stopping Sight Distance on level roadways for Automobiles

⁶ TAC Table 9.9.4. Design Intersection Sight Distance – Case B1, Left-Turn from Stop

⁷ TAC Table 9.9.6. Design Intersection Sight Distance – Case B2, Right-Turn from Stop



Table 7 outlines the 95th percentile back of queue estimates for the 2030 total traffic conditions. The following is observed:

- ▶ The southbound movement queue reach at Sacred Heart / OPP driveways is forecast to be approximately 2 metres which is approximately 28 metres from the proposed site driveway. The queue reach is not a concern; and
- ▶ The northbound movement queue react at the proposed Bonarrow Access Road is forecast to be 11 metres which is approximately 74 metres from the proposed site driveway. The queue reach is not a concern.

TABLE 7: 95TH PERCENTILE QUEUING ESTIMATES

Wellington Road 27 Intersection	Lane	Available Storage Length (m)	95th Percentile Queue (m)		Difference (m)
			AM	PM	
Sacred Heart / OPP Driveways	SB LTR	30	2	1	28
Bonarrow Access Road	NB LT	85	5	11	74

Single Driveway

The development proposes a single driveway to serve the 51 dwelling units. The Transportation Association of Canada⁸ provides guidelines for assessing the number of driveways that will be required to serve a given development size, based on the following categorization of driveway volumes:

- ▶ Low Volume Driveways: less than 25 vehicles per day;
- ▶ Moderate Volume Driveways: greater than 25 and less than 750 vehicles per day; and
- ▶ High Volume Driveways: greater than 750 vehicles per day.

Developments with low to moderate driveway volumes can be served by a single driveway with one lane each for entering and exiting.

The proposed development will generate approximately 250 vehicles per day based on the ITE Trip Generation daily rates and can be served by a single driveway.

⁸ Geometric Design Guide for Canadian Roads, Section 8.9.2 – Driveways Operational Considerations, Transportation Association of Canada, June 2018



Summary and Conclusion

The purpose of the Traffic Impact Brief has been to assess the impacts of the proposed residential development on the operations of Wellington Road 27, and to examine the potential need for road/driveway modifications to accommodate those impacts.

The traffic review involved operational analysis of the intersections for weekday AM and PM peak hours under 2030 future traffic conditions. The results of the analyses indicate that under 2030 traffic conditions the intersections and individual movements operate at good Levels of Service, i.e. LOS A, LOS B or LOS C. Based on the results of the operational analyses no driveway modifications will be required. Also, based on driveway operational guidelines, the proposed development can be adequately served by a single driveway.

The need for auxiliary (northbound) left turn lane at the driveway, and the adequacy of available sight distances north and south of the driveway were also examined. The results indicate that no auxiliary (northbound) left-turn lane is required.

Regarding sight distances, the available sight distance north of the driveway is greater than the required sight distance. The available sight distance to the south also exceeds the minimum distance.

In conclusion, the proposed residential development on Wellington Road 27 can accommodate the additional traffic without any modifications to the driveway.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED



Rajan Philips
M.Sc. (PI), P.Eng.
Senior Transportation Consultant



Jim Mallett
M.A.Sc., P.Eng., PTOE
President and Chief Executive Officer



Attachments





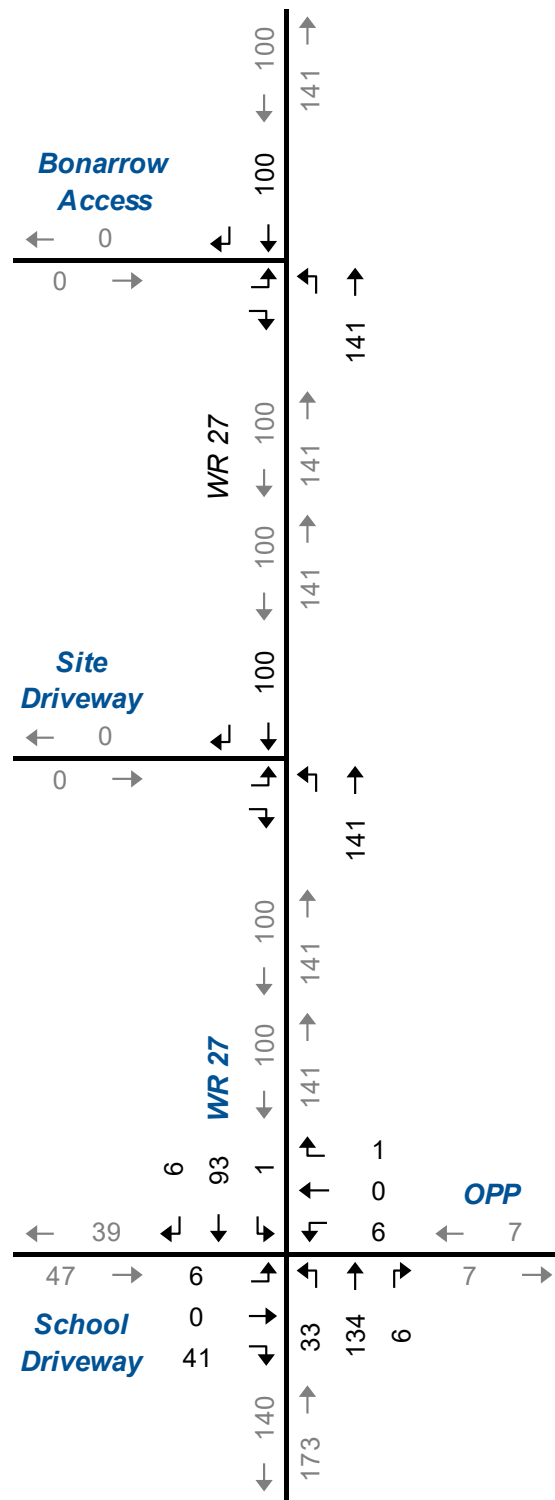
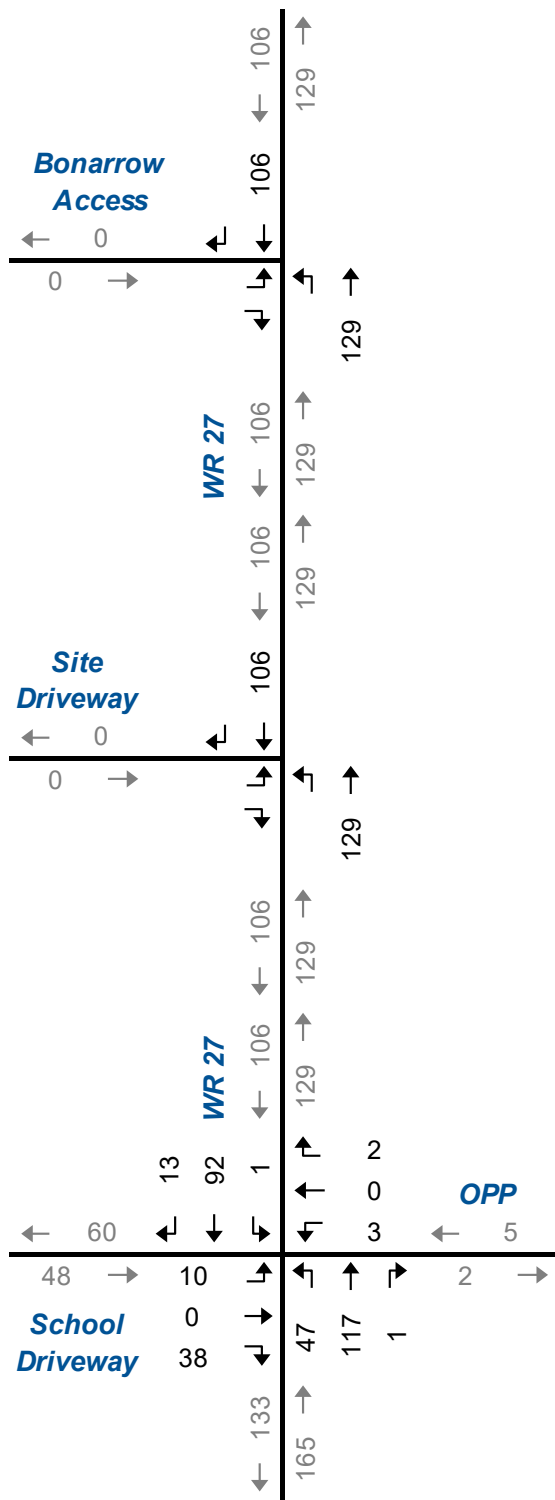
Study Area

5150 Wellington Road 27, Rockwood Traffic Brief
180097

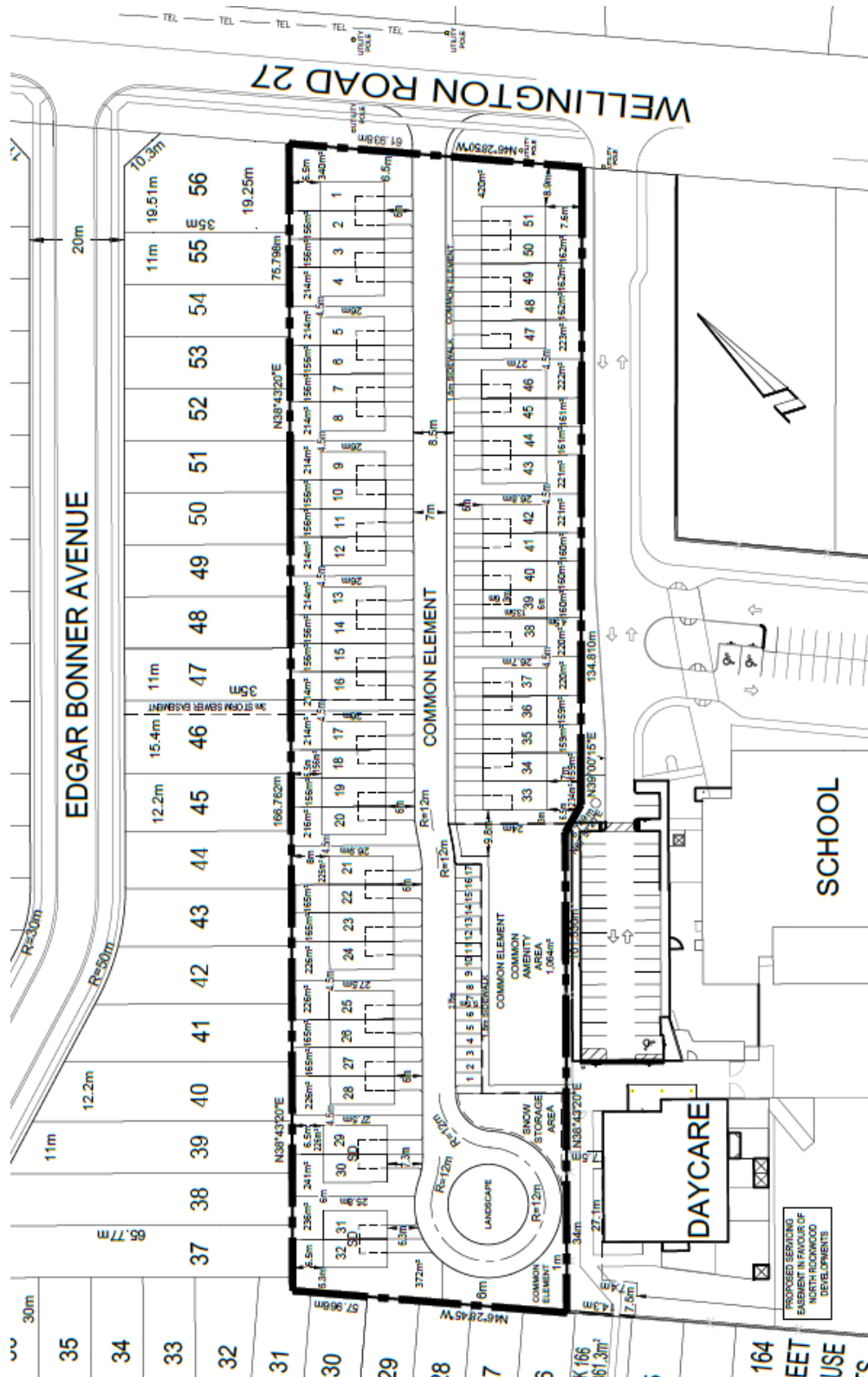
Figure 1

AM Peak Hour

PM Peak Hour



Existing Traffic Volumes



NTS



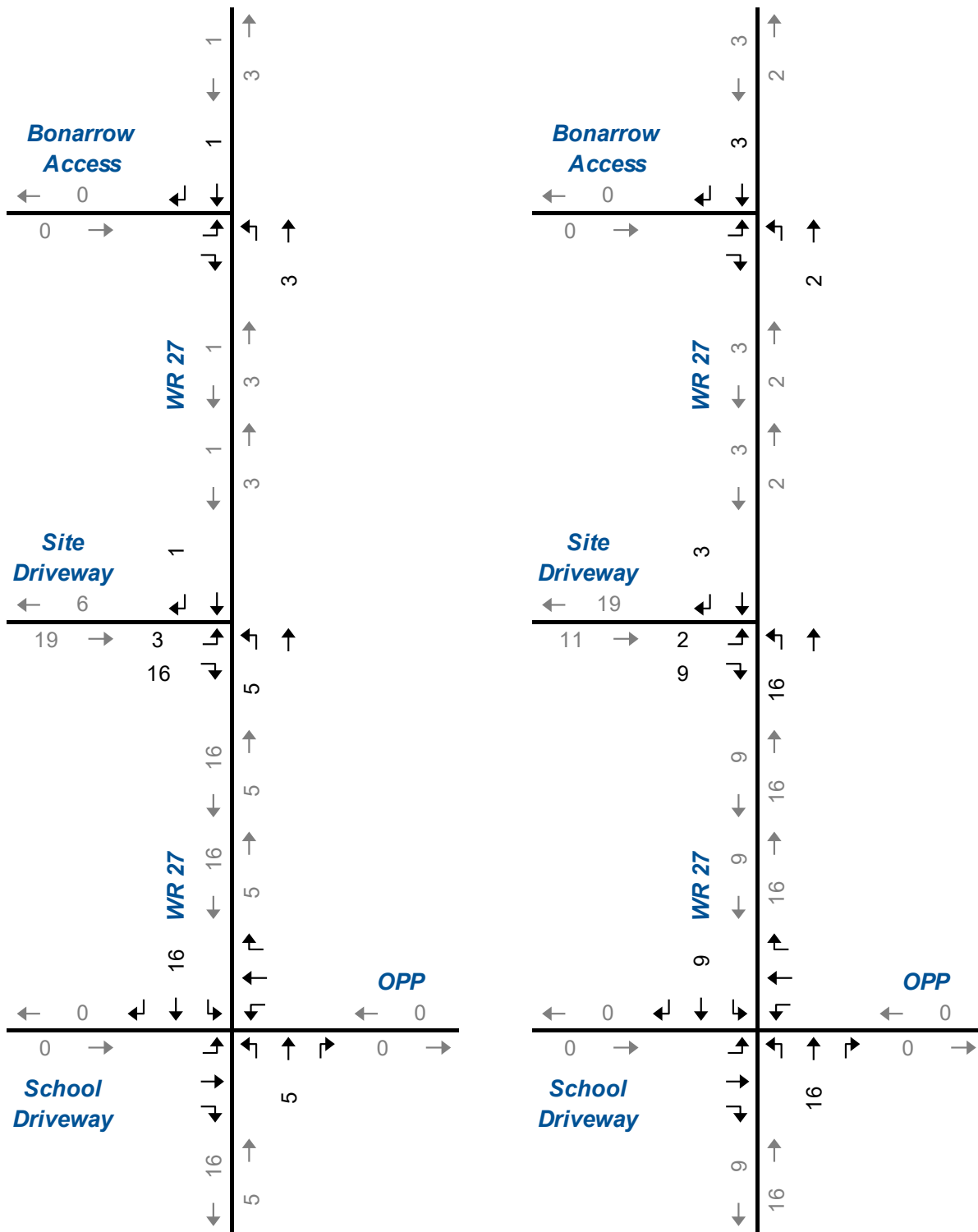
Site Plan

5150 Wellington Road 27, Rockwood Traffic Brief
180097

Figure 3

AM Peak Hour

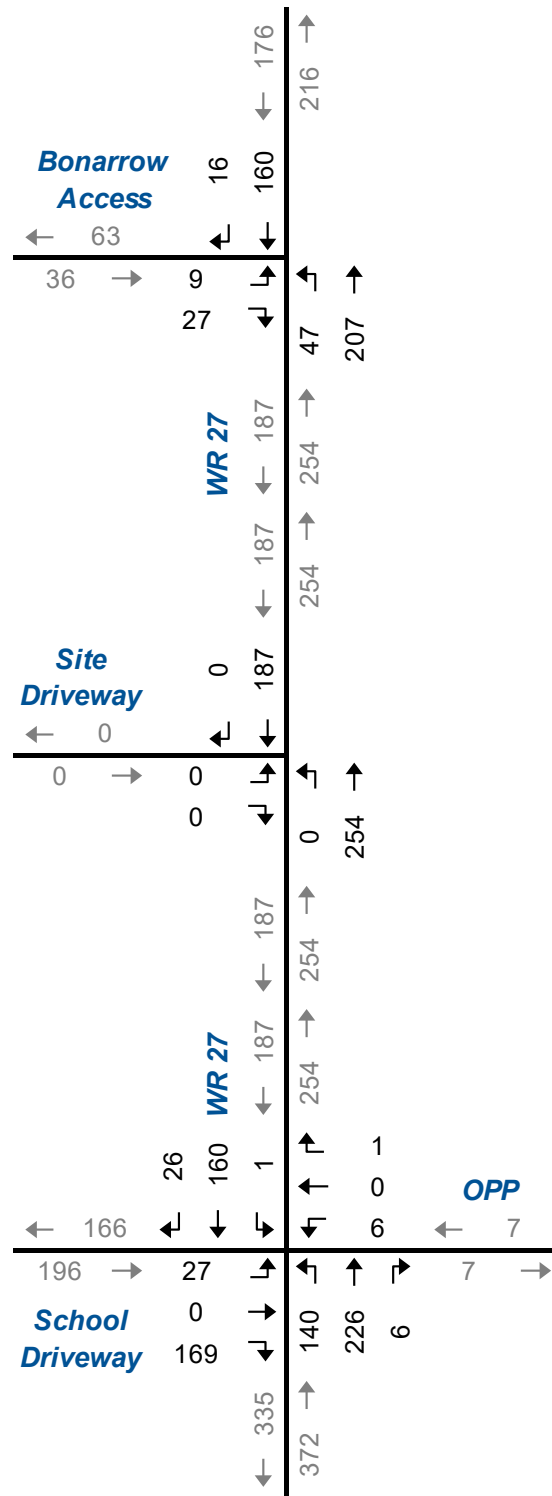
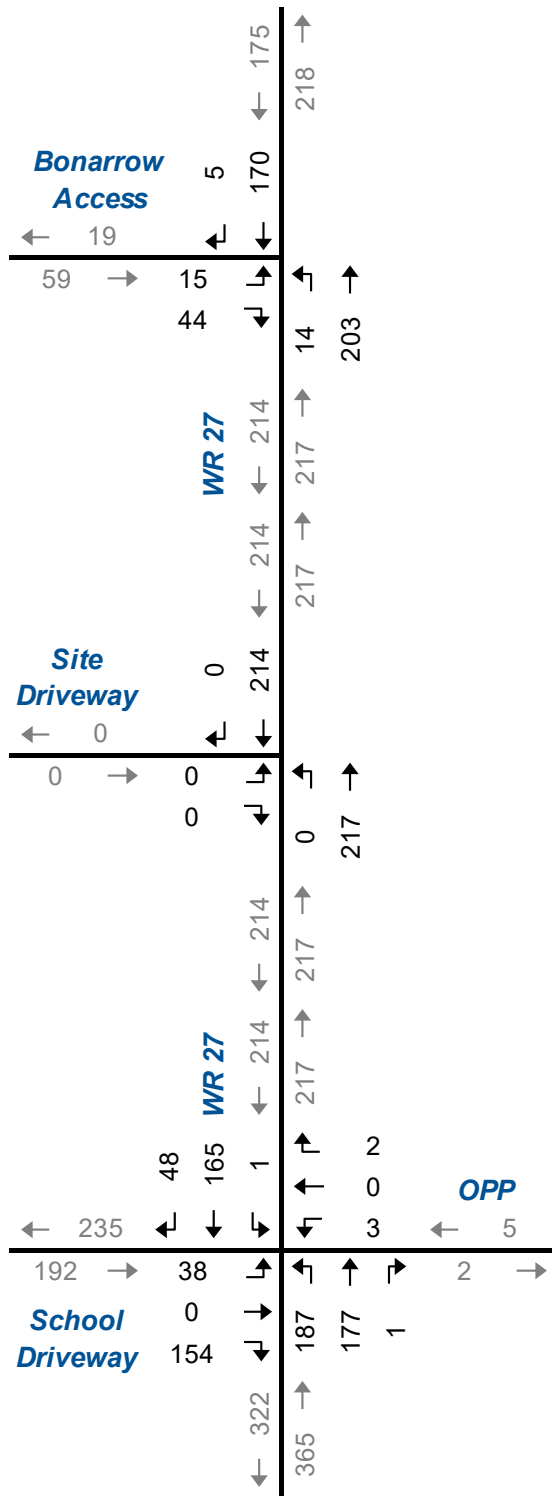
PM Peak Hour



Site Generated Traffic Volumes

AM Peak Hour

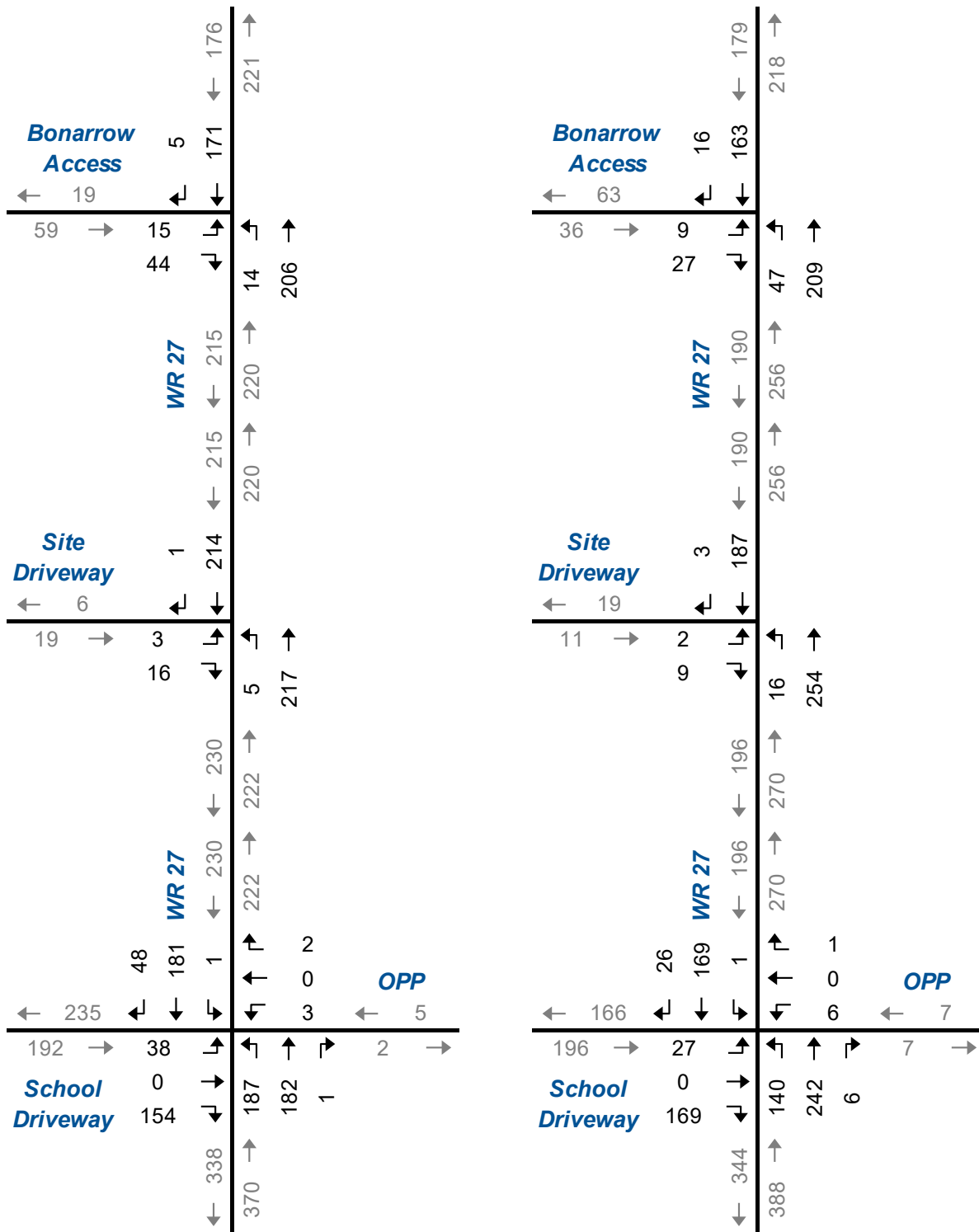
PM Peak Hour



Background (2030)
Traffic Volumes

AM Peak Hour

PM Peak Hour



Total (2030)
Traffic Volumes

Appendix A

EXISTING TRAFFIC VOLUMES





Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Sacred Heart Driveway
Site Code:
Start Date: 04/03/2018
Page No: 1

Turning Movement Data

Start Time	Sacred Heart Driveway Eastbound						Police Driveway Westbound						Main Street Northbound						Main Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	1	0	0	0	0	1	2	0	1	0	0	3	1	8	1	0	0	10	0	12	0	0	0	12	26
6:15 AM	0	0	0	0	0	0	2	0	0	0	0	2	0	13	3	0	0	16	0	11	0	0	0	11	29
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	16	1	0	0	18	0	9	0	0	0	9	27
6:45 AM	0	0	0	0	0	0	4	0	0	0	0	4	1	18	2	0	1	21	1	9	0	0	0	10	35
Hourly Total	1	0	0	0	0	1	8	0	1	0	0	9	3	55	7	0	1	65	1	41	0	0	0	42	117
7:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	25	3	0	1	28	0	10	0	0	0	10	40
7:15 AM	1	0	0	0	0	1	1	0	1	0	0	2	2	17	0	0	0	19	0	22	2	0	0	24	46
7:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	2	28	2	0	0	32	1	27	1	0	0	29	64
7:45 AM	0	0	1	0	0	1	0	0	0	0	0	0	3	22	2	0	0	27	0	24	3	0	0	27	55
Hourly Total	1	0	4	0	0	5	1	0	3	0	0	4	7	92	7	0	1	106	1	83	6	0	0	90	205
8:00 AM	0	0	3	0	0	3	1	0	1	0	0	2	7	28	1	0	0	36	0	26	3	0	0	29	70
8:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	3	34	0	0	0	37	0	22	3	0	0	25	63
8:30 AM	4	0	14	0	0	18	1	0	0	1	0	2	22	27	0	0	0	49	1	22	3	0	0	26	95
8:45 AM	6	0	21	0	0	27	1	0	0	0	0	1	15	28	0	0	0	43	0	22	4	0	0	26	97
Hourly Total	10	0	38	0	0	48	3	0	2	1	0	6	47	117	1	0	0	165	1	92	13	0	0	106	325
9:00 AM	1	0	3	0	0	4	0	0	0	0	0	0	1	20	0	0	0	21	0	24	1	0	0	25	50
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	27	1	0	0	28	0	18	0	0	0	18	46
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	20	1	0	0	21	0	17	1	0	0	18	39
9:45 AM	1	0	0	0	0	1	0	0	0	0	0	0	0	25	0	0	0	25	1	18	0	0	0	19	45
Hourly Total	2	0	3	0	0	5	0	0	0	0	0	0	1	92	2	0	0	95	1	77	2	0	0	80	180
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	18	0	28	0	0	0	28	46
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	18	0	29	1	0	0	30	48
2:30 PM	1	0	0	0	0	1	2	0	1	0	0	3	0	29	0	0	0	29	0	24	0	0	0	24	57
2:45 PM	0	0	0	0	0	0	1	0	0	0	0	1	5	32	1	0	0	38	1	27	1	0	0	29	68
Hourly Total	1	0	0	0	0	1	3	0	1	0	0	4	5	97	1	0	0	103	1	108	2	0	0	111	219
3:00 PM	1	0	7	0	0	8	1	0	0	0	0	1	20	25	0	0	0	45	0	24	3	0	0	27	81
3:15 PM	2	0	29	0	0	31	1	0	0	0	0	1	10	30	1	0	0	41	0	17	2	0	0	19	92
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3:45 PM	0	0	3	0	0	3	1	0	1	0	0	2	1	31	2	0	0	34	1	35	1	0	0	37	76
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4:00 PM	0	0	2	0	0	2	1	0	0	0	0	1	1	27	1	0	0	29	0	26	0	0	0	26	58
4:15 PM	0	0	4	0	0	4	4	0	0	0	0	4	3	24	2	0	0	29	0	32	1	0	0	33	70
4:30 PM	2	0	3	0	0	5	1	1	0	0	0	2	2	37	2	0	0	41	0	39	0	0	0	39	87
4:45 PM	5	0	3	0	0	8	0	0	1	0	0	1	1	22	1	0	0	24	0	30	0	0	0	30	63



Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsl.com

Count Name: Sacred Heart Driveway
Site Code:
Start Date: 04/03/2018
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Sacred Heart Driveway Eastbound						Police Driveway Westbound						Main Street Northbound						Main Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	0	0	3	0	0	3	1	0	1	0	0	2	7	28	1	0	0	36	0	26	3	0	0	29	70
8:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	3	34	0	0	0	37	0	22	3	0	0	25	63
8:30 AM	4	0	14	0	0	18	1	0	0	1	0	2	22	27	0	0	0	49	1	22	3	0	0	26	95
8:45 AM	6	0	21	0	0	27	1	0	0	0	0	1	15	28	0	0	0	43	0	22	4	0	0	26	97
Total	10	0	38	0	0	48	3	0	2	1	0	6	47	117	1	0	0	165	1	92	13	0	0	106	325
Approach %	20.8	0.0	79.2	0.0	-	-	50.0	0.0	33.3	16.7	-	-	28.5	70.9	0.6	0.0	-	-	0.9	86.8	12.3	0.0	-	-	-
Total %	3.1	0.0	11.7	0.0	-	14.8	0.9	0.0	0.6	0.3	-	1.8	14.5	36.0	0.3	0.0	-	50.8	0.3	28.3	4.0	0.0	-	32.6	-
PHF	0.417	0.000	0.452	0.000	-	0.444	0.750	0.000	0.500	0.250	-	0.750	0.534	0.860	0.250	0.000	-	0.842	0.250	0.885	0.813	0.000	-	0.914	0.838
Lights	8	0	37	0	-	45	3	0	2	1	-	6	44	103	1	0	-	148	1	80	13	0	-	94	293
% Lights	80.0	-	97.4	-	-	93.8	100.0	-	100.0	100.0	-	100.0	93.6	88.0	100.0	-	-	89.7	100.0	87.0	100.0	-	-	88.7	90.2
Mediums	2	0	1	0	-	3	0	0	0	0	-	0	3	12	0	0	-	15	0	6	0	0	-	6	24
% Mediums	20.0	-	2.6	-	-	6.3	0.0	-	0.0	0.0	-	0.0	6.4	10.3	0.0	-	-	9.1	0.0	6.5	0.0	-	-	5.7	7.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	6	0	0	-	6	8
% Articulated Trucks	0.0	-	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	1.7	0.0	-	-	1.2	0.0	6.5	0.0	-	-	5.7	2.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
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Count Name: Sacred Heart Driveway
Site Code:
Start Date: 04/03/2018
Page No: 6

Turning Movement Peak Hour Data (3:00 PM)

Start Time	Sacred Heart Driveway Eastbound						Police Driveway Westbound						Main Street Northbound						Main Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:00 PM	1	0	7	0	0	8	1	0	0	0	0	1	20	25	0	0	0	45	0	24	3	0	0	27	81
3:15 PM	2	0	29	0	0	31	1	0	0	0	0	1	10	30	1	0	0	41	0	17	2	0	0	19	92
3:30 PM	3	0	2	0	0	5	3	0	0	0	0	3	2	48	3	0	0	53	0	17	0	0	0	17	78
3:45 PM	0	0	3	0	0	3	1	0	1	0	0	2	1	31	2	0	0	34	1	35	1	0	0	37	76
Total	6	0	41	0	0	47	6	0	1	0	0	7	33	134	6	0	0	173	1	93	6	0	0	100	327
Approach %	12.8	0.0	87.2	0.0	-	-	85.7	0.0	14.3	0.0	-	-	19.1	77.5	3.5	0.0	-	-	1.0	93.0	6.0	0.0	-	-	-
Total %	1.8	0.0	12.5	0.0	-	14.4	1.8	0.0	0.3	0.0	-	2.1	10.1	41.0	1.8	0.0	-	52.9	0.3	28.4	1.8	0.0	-	30.6	-
PHF	0.500	0.000	0.353	0.000	-	0.379	0.500	0.000	0.250	0.000	-	0.583	0.413	0.698	0.500	0.000	-	0.816	0.250	0.664	0.500	0.000	-	0.676	0.889
Lights	4	0	39	0	-	43	6	0	1	0	-	7	30	116	6	0	-	152	1	86	6	0	-	93	295
% Lights	66.7	-	95.1	-	-	91.5	100.0	-	100.0	-	-	100.0	90.9	86.6	100.0	-	-	87.9	100.0	92.5	100.0	-	-	93.0	90.2
Mediums	2	0	2	0	-	4	0	0	0	0	-	0	3	15	0	0	-	18	0	6	0	0	-	6	28
% Mediums	33.3	-	4.9	-	-	8.5	0.0	-	0.0	-	-	0.0	9.1	11.2	0.0	-	-	10.4	0.0	6.5	0.0	-	-	6.0	8.6
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	0	1	0	0	-	1	4
% Articulated Trucks	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	2.2	0.0	-	-	1.7	0.0	1.1	0.0	-	-	1.0	1.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
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Count Name: Sacred Heart Driveway
Site Code:
Start Date: 04/03/2018
Page No: 8

Appendix B

EXISTING TRAFFIC OPERATION REPORTS



HCM Unsignalized Intersection Capacity Analysis
101: WR 27 & School Driveway/OPP Driveway

5146 Wellington Road 27
Existing (2018)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Traffic Volume (veh/h)	10	0	38	3	0	2	47	117	1	1	92	13
Future Volume (Veh/h)	10	0	38	3	0	2	47	117	1	1	92	13
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	41	3	0	2	51	127	1	1	100	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	340	339	107	380	346	128	114			128		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340	339	107	380	346	128	114			128		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	98	100	96	99	100	100	96			100		
cM capacity (veh/h)	564	565	944	541	560	928	1451			1470		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	52	5	179	115								
Volume Left	11	3	51	1								
Volume Right	41	2	1	14								
cSH	826	650	1451	1470								
Volume to Capacity	0.06	0.01	0.04	0.00								
Queue Length 95th (m)	1.5	0.2	0.8	0.0								
Control Delay (s)	9.6	10.6	2.4	0.1								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.6	10.6	2.4	0.1								
Approach LOS	A	B										
Intersection Summary												
Average Delay	2.8											
Intersection Capacity Utilization	25.5%		ICU Level of Service		A							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
101: WR 27 & School Driveway/OPP Driveway

5146 Wellington Road 27
Existing (2018)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Traffic Volume (veh/h)	6	0	41	6	0	1	33	134	6	1	93	6
Future Volume (Veh/h)	6	0	41	6	0	1	33	134	6	1	93	6
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	45	7	0	1	36	146	7	1	101	7
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	329	332	104	373	332	150	108			153		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	329	332	104	373	332	150	108			153		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	95	99	100	100	98			100		
cM capacity (veh/h)	612	577	950	549	577	902	1476			1440		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	52	8	189	109								
Volume Left	7	7	36	1								
Volume Right	45	1	7	7								
cSH	884	577	1476	1440								
Volume to Capacity	0.06	0.01	0.02	0.00								
Queue Length 95th (m)	1.4	0.3	0.6	0.0								
Control Delay (s)	9.3	11.3	1.6	0.1								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.3	11.3	1.6	0.1								
Approach LOS	A	B										
Intersection Summary												
Average Delay	2.5											
Intersection Capacity Utilization	25.9%		ICU Level of Service		A							
Analysis Period (min)	15											

Appendix C

TOTAL TRAFFIC OPERATION REPORTS



HCM Unsignalized Intersection Capacity Analysis 5150 Wellington Road 27, Rockwood
 101: WR 27 (Main St) & Sacred Heart Driveway/OPP Driveway Total (2030)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	38	0	154	3	0	2	187	182	1	1	181	48
Future Volume (Veh/h)	38	0	154	3	0	2	187	182	1	1	181	48
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	0	167	3	0	2	203	198	1	1	197	52
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	832	830	223	996	856	198	249			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	832	830	223	996	856	198	249			199		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	100	80	98	100	100	85			100		
cM capacity (veh/h)	256	261	822	158	252	848	1328			1385		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	208	5	402	250								
Volume Left	41	3	203	1								
Volume Right	167	2	1	52								
cSH	572	234	1328	1385								
Volume to Capacity	0.36	0.02	0.15	0.00								
Queue Length 95th (m)	12.6	0.5	4.1	0.0								
Control Delay (s)	14.8	20.7	4.8	0.0								
Lane LOS	B	C	A	A								
Approach Delay (s)	14.8	20.7	4.8	0.0								
Approach LOS	B	C										
Intersection Summary												
Average Delay	5.9											
Intersection Capacity Utilization	54.1%			ICU Level of Service	A							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 5150 Wellington Road 27, Rockwood
 102: WR 27 (Main St) & Bonarrow Access Total (2030)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	15	44	14	206	171	5
Future Volume (Veh/h)	15	44	14	206	171	5
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)	16	48	15	224	186	5
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	442	188	191			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442	188	191			
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	94	99			
cM capacity (veh/h)	570	859	1395			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	239	191			
Volume Left	16	15	0			
Volume Right	48	0	5			
cSH	762	1395	1700			
Volume to Capacity	0.08	0.01	0.11			
Queue Length 95th (m)	2.1	0.2	0.0			
Control Delay (s)	10.2	0.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.2	0.6	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	1.6					
Intersection Capacity Utilization	32.5%		ICU Level of Service	A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 301: WR 27 (Main St) & Site Driveway

5150 Wellington Road 27, Rockwood
 Total (2030)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (veh/h)	3	16	5	217	214	1
Future Volume (Veh/h)	3	16	5	217	214	1
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)	3	17	5	236	233	1
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	480	234	234			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	480	234	234			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	100			
cM capacity (veh/h)	547	811	1345			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	20	241	234			
Volume Left	3	5	0			
Volume Right	17	0	1			
cSH	756	1345	1700			
Volume to Capacity	0.03	0.00	0.14			
Queue Length 95th (m)	0.6	0.1	0.0			
Control Delay (s)	9.9	0.2	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	0.2	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization		25.4%		ICU Level of Service	A	
Analysis Period (min)		15				

Arterial Level of Service

5150 Wellington Road 27, Rockwood
 Total (2030)

Arterial Level of Service: NB WR 27 (Main St)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (km)	Arterial Speed
OPP Driveway	101	2.9	52.5	0.6	39
Site Driveway	301	0.3	3.4	0.0	37
Bonarrow Access	102	0.2	8.8	0.1	38
Total		3.4	64.7	0.7	39

Arterial Level of Service: SB WR 27 (Main St)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (km)	Arterial Speed
Bonarrow Access	102	0.4	24.1	0.3	40
Site Driveway	301	0.2	8.7	0.1	39
Sacred Heart Drivewa	101	0.3	3.5	0.0	35
Total		0.9	36.3	0.4	39

Queuing and Blocking Report

5150 Wellington Road 27, Rockwood
Total (2030)

Intersection: 101: WR 27 (Main St) & Sacred Heart Driveway/OPP Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	28.4	8.9	35.0	5.0
Average Queue (m)	14.1	1.3	11.1	0.2
95th Queue (m)	23.2	6.4	26.7	2.2
Link Distance (m)	108.0	65.2	555.4	22.7
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 102: WR 27 (Main St) & Bonarrow Access

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.0	10.5
Average Queue (m)	8.2	0.8
95th Queue (m)	14.2	5.2
Link Distance (m)	99.6	83.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 301: WR 27 (Main St) & Site Driveway

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	1.9
Average Queue (m)	3.8	0.1
95th Queue (m)	10.9	1.9
Link Distance (m)	55.0	22.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

HCM Unsignalized Intersection Capacity Analysis

5150 Wellington Road 27, Rockwood
Total (2030)

101: WR 27 (Main St) & Sacred Heart Driveway/OPP Driveway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	27	0	169	6	0	1	140	242	6	1	169	26
Future Volume (Veh/h)	27	0	169	6	0	1	140	242	6	1	169	26
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	184	7	0	1	152	263	7	1	184	28
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	772	774	198	954	784	266	212				270	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	772	774	198	954	784	266	212				270	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	90	100	78	96	100	100	89				100	
cM capacity (veh/h)	292	295	848	172	291	777	1370				1305	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	213	8	422	213								
Volume Left	29	7	152	1								
Volume Right	184	1	7	28								
cSH	673	191	1370	1305								
Volume to Capacity	0.32	0.04	0.11	0.00								
Queue Length 95th (m)	10.3	1.0	2.8	0.0								
Control Delay (s)	12.8	24.7	3.5	0.0								
Lane LOS	B	C	A	A								
Approach Delay (s)	12.8	24.7	3.5	0.0								
Approach LOS	B	C										
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			52.8%				ICU Level of Service				A	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 102: WR 27 (Main St) & Bonarrow Access

5150 Wellington Road 27, Rockwood
 Total (2030)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Volume (veh/h)	9	27	47	209	163	16
Future Volume (Veh/h)	9	27	47	209	163	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)	10	29	51	227	177	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	514	186	194			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	186	194			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	96			
cM capacity (veh/h)	505	862	1391			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	39	278	194			
Volume Left	10	51	0			
Volume Right	29	0	17			
cSH	729	1391	1700			
Volume to Capacity	0.05	0.04	0.11			
Queue Length 95th (m)	1.3	0.9	0.0			
Control Delay (s)	10.2	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.2	1.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		36.5%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
 301: WR 27 (Main St) & Site Driveway

5150 Wellington Road 27, Rockwood
 Total (2030)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↑	
Traffic Volume (veh/h)	3	9	16	254	187	3
Future Volume (Veh/h)	3	9	16	254	187	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)	3	10	17	276	203	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	514	204	206			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	204	206			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	517	841	1377			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	13	293	206			
Volume Left	3	17	0			
Volume Right	10	0	3			
cSH	735	1377	1700			
Volume to Capacity	0.02	0.01	0.12			
Queue Length 95th (m)	0.4	0.3	0.0			
Control Delay (s)	10.0	0.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	10.0	0.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.6				
Intersection Capacity Utilization		36.5%		ICU Level of Service	A	
Analysis Period (min)		15				

Arterial Level of Service

5150 Wellington Road 27, Rockwood
Total (2030)

Arterial Level of Service: NB WR 27 (Main St)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (km)	Arterial Speed
OPP Driveway	101	2.6	52.8	0.6	38
Site Driveway	301	0.3	3.4	0.0	36
Bonarrow Access	102	0.5	9.1	0.1	37
Total		3.4	65.3	0.7	38

Arterial Level of Service: SB WR 27 (Main St)

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (km)	Arterial Speed
Bonarrow Access	102	0.4	24.2	0.3	40
Site Driveway	301	0.2	8.8	0.1	38
Sacred Heart Drivewa	101	0.2	3.5	0.0	35
Total		0.9	36.5	0.4	39

Queuing and Blocking Report

5150 Wellington Road 27, Rockwood
Total (2030)

Intersection: 101: WR 27 (Main St) & Sacred Heart Driveway/OPP Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	27.0	10.0	26.6	2.7
Average Queue (m)	13.3	1.9	7.1	0.1
95th Queue (m)	21.2	8.0	18.9	1.4
Link Distance (m)	108.0	65.2	555.4	22.7
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 102: WR 27 (Main St) & Bonarrow Access

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.6	17.4
Average Queue (m)	6.9	2.6
95th Queue (m)	14.1	11.1
Link Distance (m)	99.6	83.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 301: WR 27 (Main St) & Site Driveway

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	16.0
Average Queue (m)	3.0	0.7
95th Queue (m)	9.8	6.1
Link Distance (m)	55.0	22.7
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

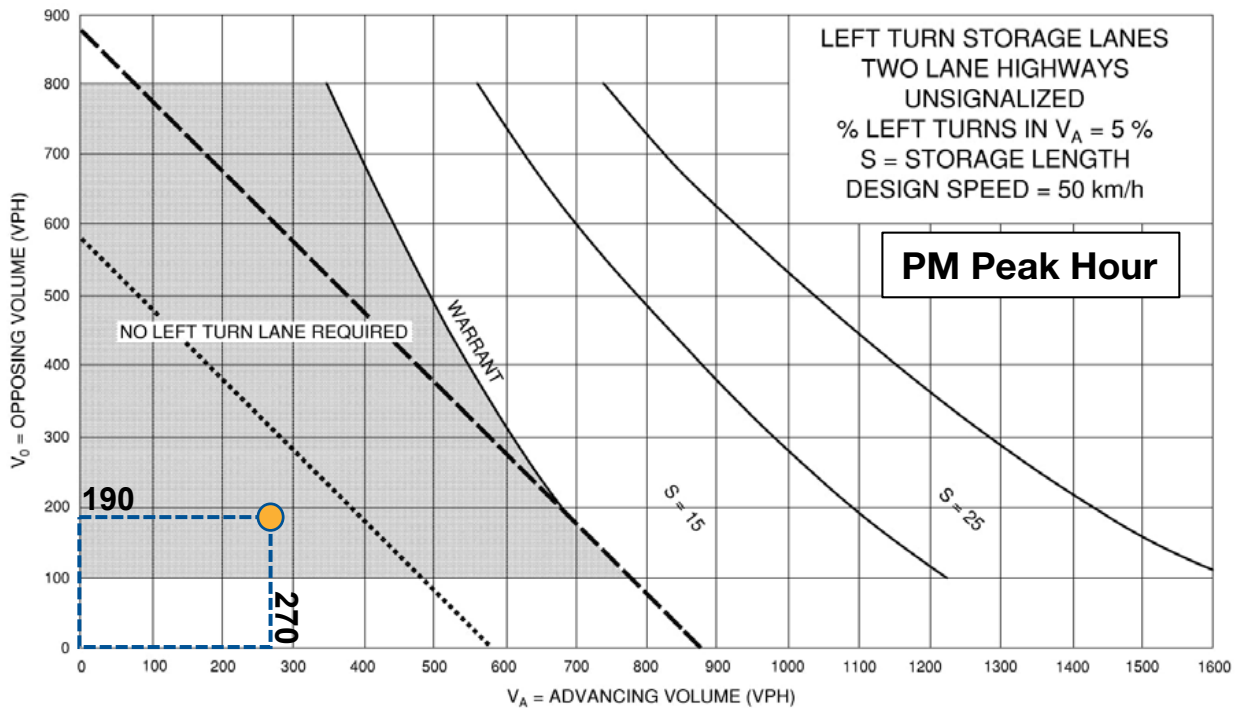
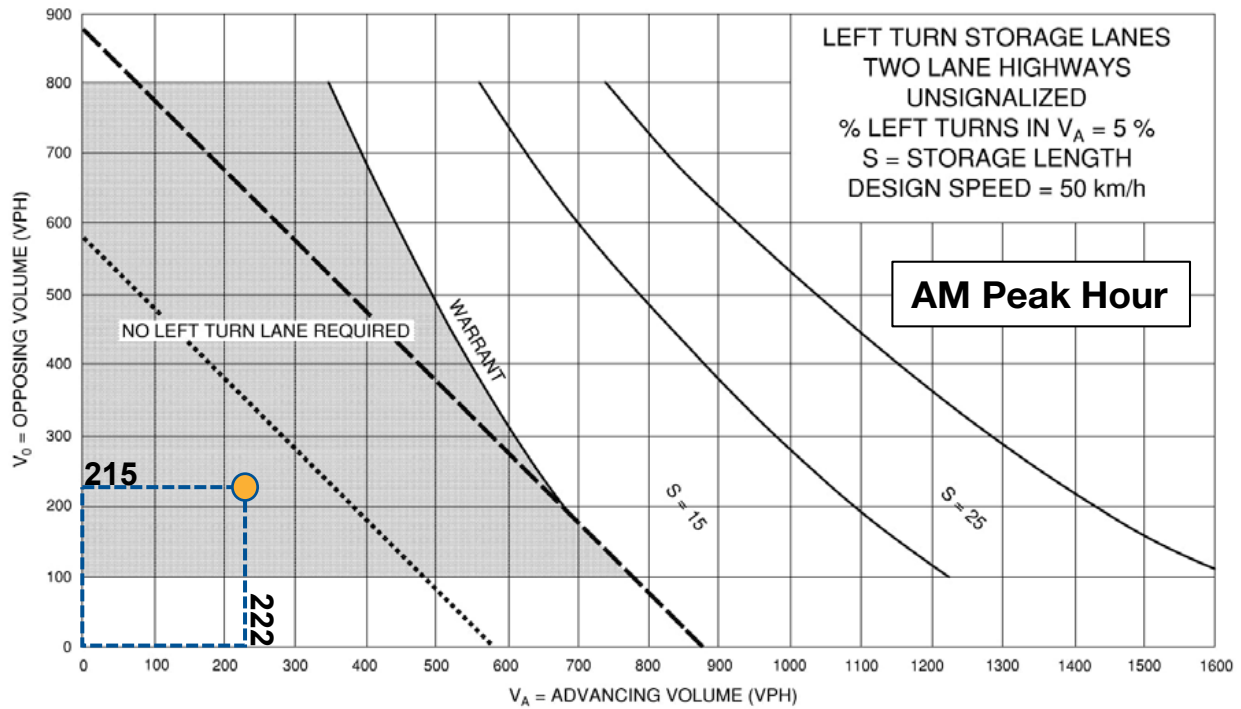
Network Summary

Network wide Queuing Penalty: 0

Appendix D

LEFT-TURN LANE WARRANT NOMOGRAPHS





Northbound Left-Turn Lane Warrant Total (2030) Traffic Volumes