



# **Proposed New Elementary School Municipal Road 80 Val Therese**

## **Traffic Impact Study**

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December 2, 2019

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Responsable des projets de construction  
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201 rue Jogues  
Sudbury, ON P2C 5L7

Dear Mr. Guillot:

**Subject: Proposed New Elementary School  
MR 80, Val Therese  
Traffic Impact Study Final Report**

We are pleased to submit our final Traffic Impact Study report dealing with your proposed new elementary school and day care centre on MR 80 in Val Therese. The school replaces three existing elementary schools in the Val Therese/Hanmer area.

While our technical analysis has shown that according to current Ontario (MTO) standards traffic signals are not warranted at the school entrance, it is our opinion that the school cannot function safely at this site without traffic signals. If the school is to be located at this site, we recommend full traffic signals on MR 80 to serve the school and Shirley Avenue.

The report also contains several recommendations implementing the City's policies on Active Transportation, including infrastructure improvements to encourage/facilitate walking, biking, transit and ridesharing.

It has been a pleasure assisting you with this project.

Yours truly,

Toivo Rukholm, P.Eng.  
Tranplan Associates



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## 1.0 INTRODUCTION AND BACKGROUND

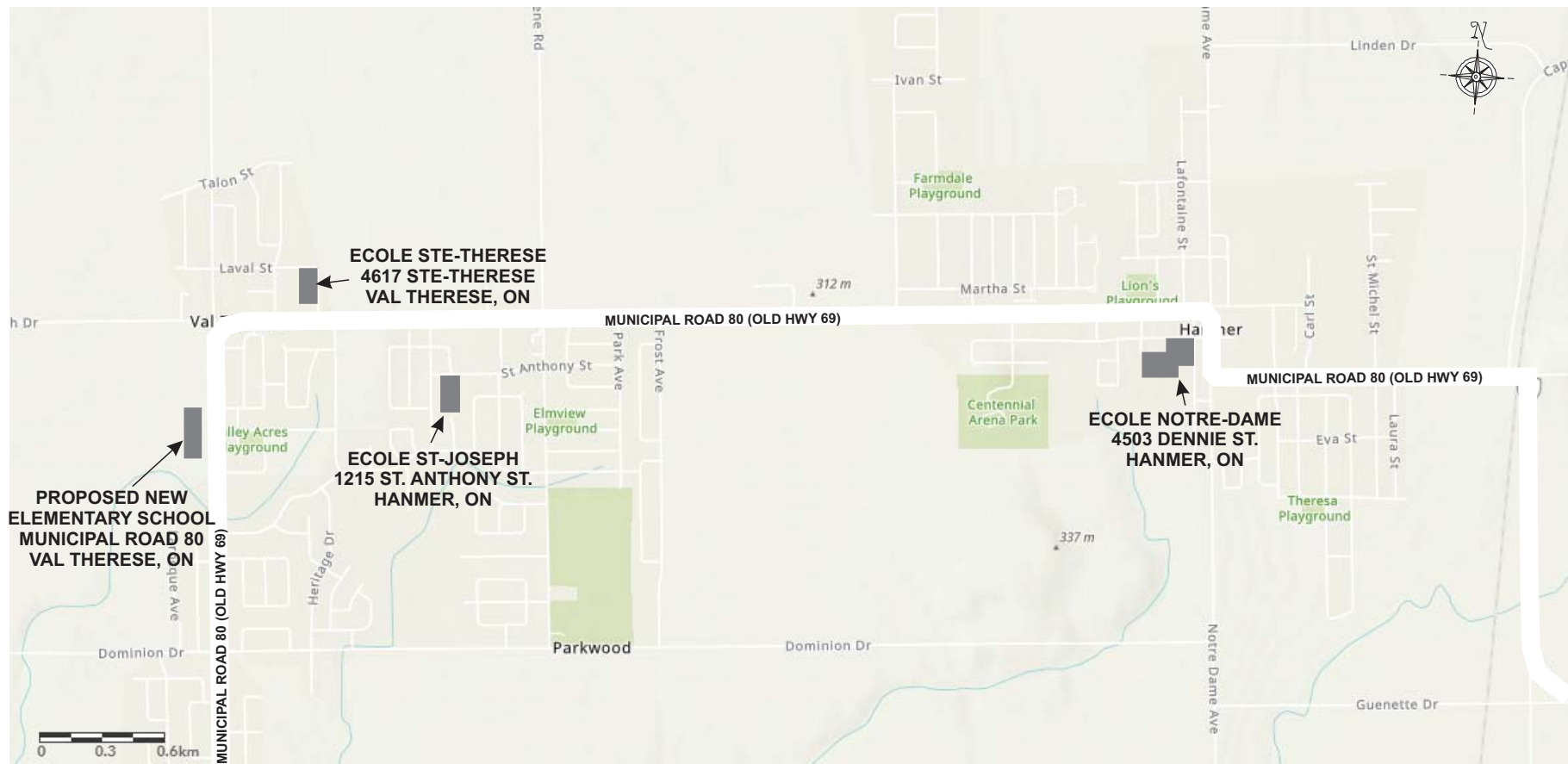
Tranplan Associates (Tranplan) is pleased to present the results of a traffic impact study dealing with the proposed new Conseil scolaire catholique du Nouvel-Ontario ("CSCNO") elementary school on the west side of Municipal Road 80 (old Highway 69 North) opposite Shirley Avenue in Val Therese (see **Exhibit 1.1 Key Map**). The new school will replace the following three existing schools in the Val Therese/Hanmer area (see *Key Map* for their locations):

- i) Ecole Ste Therese
- ii) Ecole St Joseph
- iii) Ecole Notre Dame

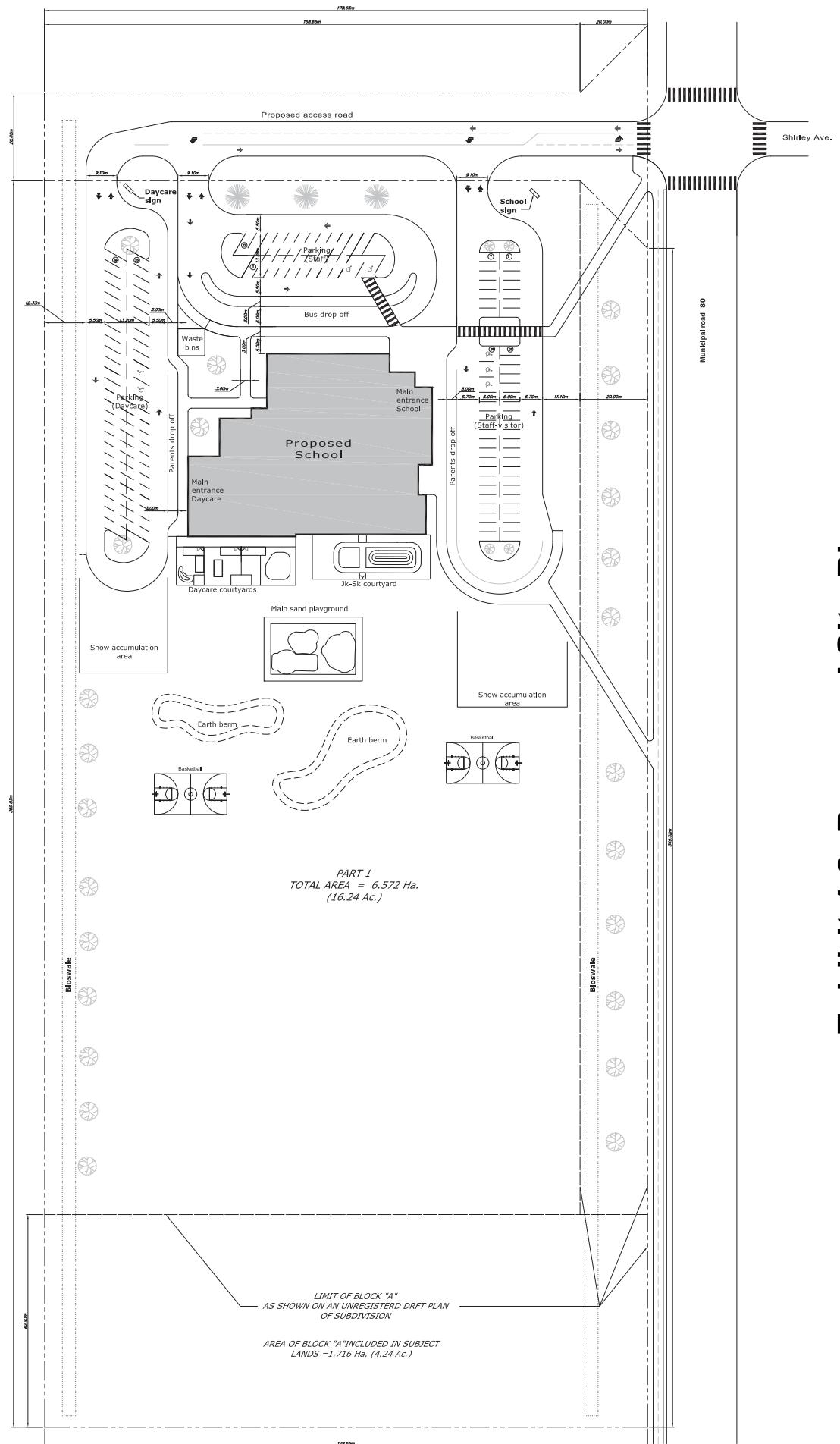
The proposed new school will have approximately 570 pupils and 74 staff, plus a Day Care for 73 children with 28 staff. Fifteen school buses will serve the school, but a number of pupils are expected to be driven to school by car. A small number will walk or ride a bike to/from school.

**Exhibit 1.2** shows the preliminary site plan for the school. Access to the school will be via a main east-west driveway opposite Shirley Avenue, with separate secondary drive aisles to the staff parking, the school bus stopping area, parent pick-up/drop-off area and day care drop-off/pick-up.

The City Traffic Office conducted a special traffic count at the MR 80/Shirley Avenue intersection for this study. Tranplan Associates conducted special counts at the three existing CSCNO schools that will be amalgamated at the new site, as well as at Ecole Jean Paul II, a comparable CSCNO school in Val Caron.



## Exhibit 1.1: Key Map



## Exhibit 1.2 Proposed Site Plan



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Background traffic volumes in the study area were projected to 2026 based on an assumed growth rate of 1.5% per annum. Traffic generation by the proposed school was estimated based on the following (see **Table 4.1**):

- i) Observed trip generation at Ecole Jean Paul II in Val Caron.
- ii) Observed trip generation at the three existing schools that will be amalgamated into the new school.
- iii) Rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual.

School board officials have concerns about safety at the MR 80/Shirley Avenue intersection and they feel that traffic signals are the solution. Accordingly this study has focused on evaluating whether signalization can be justified. Special sensitivity analysis has been carried out on the traffic forecasts to examine how different assumptions about future traffic levels would affect the results of the signal warrant analysis.

This report describes the study process. The Principal Findings and Recommendations are presented in the following section.





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## 2.0 PRINCIPAL FINDINGS AND RECOMMENDATIONS

**2.1** The following is a description of the existing road network in the study area with the classifications based on the City's Official Plan:

- Municipal Road 80, Primary Arterial, five-lane rural cross-section, no sidewalks, 70 km/h, daily traffic approximately 15,000
- Shirley Avenue, Local Road, two-lane rural cross-section, no sidewalks, 50 km/h, daily traffic approximately 800.

### 2.2 MR 80/Shirley Avenue Intersection

#### Existing Traffic Conditions

The existing peak hour traffic volumes at the unsignalized intersection of MR 80/Shirley Avenue are shown in **Exhibit 3.1a**. The critical movement is the left turn from Shirley Avenue onto MR 80 to go south. During the morning peak hour, the left turn is operating at Level of Service "C"<sup>1</sup> with average delays of 17 seconds per vehicle with minimal queuing (see **Table 5.1**). During the afternoon peak hour, the Level of Service drops to "E" with average delays of 40 seconds, but the queuing remains minimal.

#### Collision History

During the six year period from 2013 to 2018, only three collisions were reported in the vicinity of the MR 80/Shirley intersection and one of those appears to have been mistakenly assigned to this location (see Appendix B for details). One in 2017 involved a single vehicle sliding off the road under icy conditions; there was a northbound rearend in 2014 (appears to have been mistakenly assigned to the Shirley Avenue location); and the third involved a sideswipe. There were no personal injuries reported.

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<sup>1</sup> Level of Service ("LOS") is used in traffic engineering to the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing congestion with "F" representing a high level of congestion. "C" and "D" are commonly used as design standards.



None of the three appear to be susceptible to prevention by traffic signals. In summary, the collision record does not indicate a traffic safety problem.

### **2024 Background Traffic**

The existing traffic volumes were projected ahead to 2026 based on an average growth rate of 1.5% per annum. At 2026 background traffic levels the outbound left turns from Shirley Avenue are projected to continue operating at Level of Service "C" during the morning peak hour with average delays increased marginally from 17 to 19 seconds per vehicle (see **Table 5.1**). However, during the afternoon peak hour the outbound left turns are projected to operate at Level of Service "F" with average delays of 56 seconds per vehicle.

## **2.3 Forecasts of Traffic by New School**

Three data sources were examined to estimate the traffic volumes that will be generated by the proposed new school (see **Table 4.1**) :

- the Institute of Transportation Engineers<sup>2</sup> Trip Generation Manual,
- the observed trip making observed at the three existing schools that will be amalgamated at the new school, and
- the trip making at a comparable CSCNO school (Ecole Jean Paul II) in Val Caron.

The data from Ecole Jean Paul II, adjusted for differences (see **Table 4.2**), were used to estimate the traffic that will be generated by the new school. It is expected to generate approximately 270 vehicle trips during the morning peak hour (170 in, 100 out), 200 vehicle trips during the PM school peak hour

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<sup>2</sup> The Institute of Transportation Engineers is a Washington D.C. based international organization of traffic engineers and transportation planners. It publishes a number of technical manuals, including the Trip Generation Manual which is based on American and Canadian data.



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(80 in, 120 out), and 60 vehicle trips during the PM street peak hour (20 in, 40 out).

## **2.4 Directional Orientation of the New School Traffic**

The directional orientation of the school trips was estimated based on information provided by the School Board about the home locations of staff, pupils and day care users. It is estimated that 10% of school traffic will be to/from Shirley Avenue, 50% to/from MR 80 north and 40% to/from MR 80 south.

## **2.5 Impact of New School Traffic on MR 80/Shirley Intersection**

With the new school, the existing T-intersection becomes a four-way intersection. Assuming STOP signs facing Shirley Avenue and the school access driveway, there will be significant delays for vehicles attempting to turn left onto MR 80 from both sides of MR 80.

The projected outbound left turn volumes from the school driveway are expected to experience extensive delays and queues (see **Table 5.1**). The left turns leaving the school in the morning are expected to operate at a volume/capacity ratio of 1.28 and experience delays of over five minutes with queues of over 50 metres (95% probability). In the afternoon (school peak) the outbound left turns are also projected to experience a volume/capacity ratio in excess of 1.0 with delays of close to 200 seconds per vehicle and queues of close to 50 metres in length at a 95% probability level.

The school would not be able to function with the above levels of delay and queuing. Under such conditions, there would be concerns about maintaining safe operation of the school buses as well as automobiles. Furthermore, such



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a situation would not address the need for safe crossing of MR 80 by pedestrians. Some form of signalized traffic control is necessary if the school is to be located at the proposed site.

## **2.6 Alternative Forms of Signalized Control**

The following forms of signalized control were considered for the MR 80/Shirley Avenue intersection:

### **i) Intersection Pedestrian Signals (IPS)**

IPS pedestrian actuated (push button) traffic signals also known as half signals, are currently operating at several locations throughout Sudbury. When actuated, all traffic along MR 80 would be required to stop at the STOP lines in advance of Shirley Avenue and the school driveway. Pedestrians would have a protected crossing and vehicles would be able to make a left turn out from Shirley Avenue or the school driveway, or go straight across MR 80. The button can be pushed by pedestrians or motorists.

### **ii) Full Traffic Signals**

Full traffic signals would be semi-actuated (coordinated or uncoordinated along MR 80). They would rest on green for MR 80 at all times except when a vehicle is detected on Shirley Avenue or on the school driveway or a pedestrian pushes a button to cross.

## **2.7 Intersection Pedestrian Signals (IPS)**

The Ontario standards (warrants) for traffic signals for pedestrians stipulate



minimum traffic volumes along the main road and minimum pedestrian volumes crossing the main road over eight hours of a typical day. The projected pedestrian crossing volume of approximately 80 people over eight hours falls so far short of the required minimum of 200-240 that no further analysis was carried out (see Appendix F for the relevant MTO warrant charts).

In addition, School Board officials and the Sudbury Student Service Consortium, who manage the school bus system, have stated that school employees and school bus drivers will not under any circumstances actuate the IPS signals.

For these reasons IPS signals are not considered to be a realistic alternative for signal control at MR 80/Shirley Avenue.

## 2.8 Full Traffic Signals

The Ontario standards (warrants) for full traffic signals take into account vehicular volumes, pedestrian volumes and accident history. Since there have been very few collisions at the site, the analysis dealt only with the vehicular and pedestrian volumes. There are two separate warrants dealing with vehicular and pedestrian traffic levels. The first deals with overall total traffic levels on all approaches to the intersection, while the second focuses on the amount of delay experienced by the side street traffic.

The projected school traffic together with the 2026 background traffic was applied to the Ontario traffic signal warrants. In the case of Warrant 1: Total Traffic the projected volumes reached only 55% of the required minimum to justify signals. In the case of Warrant 2: Delay to Cross Traffic, the projected volumes reached 80% of the minimum (see **Table 6.2** and Appendix E).



A sensitivity analysis was carried out to see how the signal warrant would change with changes in the assumptions made in forecasting school traffic. Projected pedestrian/bicycle volumes were doubled, projected Shirley Avenue traffic to/from the school was doubled and the direction of approach along MR 80 was weighted more in favour of the north. Individually these changes had minor impact on the warrants (see **Table 6.2**), but in combination they raised Warrant 2: Delay to Cross Traffic from 80% to 89% of the required minimum.

The sensitivity analysis also looked at how the warrants might be affected by changes in non-school traffic patterns in the Shirley Avenue catchment area if the intersection were signalized (see **Table 6.2**). If the outbound left turns from Shirley Avenue were to increase by 50%, Warrant 2: Delay to Cross Street would reach 92% of the required minimum. A 100% increase in the outbound left turns would result in 97% on the warrant.

## **2.9 Conclusion with Respect to Signalization**

The school cannot function without some form of signalized traffic control on MR 80 at Shirley Avenue. Full traffic signals are considered to be the only option if the school is to be located at the proposed site.

## **2.10 Active Transportation**

The City of Greater Sudbury Official Plan places emphasis on promoting Active Transportation. In the case of the proposed school, Active Transportation would mean enabling and encouraging walking and biking to school by pupils, staff, parents and others. To a lesser extent, it would include encouraging ridesharing and public transit usage. The priorities for the new school are listed in 2.11 to 2.15.



## **2.11 Sidewalks/Footpaths/Bike Paths**

The following sidewalks/footpaths/bike paths are recommended:

- i) Pedestrian walkways (raised sidewalks or paths removed from vehicular driveways) from all building entrances to a main raised sidewalk along the main driveway leading to MR 80
- ii) A safe raised pedestrian holding area on Shirley Avenue on the east side of MR 80
- iii) Bicycle path(s) from MR 80 to bike racks near the school entrance(s).
- iv) A paved pedestrian/bike path on the west side of MR 80 (removed from the vehicular roadway) from the school driveway to Jeanne d'Arc Street.
- v) A high level of winter maintenance on all of the above.

## **2.12 MR 80 Crossing**

In addition to traffic signals, it is recommended that a school crossing guard should be on duty for pupils crossing MR 80 at Shirley

## **2.13 Vehicle/Pedestrian Conflicts on Site**

To make walking/biking as attractive as possible and to maximize safety, the site plan should minimize/eliminate conflicts between vehicular traffic and pedestrian/bike traffic on school property. Pedestrians and bicyclists should be able to get from MR 80 to the school preferably without having to cross any automobile/bus traffic/driveways. The proposed site plan requires pedestrians/bicyclists to cross the parent drop-off parking lot on the east side of the school. Pupil safety and convenience would be improved if the east side parking lot were relocated to the west side of the school. If the east side parking lot is retained as proposed, it is recommended that the pedestrian crossing be a raised platform across the parking lot.



#### **2.14 Bike Racks**

Convenient and secure bike storage should be provided at all relevant school entrances.

#### **2.15 Bus Shelters**

In order to enhance the appeal of taking transit, the School Board should work with the City to provide bus shelters at the bus stops on MR 80.

#### **2.16 Priority Parking for Ridesharers**

In order to encourage ridesharing, the most desirable parking should be reserved for rideshare participants.





### 3. Existing Conditions

#### 3.1 Road Network

Municipal Road 80 is a Primary Arterial with a five-lane rural cross-section (centre two-way left turn lane) and no sidewalks. The posted speed limit is 70 km/h with daily traffic volumes of approximately 15,000.

Shirley Avenue is a two-lane Local Road with a rural cross-section and no sidewalks. The speed limit is 50 km/h. Daily traffic volumes are estimated at approximately 500.

#### 3.2 Existing Peak Hour Traffic Volumes

The existing peak hour volumes at the study area intersection are shown in **Exhibit 3.1a**. The peak hour volumes are from a special nine hour Turning Movement Count conducted by the City at the MR 80/Shirley intersection expressly for this study. The turning movement volumes for all nine hours are shown in **Table 4.1** (see also **Appendix A**). The City also provided a 24-hour Automatic Traffic Recorder count on MR 80 north of Dominion Drive (see **Appendix A**).

The existing morning peak hour at the MR 80/Shirley intersection is between 7:45 and 8:45 am; the afternoon peak hour is between 4:30 and 5:30 pm, but the school peak in the afternoon is expected to be between 2:45 and 3:45 pm.

One noteworthy feature of the peak hour (and during all nine hours) traffic volumes at the intersection is the total absence of pedestrian traffic crossing MR 80, despite the fact that the City transit service has a stop on the west side of MR 80.

#### 3.3 Existing Level of Service

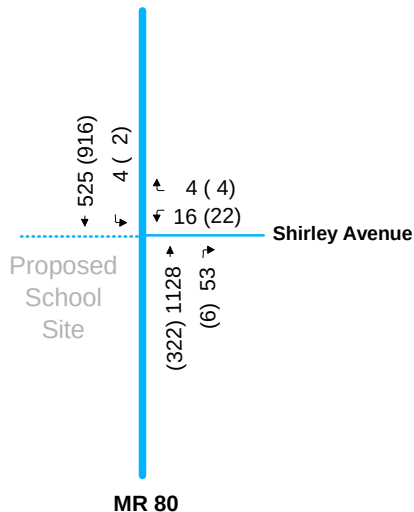
The outbound left turns from Shirley Avenue at the MR 80/Shirley intersection are currently operating at Level of Service "C" during the morning peak hour



### a) Existing Peak Hour Traffic Volumes

Counts by City Traffic Office  
October 3, 2019 4:30 - 5:30 pm  
October 4, 2019 7:15 - 8:15 am

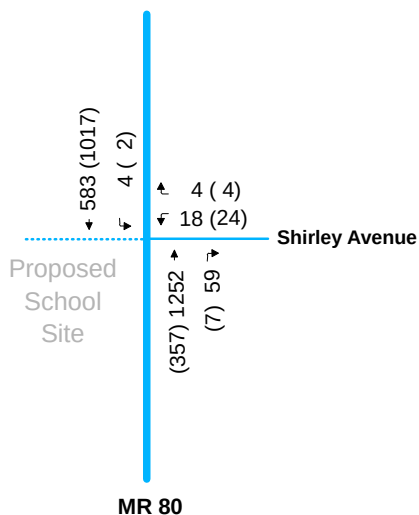
**PM Peak Hour**  
(AM pk hr in brackets)



### b) 2026 Peak Hour Background Traffic Volumes

Volumes increased by 1.5% per annum  
from 2019 to 2026.

**PM Peak Hour**  
(AM pk hr in brackets)



NOTE: Not to scale

### Exhibit 3.1

## Existing and Projected 2026 Background Traffic Volumes





(average delays of 17 seconds per vehicle at a volume/capacity ratio of 0.09 and minimal queuing - see **Table 5.1**). During the afternoon peak hour the Level of Service drops to "E" with average delays of 40 seconds, a v/c ratio of 0.18 and minor queuing. Levels of Service "E" and "F" are common for side street traffic making left turns onto high volume arterial roads such as MR 80.

### **3.4 Collision Statistics**

Vehicular collision reports in the City data bank for the six year period from 2013 through 2018 were provided by the City Traffic Office (see Appendix B for the data from the City). Only three collisions are on file for that period. The first collision occurred in 2017 and involved a single vehicle running off the road under icy conditions; the second collision, a rearender that occurred in 2014 appears to have been mistakenly assigned to the Shirley Avenue intersection; the third collision, also in 2014, was a sideswipe. No injuries were reported in the three collision reports. Traffic safety does not appear to be an issue at the intersection, nor does it appear that any of the three collisions were susceptible to correction by the presence of traffic signals.



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## 4. Traffic Forecasts

### 4.1 Background Traffic Growth

The existing traffic volumes along MR 80 and Shirley Avenue have been increased by 1.5% per annum to 2026 to produce the 2026 background traffic volumes (see **Exhibit 3.1b**).

This assumes no change in the street network or traffic control measures in the vicinity of the MR 80/Shirley Avenue intersection. See Section 6.3 for a discussion of potential changes in background traffic if traffic signals were to be installed at MR 80/Shirley Avenue.

### 4.2 Site Traffic

In estimating the site traffic from the proposed new school and day care consideration was given to three data sources:

- i) Surveys of the existing trips being generated by the three schools that will be amalgamated at the new school
- ii) A survey of a comparable elementary school in Val Caron, Ecole Jean Paul II on MR 15 west of MR 80.
- iii) Institute of Transportation Engineers (ITE) Trip Generation Manual

The results from the three sources are shown in **Table 4.1**. The ITE trip volumes for a 570 pupil elementary school are very similar to the observed volumes at the 436 pupil Ecole Jean Paul II during the morning peak hour. During the school peak in the afternoon, the observed volumes at Jean Paul II are 20% higher than the estimates produced by the ITE rates, even though the ITE estimates were based on 570 pupils as opposed to the 436 pupils at Jean Paul II.

**Table 4.1: COMPARISON OF TRIP GENERATION  
DATA SOURCES  
ITE RATES vs OBSERVED LOCAL VOLUMES**

| LAND USE                                                                               | WEEKDAY AM PEAK HOUR                                                         |               |                    |                    | WEEKDAY SCHOOL PM PEAK HOUR                                                  |               |                   |                    | WEEKDAY PM PEAK HOUR (4-6 PM)                                                  |               |                   |                   |
|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------|--------------------|--------------------|------------------------------------------------------------------------------|---------------|-------------------|--------------------|--------------------------------------------------------------------------------|---------------|-------------------|-------------------|
|                                                                                        | ITE Trip Generation Rate<br>(ITE Trip Generation<br>Manual - 10th Edition)   | Vehicle Trips |                    |                    | ITE TG Rate<br>(ITE Trip Generation<br>Manual - 10th Edition)                | Vehicle Trips |                   |                    | ITE Trip Generation Rate<br>(ITE Trip Generation<br>Manual - 10th Edition)     | Vehicle Trips |                   |                   |
|                                                                                        |                                                                              | Total         | In                 | Out                |                                                                              | Total         | In                | Out                |                                                                                | Total         | In                | Out               |
| <b>ITE Trip Generation Manual</b>                                                      |                                                                              |               |                    |                    |                                                                              |               |                   |                    |                                                                                |               |                   |                   |
| <b>Elementary School</b> <b>570</b> pupils<br>ITE Land Use #520      (design capacity) | $\ln(T) = 1.14 \ln(X) - 1.86$<br>where T = vehicle trips<br>X = no of pupils | 216           | 55%<br>119         | 45%<br>97          | $\ln(T) = 1.09 \ln(X) - 1.92$<br>where T = vehicle trips<br>X = no of pupils | 148           | 45%<br>67         | 55%<br>81          | $T = 0.15 (X)$<br>where T = vehicle trips<br>X = no of pupils                  | 86            | 49%<br>42         | 51%<br>44         |
| <b>Day Care Centre</b> <b>73</b> child<br>ITE Land Use #565                            | $T = 0.73 (X) + 5.24$<br>where T = vehicle trips<br>X = no of children       | 59            | 53%<br>31          | 47%<br>28          | Estimated                                                                    | 20            | 50%<br>10         | 50%<br>10          | $\ln(T) = 0.87 \ln(X) + 0.32$<br>where T = vehicle trips<br>X = no of children | 58            | 47%<br>27         | 53%<br>31         |
| <b>TOTAL using ITE rates</b>                                                           |                                                                              | <b>274</b>    | <b>150</b>         | <b>125</b>         |                                                                              | <b>168</b>    | <b>77</b>         | <b>91</b>          |                                                                                | <b>143</b>    | <b>69</b>         | <b>74</b>         |
| <b>St Joseph + Notre Dame<br/>+ Val Therese</b><br>(total of 3 existing schools)       |                                                                              | <b>260</b>    | <b>54%<br/>141</b> | <b>46%<br/>119</b> |                                                                              | <b>201</b>    | <b>46%<br/>93</b> | <b>54%<br/>108</b> |                                                                                |               |                   |                   |
| <b>Ecole Jean Paul II</b> <b>436</b> pupils<br>(comparable school in Val Caron)        |                                                                              | <b>264</b>    | <b>64%<br/>169</b> | <b>36%<br/>95</b>  |                                                                              | <b>202</b>    | <b>41%<br/>83</b> | <b>59%<br/>119</b> |                                                                                | <b>59</b>     | <b>34%<br/>20</b> | <b>66%<br/>39</b> |

Note: Numbers may not add up exactly due to rounding.



Accordingly the observed traffic volumes at Ecole Jean Paul II were adopted as the basis for estimating future traffic volumes at the new Val Therese school and adjusted to reflect the differences between the two schools (see **Table 4.2**). The design capacity of the proposed elementary school in Val Therese is 570 pupils compared to the 436 pupils currently attending Jean Paul II (30% more), but there are 10% more staff at Jean Paul II (83 versus 74). The day cares at the two schools are identical in size, but Jean Paul II provides care for children with special requirements that involve special bus services. The impact of each of the differences is estimated as shown in **Table 4.2**.

The proposed new school is expected to generate (see **Table 4.2**):

- 300 vehicle trips during the AM peak hour (180 in, 120 out)
- 240 vehicle trips during the PM school peak hour (100 in, 140 out)
- 60 vehicle trips during the PM street peak hour (20 in, 40 out)
- 30-40 pedestrian/bicycle trips during the AM and PM peak hours.

#### **4.3 Orientation of the Site Traffic**

The orientation of the trips to/from the proposed new school has been estimated on the basis of the following:

- home addresses of the school staff,
- home location of the pupils,
- home location of the day care clients,
- configuration of the study area road network,

The school staff home address locations are distributed as follows:

- 5% are in the Shirley Avenue catchment area within Val Therese
- 50% are in the MR 80 north traffic catchment area
- 45% are in the MR 80 south traffic catchment area

**Table 4.2: ESTIMATED TRIP GENERATION  
BY PROPOSED NEW VAL THERESE  
ELEMENTARY SCHOOL**

|                                                                                    | WEEKDAY AM PK HR |                    |                   | SCHOOL PM PK HR |                   |                    | STREET PM PK HR |                   |                   |
|------------------------------------------------------------------------------------|------------------|--------------------|-------------------|-----------------|-------------------|--------------------|-----------------|-------------------|-------------------|
|                                                                                    | Vehicle Trips    |                    |                   | Vehicle Trips   |                   |                    | Vehicle Trips   |                   |                   |
|                                                                                    | Total            | In                 | Out               | Total           | In                | Out                | Total           | In                | Out               |
| <b>Ecole Jean Paul II</b><br>(comparable school in Val Caron) <b>436 pupils</b>    | <b>264</b>       | <b>64%<br/>169</b> | <b>36%<br/>95</b> | <b>202</b>      | <b>41%<br/>83</b> | <b>59%<br/>119</b> | <b>59</b>       | <b>34%<br/>20</b> | <b>66%<br/>39</b> |
| Trips by school buses                                                              | 28               | 14                 | 14                | 26              | 13                | 13                 | 2               | 1                 | 1                 |
| Estimated trips by staff                                                           | 86               | 80                 | 6                 | 30              | 0                 | 30                 | 25              | 2                 | 23                |
| Estimated trips by parents & others                                                | 150              | 75                 | 75                | 146             | 70                | 76                 | 32              | 17                | 15                |
| <b>Differences between Jean Paul II<br/>and proposed New School</b>                |                  |                    |                   |                 |                   |                    |                 |                   |                   |
| i) 570 pupils vs 436 pupils at JP II: 30% increase in pupils and driving to school | 45               | 23                 | 23                | 44              | 21                | 23                 | 10              | 5                 | 5                 |
| ii) 74 staff vs 83 staff at JP II: 11% decrease in staff and staff trips           | -9               | -9                 | 0                 | -3              | 0                 | -3                 | -3              | 0                 | -3                |
| iii) special needs Day Care at JP II: decrease in Day Care trips (est)             | -5               | -3                 | -2                | -5              | -2                | -3                 | -2              | -1                | -1                |
| iv) 15 school buses vs 14 at JP II: increase of 1 bus trip                         | 2                | 1                  | 1                 | 2               | 1                 | 1                  | -2              | -1                | -1                |
| <b>Proposed New School<br/>Val Therese</b> <b>570 pupils</b>                       | <b>297</b>       | <b>181</b>         | <b>117</b>        | <b>240</b>      | <b>103</b>        | <b>137</b>         | <b>62</b>       | <b>23</b>         | <b>39</b>         |

Note: Numbers may not add up exactly due to rounding.



The pupil population is distributed as follows:

- 8% are in the Shirley Avenue catchment area within Val Therese
- 55% are in the MR 80 north catchment area
- 37% are in the MR 80 south catchment area

The day care families are distributed as follows:

- 75% in the Hanmer/Capreol area (including Val Therese)
- 25% in the Val Caron/Bleazard area

Based on the above, for planning purposes the future school traffic is projected to be oriented as follows:

- i) 10% to/from Shirley Avenue
- ii) 50% to/from the north along MR 80
- iii) 40% to/from the south along MR 80

**Exhibits 4.1a** and **4.1b** show the projected site traffic volumes by turning movement during the morning and two afternoon peak hours.

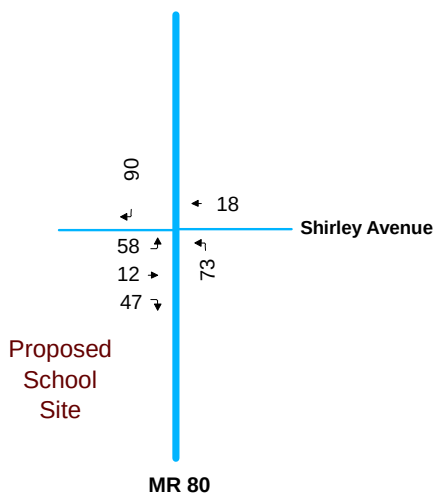
#### **4.4 Total Traffic**

**Exhibits 4.1c** and **4.1d** show the projected total traffic in 2026 with the development of the proposed school.

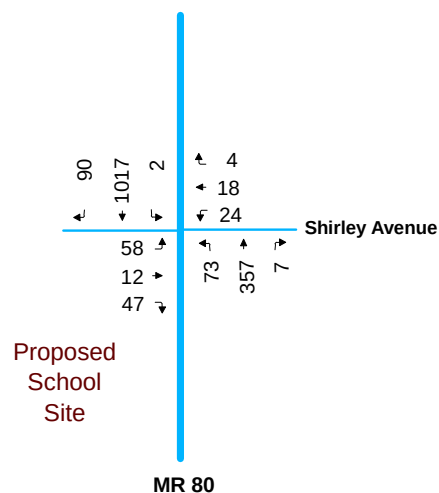




### a) Projected AM Peak Hour Site Traffic

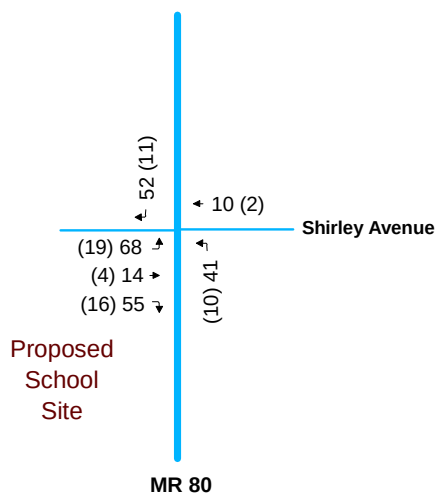


### c) Projected AM Peak Hour Total Traffic



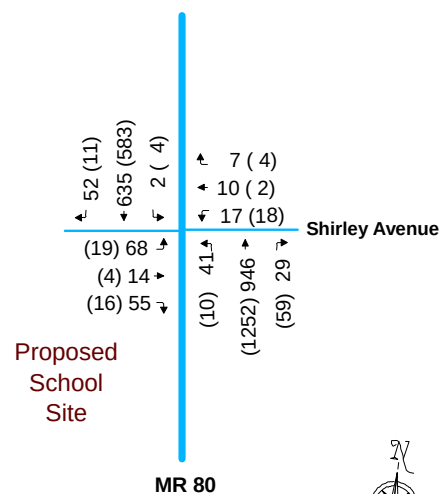
### b) Projected PM Peak Hour Site Traffic

School PM pk hr (Street PM pk hr in brackets)



### d) Projected PM Peak Hour Total Traffic

School PM pk hr (Street PM pk hr in brackets)



NOTE: Not to scale

## Exhibit 4.1

# Projected Site Traffic and 2026 Total Traffic Volumes





## 5. Capacity Analysis

The study area traffic volumes have been analyzed using the Synchro HCM methodology for the following cases:

- i) Existing traffic volumes (see **Exhibit 3.1a**).
- ii) Projected 2026 background traffic volumes (see **Exhibit 3.1b**).
- iii) Projected 2026 background traffic volumes plus the new school traffic (see **Exhibits 4.1c** and **4.1d**).

The key results are summarized in **Table 5.1**. Detailed Synchro analysis reports are in Appendix C.

### 5.1 Existing Conditions

As discussed in section 3.3, at existing traffic levels, the outbound left turns from Shirley Avenue at the MR 80/Shirley intersection are operating at Level of Service "C" during the morning peak hour (average delays of 17 seconds per vehicle at a volume/capacity ratio of 0.09 and minimal queuing). During the afternoon peak hour the Level of Service drops to "E" with average delays of 40 seconds, a v/c ratio of 0.18 and minor queuing. Levels of Service "E" and "F" are common for left turns from side streets along high volume arterial roads such as MR 80.

### 5.2 2026 Background Traffic

At 2026 traffic levels (without the proposed new school) the outbound left turns from Shirley Avenue are projected to continue operating at Level of Service "C" during the morning peak hour (average delays of 19 seconds per vehicle at a volume/capacity ratio of 0.11 and minimal queuing). During the afternoon peak hour the Level of Service is projected to drop from "E" to "F" with average delays of 56 seconds, a v/c ratio of 0.26 and minor queuing (one

**Table 5.1: Summary of Intersection Analysis**  
**MR 80 / Shirley Avenue**  
**Synchro Software HCM Report\***

| Intersection                                                                        | 2019 Existing Conditions |              |      |             | 2026 Background Traffic** |              |      |             | 2026 Background Traffic + New School*** Unsignalized |              |      |             | 2026 Background Traffic + New School Signalized |      |             |      |
|-------------------------------------------------------------------------------------|--------------------------|--------------|------|-------------|---------------------------|--------------|------|-------------|------------------------------------------------------|--------------|------|-------------|-------------------------------------------------|------|-------------|------|
|                                                                                     | LOS                      | Delay (sec.) | v/c  | Q95*** (m.) | LOS                       | Delay (sec.) | v/c  | Q95*** (m.) | LOS                                                  | Delay (sec.) | v/c  | Q95*** (m.) |                                                 | v/c  | Q95*** (m.) |      |
| <b>AM pk hr</b><br>EBTL<br>EBR<br>WBLTR<br>NBL<br>NBTR<br>SBL<br>SBTR               |                          |              |      |             |                           |              |      |             | <b>F</b>                                             | 324.1        | 1.28 | 51.8        | <b>D</b>                                        | 42.9 | 0.44        | 25.1 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>B</b>                                             | 14.2         | 0.12 | 3.1         | <b>B</b>                                        | 12.1 | 0.22        | 9.6  |
|                                                                                     | <b>C</b>                 | 17.0         | 0.09 | 2.2         | <b>C</b>                  | 19.1         | 0.11 | 2.8         | <b>F</b>                                             | 79.8         | 0.53 | 19.0        | <b>D</b>                                        | 35.7 | 0.28        | 17.5 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>B</b>                                             | 12.3         | 0.14 | 3.8         | <b>A</b>                                        | 5.8  | 0.24        | 10.5 |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 2.8  | 0.14        | 13.7 |
|                                                                                     | <b>A</b>                 | 8.0          | 0.00 | 0.0         | <b>A</b>                  | 8.1          | 0.00 | 0.0         | <b>A</b>                                             | 8.1          | 0.00 | 0.0         | <b>A</b>                                        | 3.0  | 0.00        | 0.6  |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 4.0  | 0.43        | 50.2 |
| <b>PM pk hr (street peak)</b><br>EBTL<br>EBR<br>WBLTR<br>NBL<br>NBTR<br>SBL<br>SBTR |                          |              |      |             |                           |              |      |             | <b>E</b>                                             | 41.3         | 0.29 | 8.6         | <b>D</b>                                        | 41.1 | 0.20        | 11.6 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>B</b>                                             | 10.5         | 0.03 | 0.6         | <b>B</b>                                        | 18.3 | 0.11        | 6.1  |
|                                                                                     | <b>E</b>                 | 40.7         | 0.18 | 5.0         | <b>F</b>                  | 56.4         | 0.26 | 7.5         | <b>F</b>                                             | 113.8        | 0.46 | 14.0        | <b>D</b>                                        | 37.4 | 0.21        | 11.3 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>A</b>                                             | 8.9          | 0.01 | 0.3         | <b>A</b>                                        | 2.0  | 0.02        | 1.3  |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 2.7  | 0.46        | 46.7 |
|                                                                                     | <b>B</b>                 | 11.8         | 0.01 | 0.2         | <b>B</b>                  | 12.7         | 0.01 | 0.2         | <b>B</b>                                             | 12.7         | 0.01 | 0.2         | <b>A</b>                                        | 2.2  | 0.01        | 0.7  |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 1.8  | 0.21        | 16.2 |
| <b>PM pk hr (school peak)</b><br>EBTL<br>EBR<br>WBLTR<br>NBL<br>NBTR<br>SBL<br>SBTR |                          |              |      |             |                           |              |      |             | <b>F</b>                                             | 195.3        | 1.04 | 47.9        | <b>D</b>                                        | 45.5 | 0.51        | 28.7 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>B</b>                                             | 11.4         | 0.10 | 2.5         | <b>B</b>                                        | 11.4 | 0.24        | 10.4 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>F</b>                                             | 99.7         | 0.52 | 17.1        | <b>C</b>                                        | 29.5 | 0.19        | 13.1 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>A</b>                                             | 9.4          | 0.05 | 1.3         | <b>A</b>                                        | 3.8  | 0.08        | 5.4  |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 4.1  | 0.38        | 45.1 |
|                                                                                     |                          |              |      |             |                           |              |      |             | <b>B</b>                                             | 10.5         | 0.00 | 0.1         | <b>A</b>                                        | 3.5  | 0.01        | 0.7  |
|                                                                                     |                          |              |      |             |                           |              |      |             |                                                      |              |      |             | <b>A</b>                                        | 3.4  | 0.27        | 28.3 |

NOTE: \* See Appendix D for detailed Synchro reports of the capacity/Level of Service.

\*\* Background traffic includes 1.5% growth p.a. in traffic from 2019 to 2026.

\*\*\* See Table 4.2 for school traffic volumes.



or two vehicles, due to the low volumes). As stated earlier Levels of Service "E" and "F" are common for side street left turns onto high volume arterial roads such as MR 80.

### **5.3 2026 with New School Traffic**

#### **Unsignalized**

With the new school, the existing T-intersection becomes a four-way intersection. Assuming STOP signs facing Shirley Avenue and the school access driveway, there will be significant delays for vehicles attempting to turn left onto MR 80 from both sides of MR 80.

The projected outbound left turn volumes from the school driveway will be well beyond the capacity of the intersection during peak hours and would result in extensive delays and queues (see **Table 5.1**). The left turn leaving the school in the morning is projected to experience delays of over five minutes (volume/capacity ratio of 1.28) and queues of over 50 metres. In the afternoon (school peak) the outbound left turns are projected to experience a volume/capacity ratio of 1.04 with delays of 195 seconds per vehicle and queues of 48 metres.

#### **Signalized**

The capacity analysis was also carried out assuming traffic signals at the intersection (see next section for a discussion of traffic signal warrants). Traffic signal would provide a good Level of Service at the intersection. For study purposes it was assumed that the intersection would have signals that would rest on green for MR 80 except when a vehicle was detected on either side street approach. A base 90 second cycle was assumed with permissive left turn on all approaches. Changes in these assumptions would change the



results, but only marginally.

As can be seen in Table 5.1, all movements along MR 80 would operate at Level of Service "A" with minimal delays. The outbound left turns from the school and from Shirley Avenue would operate at Level of Service "C" and "D" with average delays ranging from 30 seconds to 45 seconds and queues of 10 to 30 metres. If needed the side street greens could be increased slightly to reduce the delays and queuing at the school and on Shirley Avenue with only a minor impact on MR 80 traffic.



## 6. Analysis of the Need for Signalization

The School Board made it clear from the beginning that they want the MR 80/Shirley Avenue intersection to be signalized to provide the proper level of controlled access to/from the proposed new school. In order to respond to the Board's position, the following analyses have been carried out:

- i) Application of the projected future traffic volumes to the Ontario (MTO) Traffic Signal warrants
- ii) Traffic Signal Warrants sensitivity analysis with respect to the school traffic
  - potential variation in the direction of approach
  - potential variation in the pedestrian and biking volumes.
- iii) Traffic Signal Warrants sensitivity analysis with respect to reorientation of non-school traffic to the signalized intersection.
- iv) Application of the projected future pedestrian and bike volumes to the Ontario (MTO) warrants for an Intersection Pedestrian Signal (IPS).
- v) Site inspection for sightlines and any unique conditions that might affect the need for signalization.

### 6.1 Ontario (MTO) Traffic Signal Warrants

The Traffic Signal Warrants are based on traffic levels (including pedestrian traffic) over the highest eight hours of a typical day. The projected 2026 traffic volumes at the MR 80/Shirley Avenue intersection for the eight highest hours are shown in **Table 6.1**. These volumes were applied to the Ontario (MTO) Traffic Signal Warrants (see Appendix E for the detailed warrant computations).

The projected volumes produced the following results<sup>3</sup>:

|                                |                                  |
|--------------------------------|----------------------------------|
| Warrant 1 Total Traffic        | 55% (of the minimum requirement) |
| Warrant 2 Delay to Side Street | 80% (of the minimum requirement) |

---

<sup>3</sup> Signalization is warranted if Warrant 1 or Warrant 2 reaches 100%, or if both reach 80%.

**Table 6.1 Hourly Traffic Volumes Through MR 80 / Shirley Avenue Intersection**

**a) Existing Traffic Volumes 2019**

| TIME          | MR 80 SB |      |    | Shirley Ave WB |      |    |       | MR 80 NB |      |    | School Drway EB |      |    |
|---------------|----------|------|----|----------------|------|----|-------|----------|------|----|-----------------|------|----|
|               | RT       | Thru | LT | RT             | Thru | LT | Peds* | RT       | Thru | LT | RT              | Thru | LT |
| 6:00 - 7:00   |          | 604  | 0  | 1              |      | 27 | 0     | 3        | 134  |    |                 |      |    |
| 7:00 - 8:00   |          | 927  | 1  | 4              |      | 21 | 0     | 5        | 310  |    |                 |      |    |
| 8:00 - 9:00   |          | 731  | 3  | 1              |      | 23 | 0     | 9        | 373  |    |                 |      |    |
| 11:00 - 12:00 |          | 512  | 3  | 3              |      | 13 | 0     | 8        | 514  |    |                 |      |    |
| 12:00 - 1:00  |          | 557  | 3  | 5              |      | 18 | 0     | 14       | 547  |    |                 |      |    |
| 2:00 - 3:00   |          | 566  | 5  | 3              |      | 17 | 1     | 22       | 655  |    |                 |      |    |
| 3:00 - 4:00   |          | 572  | 2  | 6              |      | 15 | 0     | 26       | 852  |    |                 |      |    |
| 4:00 - 5:00   |          | 522  | 3  | 4              |      | 23 | 1     | 39       | 1109 |    |                 |      |    |
| 5:00 - 6:00   |          | 474  | 2  | 5              |      | 13 | 0     | 48       | 964  |    |                 |      |    |

Note \*: Pedestrians crossing MR 80 in both directions on both sides of Shirley Avenue.

**b) Projected Background Traffic Volumes 2026**

| TIME          | MR 80 SB |      |    | Shirley Ave WB |      |    |       | MR 80 NB |      |    | School Drway EB |      |    |
|---------------|----------|------|----|----------------|------|----|-------|----------|------|----|-----------------|------|----|
|               | RT       | Thru | LT | RT             | Thru | LT | Peds* | RT       | Thru | LT | RT              | Thru | LT |
| 6:00 - 7:00   |          | 670  | 0  | 1              |      | 30 | 0     | 3        | 149  |    |                 |      |    |
| 7:00 - 8:00   |          | 1029 | 1  | 4              |      | 23 | 0     | 6        | 344  |    |                 |      |    |
| 8:00 - 9:00   |          | 811  | 3  | 1              |      | 26 | 0     | 10       | 414  |    |                 |      |    |
| 11:00 - 12:00 |          | 568  | 3  | 3              |      | 14 | 0     | 9        | 571  |    |                 |      |    |
| 12:00 - 1:00  |          | 618  | 3  | 6              |      | 20 | 0     | 16       | 607  |    |                 |      |    |
| 2:00 - 3:00   |          | 628  | 6  | 3              |      | 19 | 1     | 24       | 727  |    |                 |      |    |
| 3:00 - 4:00   |          | 635  | 2  | 7              |      | 17 | 0     | 29       | 946  |    |                 |      |    |
| 4:00 - 5:00   |          | 579  | 3  | 4              |      | 26 | 1     | 43       | 1231 |    |                 |      |    |
| 5:00 - 6:00   |          | 526  | 2  | 6              |      | 14 | 0     | 53       | 1070 |    |                 |      |    |

**c) New School Traffic**

| TIME          | MR 80 SB |      |    | Shirley Ave WB |      |    |       | MR 80 NB |      |    | School Drway EB |      |    |
|---------------|----------|------|----|----------------|------|----|-------|----------|------|----|-----------------|------|----|
|               | RT       | Thru | LT | RT             | Thru | LT | Peds* | RT       | Thru | LT | RT              | Thru | LT |
| 6:00 - 7:00   | 0        |      |    | 0              |      |    | 0     |          |      | 0  | 0               | 0    | 0  |
| 7:00 - 8:00   | 39       |      |    | 8              |      |    | 2     |          |      | 31 | 5               | 1    | 6  |
| 8:00 - 9:00   | 78       |      |    | 16             |      |    | 36    |          |      | 62 | 50              | 12   | 62 |
| 11:00 - 12:00 | 11       |      |    | 2              |      |    | 2     |          |      | 9  | 8               | 2    | 10 |
| 12:00 - 1:00  | 8        |      |    | 2              |      |    | 1     |          |      | 6  | 6               | 2    | 8  |
| 2:00 - 3:00   | 20       |      |    | 4              |      |    | 13    |          |      | 16 | 2               | 0    | 2  |
| 3:00 - 4:00   | 36       |      |    | 7              |      |    | 28    |          |      | 29 | 63              | 16   | 78 |
| 4:00 - 5:00   | 18       |      |    | 4              |      |    | 2     |          |      | 15 | 20              | 5    | 25 |
| 5:00 - 6:00   | 3        |      |    | 1              |      |    | 1     |          |      | 3  | 11              | 3    | 13 |

**d) 2026 Total Traffic**

| TIME          | MR 80 SB |      |    | Shirley Ave WB |      |    |       | MR 80 NB |      |    | School Drway EB |      |    |
|---------------|----------|------|----|----------------|------|----|-------|----------|------|----|-----------------|------|----|
|               | RT       | Thru | LT | RT             | Thru | LT | Peds* | RT       | Thru | LT | RT              | Thru | LT |
| 6:00 - 7:00   | 0        | 670  | 0  | 1              | 0    | 30 | 0     | 3        | 149  | 0  | 0               | 0    | 0  |
| 7:00 - 8:00   | 39       | 1029 | 1  | 4              | 8    | 23 | 2     | 6        | 344  | 31 | 5               | 1    | 6  |
| 8:00 - 9:00   | 78       | 811  | 3  | 1              | 16   | 26 | 36    | 10       | 414  | 62 | 50              | 12   | 62 |
| 11:00 - 12:00 | 11       | 568  | 3  | 3              | 2    | 14 | 2     | 9        | 571  | 9  | 8               | 2    | 10 |
| 12:00 - 1:00  | 8        | 618  | 3  | 6              | 2    | 20 | 1     | 16       | 607  | 6  | 6               | 2    | 8  |
| 2:00 - 3:00   | 20       | 628  | 6  | 3              | 4    | 19 | 14    | 24       | 727  | 16 | 2               | 0    | 2  |
| 3:00 - 4:00   | 36       | 635  | 2  | 7              | 7    | 17 | 28    | 29       | 946  | 29 | 63              | 16   | 78 |
| 4:00 - 5:00   | 18       | 579  | 3  | 4              | 4    | 26 | 3     | 43       | 1231 | 15 | 20              | 5    | 25 |
| 5:00 - 6:00   | 3        | 526  | 2  | 6              | 1    | 14 | 1     | 53       | 1070 | 3  | 11              | 3    | 13 |



Traffic signals are not warranted on the basis of the projected 2026 vehicular and pedestrian volumes.

## 6.2 School Traffic Sensitivity Analysis

Sensitivity analyses were carried out to see how changes in the assumptions made in forecasting school traffic would affect the outcome of the warrant computations. The following tests were carried out (see summary of results in **Table 6.2**):

- i) The directional orientation of the school traffic was adjusted to double the volume arriving/leaving the school via Shirley Avenue. That change on its own produced the following results:

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 58% |
| Warrant 2 Delay to Side Street | 84% |
- ii) The directional orientation of the school traffic was adjusted to increase the proportion of vehicles arriving from MR 80 North from 50% to 70% and reducing those arriving from MR 80 South from 40% to 20%. That change on its own produced the following results:

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 56% |
| Warrant 2 Delay to Side Street | 84% |
- iii) The pedestrian and biking volumes across MR 80 were increased by 100%. That increase on its own produced the following results:

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 56% |
| Warrant 2 Delay to Side Street | 83% |
- iii) The combination of the above three adjustments gave the following results:

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 58% |
| Warrant 2 Delay to Side Street | 89% |

Traffic signals are not warranted even with a combination of relatively major changes in school traffic patterns/volumes.



**TABLE 6.2**  
**PROPOSED NEW ELEMENTARY SCHOOL**  
**MR 80 at SHIRLEY AVENUE, VAL THERESE**  
**SIGNAL WARRANT SENSITIVITY ANALYSIS**

|                                                                                                                   | <b>Warrant 1*</b><br><b>Total Traffic</b> | <b>Warrant 2*</b><br><b>Delay</b><br><b>to Cross Traffic</b> |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------|
| <b>Projected 2026 Total Traffic</b><br>(2026 Background Traffic + Projected School Traffic)                       | <b>55%</b>                                | <b>80%</b>                                                   |
| <b>Sensitivity Test No.1</b><br>(School traffic via Shirley Avenue doubled)                                       | <b>58%</b>                                | <b>84%</b>                                                   |
| <b>Sensitivity Test No.2</b><br>(Directional orientation of school traffic weighted to north)**                   | <b>56%</b>                                | <b>84%</b>                                                   |
| <b>Sensitivity Test No.3</b><br>(Pedestrian and bike traffic to/from school doubled)                              | <b>56%</b>                                | <b>83%</b>                                                   |
| <b>Adjustments No.1, No.2 and No.3 Combined</b>                                                                   | <b>58%</b>                                | <b>89%</b>                                                   |
| <b>Sensitivity Test No.4 - Non-School Traffic</b><br>(Westbound left turns from Shirley Avenue increased by 50%)  | <b>62%</b>                                | <b>92%</b>                                                   |
| <b>Sensitivity Test No.5 - Non-School Traffic</b><br>(Westbound left turns from Shirley Avenue increased by 100%) | <b>68%</b>                                | <b>97%</b>                                                   |

NOTE \*: Traffic signals are warranted if either Warrant 1 or Warrant 2 reaches 100% or if both reach 80%.

\*\*\*: School traffic to/from MR 80 south reduced by 50% and reassigned to the north approach.



### 6.3 Non-School Traffic Sensitivity Analysis

Traffic signals can be expected to have an impact on non-school traffic, especially on motorists in the Shirley Avenue catchment area that wish to go south on MR 80 (i.e. to make a left turn from Shirley Avenue onto MR 80 southbound). Traffic signals would attract some additional traffic and for study purposes two scenarios were tested.

In the first scenario, the volume of non-school traffic using Shirley Avenue to make left turns onto MR 80 was increased by 50%. That change on its own produced the following results (see **Table 6.2**):

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 62% |
| Warrant 2 Delay to Side Street | 92% |

In the second case, a 100% increase in left turns from Shirley Avenue was tested with the following results:

|                                |     |
|--------------------------------|-----|
| Warrant 1 Total Traffic        | 68% |
| Warrant 2 Delay to Side Street | 97% |

The conclusion from the sensitivity analysis is that school traffic on its own, even under the most "optimistic" assumptions, is very unlikely to warrant traffic signals on MR 80. However if the non-school traffic using Shirley Avenue for left turns out onto MR 80 were to increase by 100%, accompanied by a small increase in the school traffic forecasts, the traffic volumes could reach signal warrant levels.

### 6.4 Ontario (MTO) Intersection Pedestrian Signals (IPS)

The projected pedestrian (and bike) volumes that are expected to cross MR 80 to/from the school over eight hours total approximately 80. These pedestrians would all be 12 years of age or older since the School Board provides school bus service to anybody younger regardless of their distance from school if they have to cross a major road such as MR 80. While the Provincial warrant for pedestrian traffic signals gives additional weight (i.e.



factored by two) to younger children and the elderly, that does not apply in this situation.

The Provincial Warrant 1- Pedestrian Volume (see Appendix F) requires a minimum of 240 pedestrian crossings during eight highest hours of the day where the 8-hour vehicular volume is 10,000 (MR 80 total volume during eight hours).

The Provincial Warrant 2 - Pedestrian Delay (see Appendix F) requires a minimum of 200 pedestrian crossings in eight hours and high levels of delay for at least 130 of the 200 pedestrians.

The total projected volume of 80 pedestrians falls so far short of the pedestrian signal warrants that no further analysis was undertaken.

In addition, School Board officials and the Sudbury Student Service Consortium, who manage the school bus system, have stated that school employees and school bus drivers will not under any circumstances actuate IPS signals.

For these reasons IPS signals are not considered to be a realistic alternative for signal control at MR 80/Shirley Avenue.

## **6.5 Site Inspection**

The site was visited to identify any unique conditions that might affect the need for signalization. The following conditions were noted:

- Sight distances are excellent on all approaches
- MR 80 has minimal side friction (i.e. wide open spaces around the road) and this will always encourage higher speeds.

## **6.6 Potential Impact of Traffic Signals on Background Traffic**

It is likely that if traffic signals were to be installed at the MR 80/Shirley Avenue intersection that there would be some additional non-school traffic



attracted to use this route for making a left turn out onto MR 80. The existing traffic count at the MR 80/Shirley Avenue intersection (see **Exhibit 3.1a**) shows that 22 vehicles turned left from Shirley Avenue in the morning peak hour and 53 returned in the afternoon (northbound right turn). This could be an indicator that some motorists avoid using Shirley Avenue in the morning to make a left turn onto MR 80, but find it convenient to use Shirley Avenue in the afternoon when it only requires a right turn.

There may be a number of motorists that might be attracted to Shirley Avenue if it is signalized. As stated in Section 6.3, if the outbound left turns from Shirley Avenue were to double, the signal warrant for the intersection is projected to reach 97%.



## **7 Active Transportation**

The City of Greater Sudbury Official Plan places emphasis on promoting Active Transportation. In the case of the proposed school, Active Transportation would mean enabling and encouraging walking and biking to school by pupils, staff, parents and others. To a lesser extent, it would include encouraging ridesharing and public transit usage. The following are considered to be the priorities for the new school:

- i) Good quality and convenient walkways/bike paths, including a high level of winter maintenance of these facilities
- ii) Safe crossing of MR 80 i.e. traffic signals and crossing guard
- iii) Eliminating/minimizing vehicular/pedestrian conflicts on site
- iv) Conveniently located secure bike storage at school entrances
- v) Encourage provision of bus shelters on MR 80 at bus stops
- vi) Priority parking for ridesharing .

### **7.1 Sidewalks/Footpaths/Bike Paths**

There are no sidewalks along this section of MR 80 nor are there any along Shirley Avenue. There is a sidewalk along the south side of Gauthier Street and there are sidewalks in the Jeanne d'Arc Street area including along the west side of Dugas Street in the vicinity of Jeanne d'Arc Street.

Some older pupils living in the Shirley Avenue catchment area will be expected to walk (or bike) to school. They will need safe sidewalks /footpaths/bike paths from MR 80 to the school entrance. Some parents and staff will also want to walk to school and there should be sidewalks/footpaths to appropriate school entrances. Day Care staff occasionally take children out for a walk and a suitable sidewalk/footpath is desirable.

In consideration of the above, the following sidewalks/footpaths/bike paths are recommended as priorities for the school:



- i) Pedestrian walkways (raised sidewalks or paths removed from vehicular driveways) from all building entrances to a main raised sidewalk along the main driveway leading to MR 80
- ii) A safe raised pedestrian holding area on Shirley Avenue on the east side of MR 80
- iii) Bicycle path(s) from MR 80 to bike racks near the school entrance(s).
- iv) A paved pedestrian/bike path on the west side of MR 80 (removed from the vehicular roadway) from the school driveway to Jeanne d'Arc Street.
- v) A high level of winter maintenance will need to be put in place possibly with shared responsibility between the City and the School Board.

## **7.2 MR 80 Crossing**

MR 80 is a straight wide open roadway with high vehicular speeds. In addition to traffic signals, a school crossing guard should be on duty for pupils crossing MR 80 at Shirley

## **7.3 Vehicle/Pedestrian Conflicts on Site**

To make walking/biking as attractive as possible and maximize safety, the site plan should minimize/eliminate conflicts between vehicular traffic and pedestrian/bike traffic on school property. Pedestrians and bicyclists should desirably be able to get from MR 80 to the school without having to cross any automobile/bus traffic/driveways.

The proposed site plan requires pedestrians/bicyclists to cross the parent drop-off parking lot on the east side of the school. This conflict between pedestrians and vehicles could be eliminated if the parking lot was relocated to the west side of the school. If the parking lot remains on the east side, pedestrian safety would be improved by making the crossing a raised platform



(i.e. the crossing at sidewalk level with ramps on the approaches for vehicular traffic).

#### **7.4 Bike Racks**

Convenient and secure bike storage should be provided at all relevant school entrances.

#### **7.5 Bus Shelters**

In order to enhance the appeal of taking transit, the School Board should work with the City to provide bus shelters at the bus stops on MR 80.

#### **7.6 Priority Parking for Ridesharers**

In order to encourage ridesharing, the most desirable parking spaces should be reserved for rideshare participants.

## **APPENDIX A**

**Traffic Count Data  
provided by City Traffic Office**





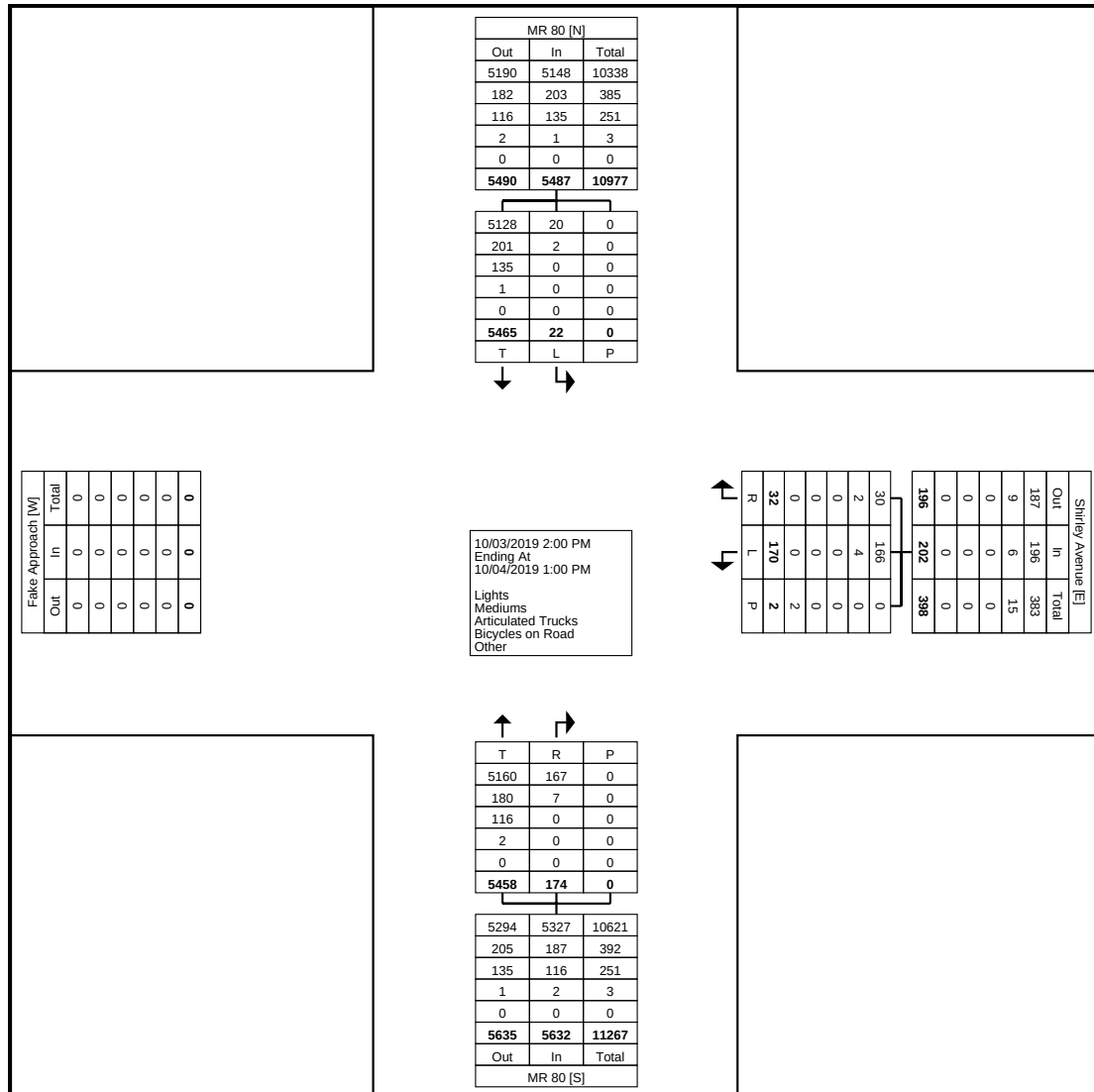
Traffic and Transportation Engineering Services  
1800 Frobisher Street  
PO Box 5000, STN A  
Sudbury, Ontario, Canada P3A 5P3  
705-674-4455

Count Name: MR 80 at Shirley Avenue  
Site Code:  
Start Date: 10/03/2019  
Page No: 1

## Turning Movement Data

| Start Time           | MR 80 Southbound |      |      |            | Shirley Avenue Westbound |      |      |            | MR 80 Northbound |      |      |            | Int. Total |
|----------------------|------------------|------|------|------------|--------------------------|------|------|------------|------------------|------|------|------------|------------|
|                      | Thru             | Left | Peds | App. Total | Right                    | Left | Peds | App. Total | Right            | Thru | Peds | App. Total |            |
| 2:00 PM              | 135              | 0    | 0    | 135        | 0                        | 5    | 0    | 5          | 4                | 137  | 0    | 141        | 281        |
| 2:15 PM              | 161              | 3    | 0    | 164        | 3                        | 4    | 0    | 7          | 8                | 153  | 0    | 161        | 332        |
| 2:30 PM              | 131              | 1    | 0    | 132        | 0                        | 5    | 1    | 5          | 6                | 176  | 0    | 182        | 319        |
| 2:45 PM              | 139              | 1    | 0    | 140        | 0                        | 3    | 0    | 3          | 4                | 189  | 0    | 193        | 336        |
| Hourly Total         | 566              | 5    | 0    | 571        | 3                        | 17   | 1    | 20         | 22               | 655  | 0    | 677        | 1268       |
| 3:00 PM              | 119              | 1    | 0    | 120        | 2                        | 3    | 0    | 5          | 4                | 172  | 0    | 176        | 301        |
| 3:15 PM              | 164              | 1    | 0    | 165        | 1                        | 7    | 0    | 8          | 6                | 211  | 0    | 217        | 390        |
| 3:30 PM              | 149              | 0    | 0    | 149        | 2                        | 3    | 0    | 5          | 8                | 243  | 0    | 251        | 405        |
| 3:45 PM              | 140              | 0    | 0    | 140        | 1                        | 2    | 0    | 3          | 8                | 226  | 0    | 234        | 377        |
| Hourly Total         | 572              | 2    | 0    | 574        | 6                        | 15   | 0    | 21         | 26               | 852  | 0    | 878        | 1473       |
| 4:00 PM              | 132              | 0    | 0    | 132        | 1                        | 4    | 1    | 5          | 5                | 267  | 0    | 272        | 409        |
| 4:15 PM              | 122              | 1    | 0    | 123        | 2                        | 9    | 0    | 11         | 8                | 249  | 0    | 257        | 391        |
| 4:30 PM              | 142              | 1    | 0    | 143        | 1                        | 3    | 0    | 4          | 10               | 297  | 0    | 307        | 454        |
| 4:45 PM              | 126              | 1    | 0    | 127        | 0                        | 7    | 0    | 7          | 16               | 296  | 0    | 312        | 446        |
| Hourly Total         | 522              | 3    | 0    | 525        | 4                        | 23   | 1    | 27         | 39               | 1109 | 0    | 1148       | 1700       |
| 5:00 PM              | 106              | 0    | 0    | 106        | 3                        | 3    | 0    | 6          | 11               | 290  | 0    | 301        | 413        |
| 5:15 PM              | 151              | 2    | 0    | 153        | 0                        | 3    | 0    | 3          | 16               | 245  | 0    | 261        | 417        |
| 5:30 PM              | 112              | 0    | 0    | 112        | 1                        | 5    | 0    | 6          | 11               | 227  | 0    | 238        | 356        |
| 5:45 PM              | 105              | 0    | 0    | 105        | 1                        | 2    | 0    | 3          | 10               | 202  | 0    | 212        | 320        |
| Hourly Total         | 474              | 2    | 0    | 476        | 5                        | 13   | 0    | 18         | 48               | 964  | 0    | 1012       | 1506       |
| 6:00 PM              | 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          |
| 6:00 AM              | 124              | 0    | 0    | 124        | 1                        | 3    | 0    | 4          | 0                | 23   | 0    | 23         | 151        |
| 6:15 AM              | 151              | 0    | 0    | 151        | 0                        | 7    | 0    | 7          | 0                | 29   | 0    | 29         | 187        |
| 6:30 AM              | 163              | 0    | 0    | 163        | 0                        | 9    | 0    | 9          | 2                | 37   | 0    | 39         | 211        |
| 6:45 AM              | 166              | 0    | 0    | 166        | 0                        | 8    | 0    | 8          | 1                | 45   | 0    | 46         | 220        |
| Hourly Total         | 604              | 0    | 0    | 604        | 1                        | 27   | 0    | 28         | 3                | 134  | 0    | 137        | 769        |
| 7:00 AM              | 228              | 0    | 0    | 228        | 0                        | 4    | 0    | 4          | 1                | 51   | 0    | 52         | 284        |
| 7:15 AM              | 248              | 0    | 0    | 248        | 1                        | 6    | 0    | 7          | 2                | 57   | 0    | 59         | 314        |
| 7:30 AM              | 263              | 0    | 0    | 263        | 2                        | 6    | 0    | 8          | 2                | 89   | 0    | 91         | 362        |
| 7:45 AM              | 188              | 1    | 0    | 189        | 1                        | 5    | 0    | 6          | 0                | 113  | 0    | 113        | 308        |
| Hourly Total         | 927              | 1    | 0    | 928        | 4                        | 21   | 0    | 25         | 5                | 310  | 0    | 315        | 1268       |
| 8:00 AM              | 217              | 1    | 0    | 218        | 0                        | 5    | 0    | 5          | 2                | 63   | 0    | 65         | 288        |
| 8:15 AM              | 182              | 1    | 0    | 183        | 1                        | 10   | 0    | 11         | 2                | 102  | 0    | 104        | 298        |
| 8:30 AM              | 170              | 0    | 0    | 170        | 0                        | 7    | 0    | 7          | 4                | 100  | 0    | 104        | 281        |
| 8:45 AM              | 162              | 1    | 0    | 163        | 0                        | 1    | 0    | 1          | 1                | 108  | 0    | 109        | 273        |
| Hourly Total         | 731              | 3    | 0    | 734        | 1                        | 23   | 0    | 24         | 9                | 373  | 0    | 382        | 1140       |
| 9:00 AM              | 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          |
| 11:00 AM             | 126              | 2    | 0    | 128        | 1                        | 3    | 0    | 4          | 1                | 113  | 0    | 114        | 246        |
| 11:15 AM             | 129              | 1    | 0    | 130        | 0                        | 3    | 0    | 3          | 3                | 126  | 0    | 129        | 262        |
| 11:30 AM             | 123              | 0    | 0    | 123        | 0                        | 5    | 0    | 5          | 2                | 120  | 0    | 122        | 250        |
| 11:45 AM             | 134              | 0    | 0    | 134        | 2                        | 2    | 0    | 4          | 2                | 155  | 0    | 157        | 295        |
| Hourly Total         | 512              | 3    | 0    | 515        | 3                        | 13   | 0    | 16         | 8                | 514  | 0    | 522        | 1053       |
| 12:00 PM             | 148              | 2    | 0    | 150        | 2                        | 3    | 0    | 5          | 2                | 132  | 0    | 134        | 289        |
| 12:15 PM             | 143              | 0    | 0    | 143        | 1                        | 5    | 0    | 6          | 1                | 146  | 0    | 147        | 296        |
| 12:30 PM             | 138              | 0    | 0    | 138        | 1                        | 4    | 0    | 5          | 8                | 134  | 0    | 142        | 285        |
| 12:45 PM             | 128              | 1    | 0    | 129        | 1                        | 6    | 0    | 7          | 3                | 135  | 0    | 138        | 274        |
| Hourly Total         | 557              | 3    | 0    | 560        | 5                        | 18   | 0    | 23         | 14               | 547  | 0    | 561        | 1144       |
| Grand Total          | 5465             | 22   | 0    | 5487       | 32                       | 170  | 2    | 202        | 174              | 5458 | 0    | 5632       | 11321      |
| Approach %           | 99.6             | 0.4  | -    | -          | 15.8                     | 84.2 | -    | -          | 3.1              | 96.9 | -    | -          | -          |
| Total %              | 48.3             | 0.2  | -    | 48.5       | 0.3                      | 1.5  | -    | 1.8        | 1.5              | 48.2 | -    | 49.7       | -          |
| Lights               | 5128             | 20   | -    | 5148       | 30                       | 166  | -    | 196        | 167              | 5160 | -    | 5327       | 10671      |
| % Lights             | 93.8             | 90.9 | -    | 93.8       | 93.8                     | 97.6 | -    | 97.0       | 96.0             | 94.5 | -    | 94.6       | 94.3       |
| Mediums              | 201              | 2    | -    | 203        | 2                        | 4    | -    | 6          | 7                | 180  | -    | 187        | 396        |
| % Mediums            | 3.7              | 9.1  | -    | 3.7        | 6.3                      | 2.4  | -    | 3.0        | 4.0              | 3.3  | -    | 3.3        | 3.5        |
| Articulated Trucks   | 135              | 0    | -    | 135        | 0                        | 0    | -    | 0          | 0                | 116  | -    | 116        | 251        |
| % Articulated Trucks | 2.5              | 0.0  | -    | 2.5        | 0.0                      | 0.0  | -    | 0.0        | 0.0              | 2.1  | -    | 2.1        | 2.2        |
| Bicycles on Road     | 1                | 0    | -    | 1          | 0                        | 0    | -    | 0          | 0                | 2    | -    | 2          | 3          |

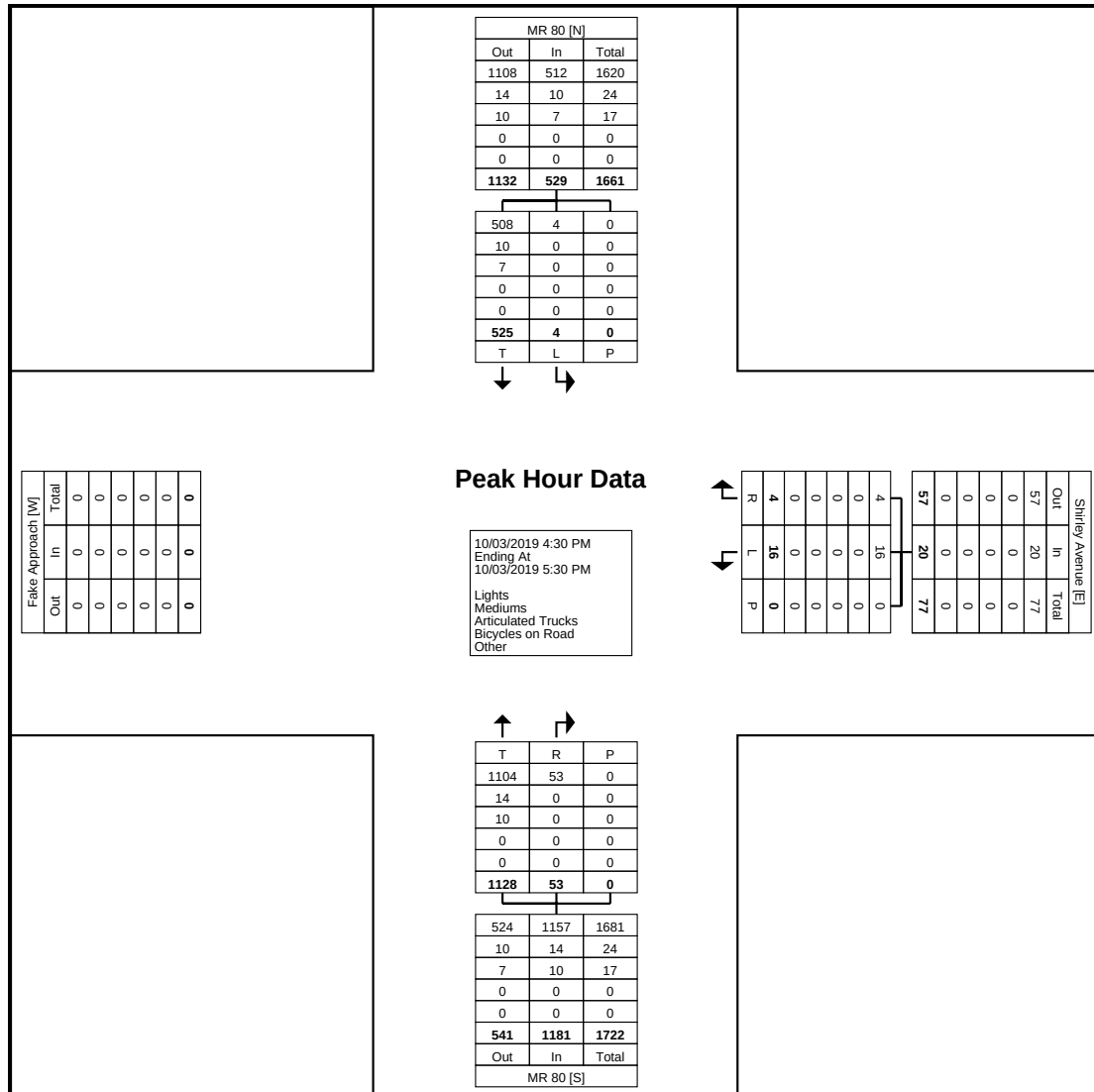
|                         |     |     |   |     |     |     |       |     |     |     |   |     |     |
|-------------------------|-----|-----|---|-----|-----|-----|-------|-----|-----|-----|---|-----|-----|
| % Bicycles on Road      | 0.0 | 0.0 | - | 0.0 | 0.0 | 0.0 | -     | 0.0 | 0.0 | 0.0 | - | 0.0 | 0.0 |
| Bicycles on Crosswalk   | -   | -   | 0 | -   | -   | -   | 0     | -   | -   | -   | 0 | -   | -   |
| % Bicycles on Crosswalk | -   | -   | - | -   | -   | -   | 0.0   | -   | -   | -   | - | -   | -   |
| Pedestrians             | -   | -   | 0 | -   | -   | -   | 2     | -   | -   | -   | 0 | -   | -   |
| % Pedestrians           | -   | -   | - | -   | -   | -   | 100.0 | -   | -   | -   | - | -   | -   |



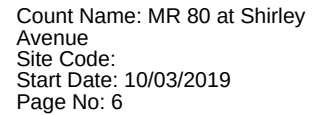
### Turning Movement Data Plot

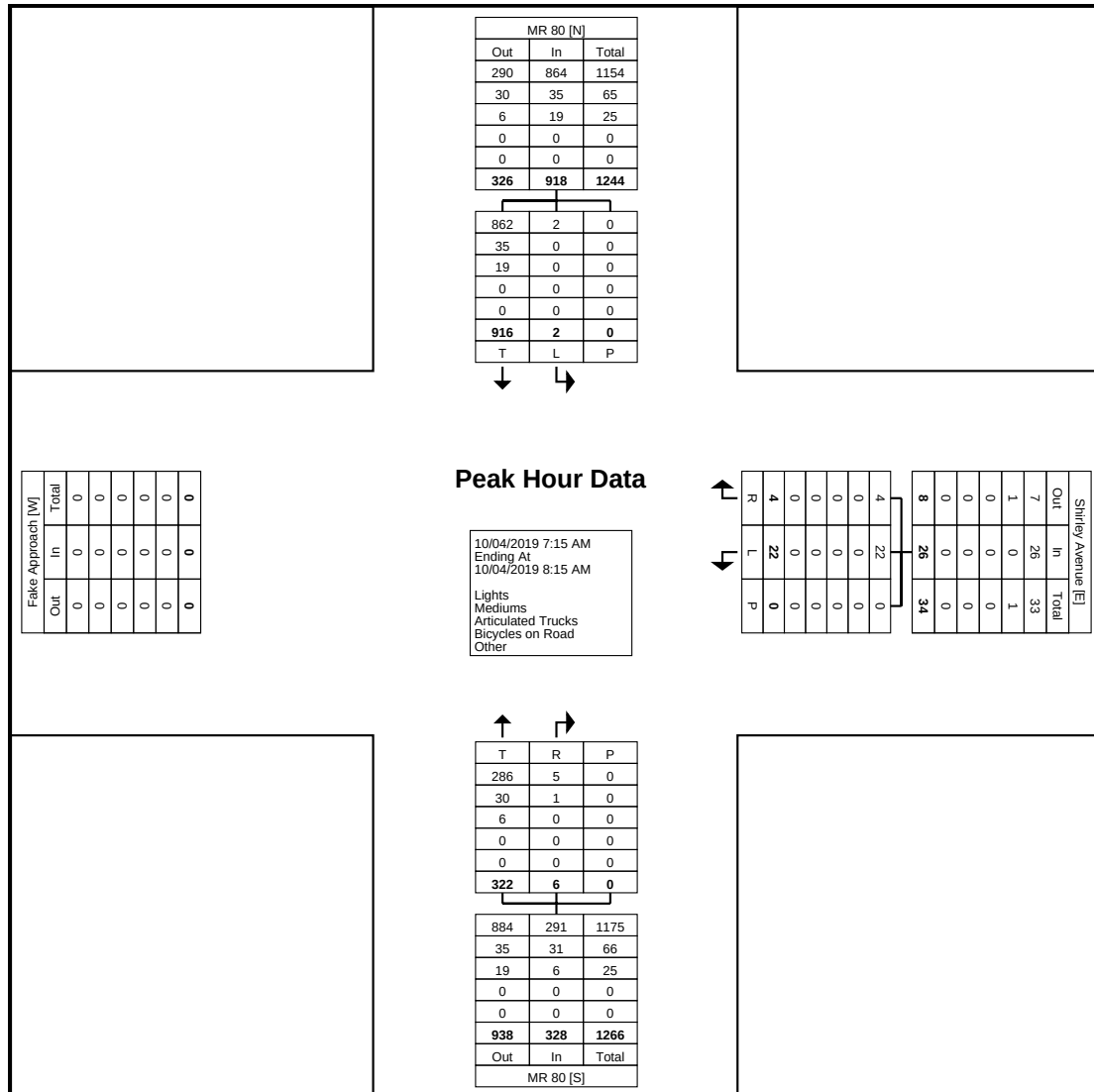
### Turning Movement Peak Hour Data (4:30 PM)

[illegible]



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

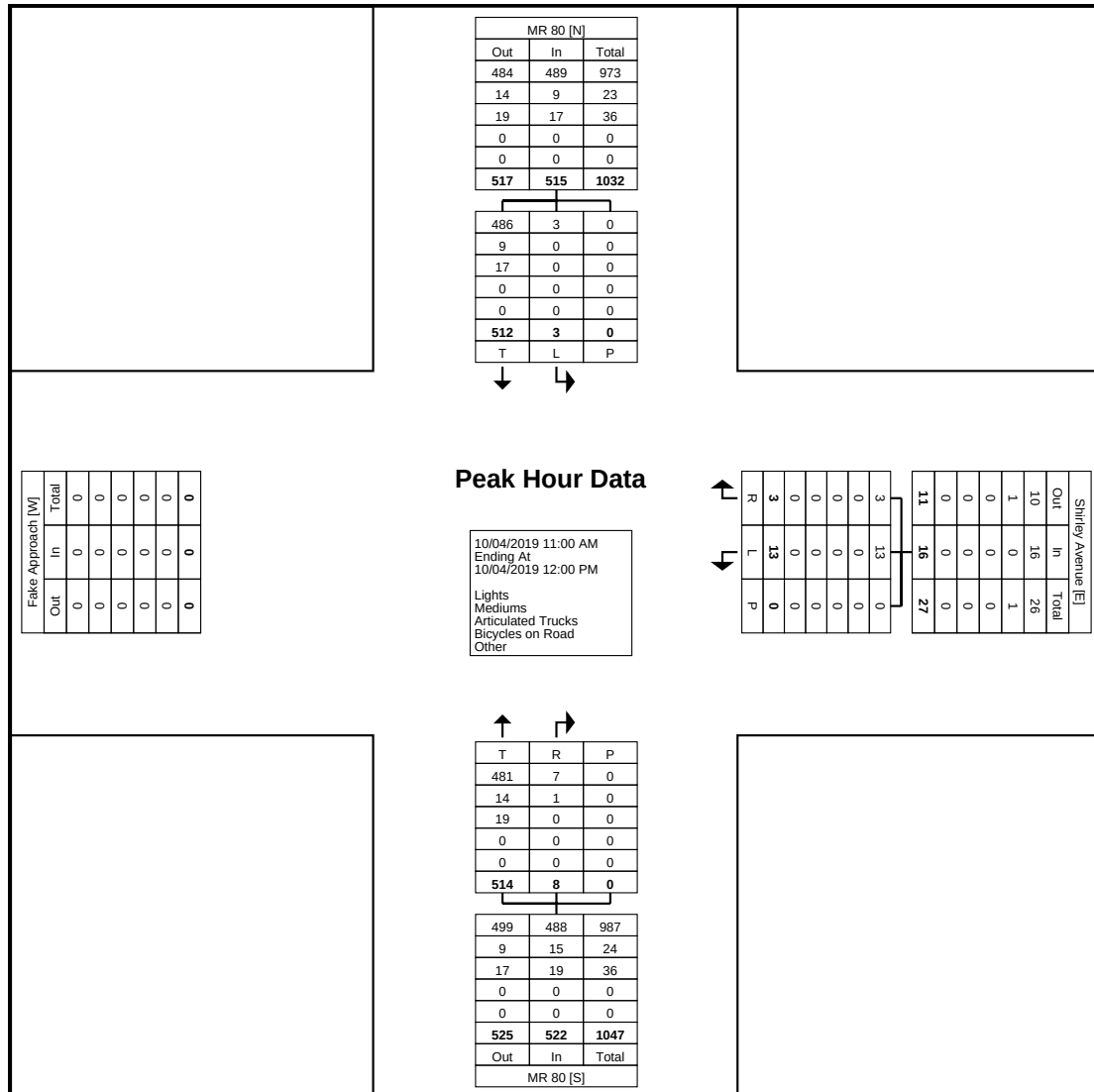




Turning Movement Peak Hour Data Plot (7:15 AM)



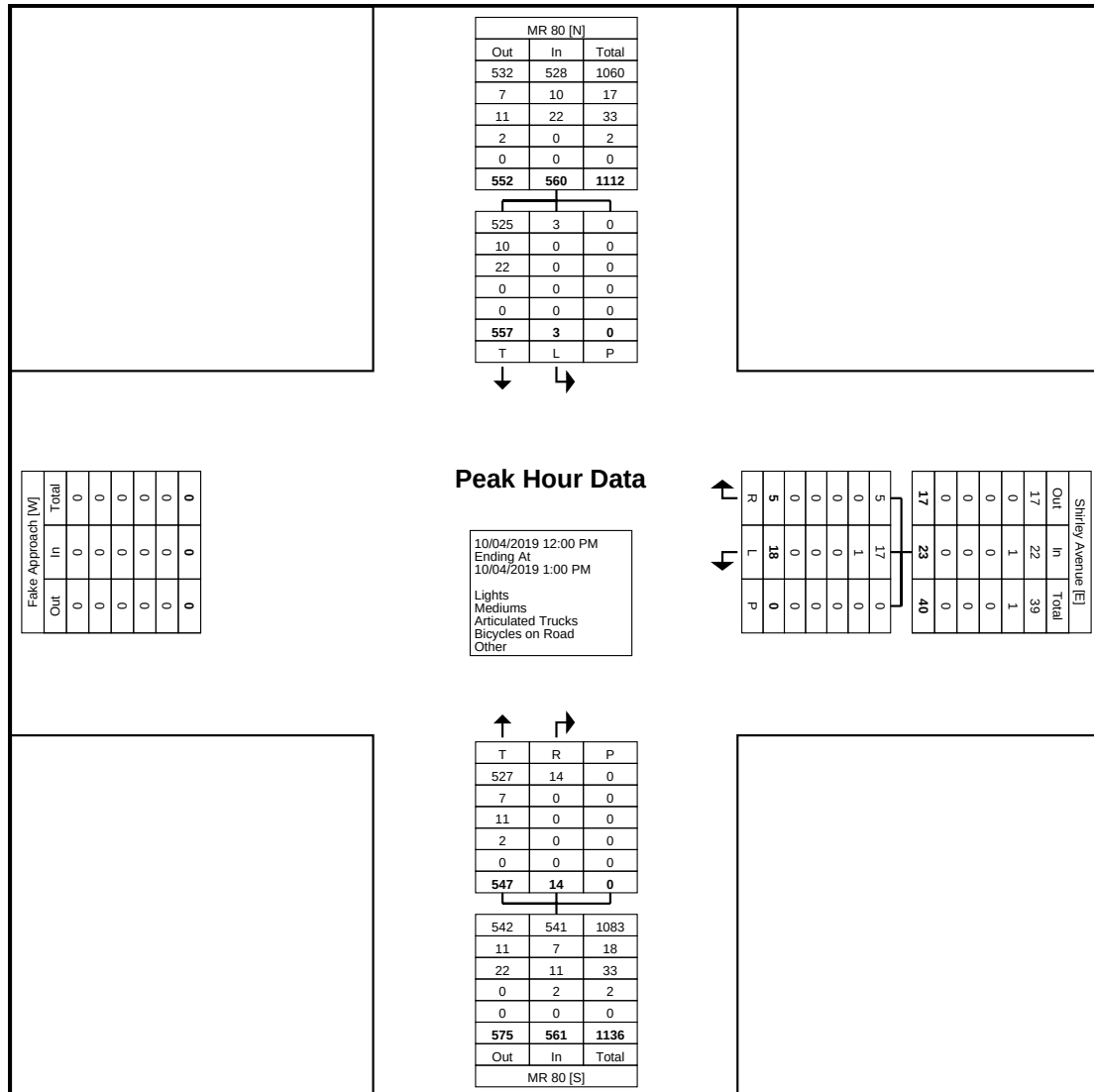




Turning Movement Peak Hour Data Plot (11:00 AM)

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

[illegible]



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

## Automatic Counter Tabulations

|                      |                          |
|----------------------|--------------------------|
| Street:              | MR 80 (Total)            |
| Location:            | North of Dominion Drive  |
| Title:               | Special                  |
| Counter Number:      | Radar                    |
| Start Date of Count: | Wednesday, June 11, 2014 |
| Total:               | 17457                    |
| AADT:                | 15010                    |
| Analyst:             | PG                       |

| Hour     | First Quarter | Second Quarter | Third Quarter | Fourth Quarter |  | Total | Factored Total |
|----------|---------------|----------------|---------------|----------------|--|-------|----------------|
| 0 to 1   | 19            | 33             | 23            | 13             |  | 88    | 76             |
| 1 to 2   | 18            | 13             | 11            | 6              |  | 48    | 41             |
| 2 to 3   | 10            | 11             | 9             | 9              |  | 39    | 34             |
| 3 to 4   | 4             | 4              | 3             | 8              |  | 19    | 16             |
| 4 to 5   | 15            | 16             | 28            | 43             |  | 102   | 88             |
| 5 to 6   | 62            | 88             | 122           | 123            |  | 395   | 340            |
| 6 to 7   | 161           | 218            | 254           | 224            |  | 857   | 737            |
| 7 to 8   | 237           | 289            | 292           | 281            |  | 1099  | 945            |
| 8 to 9   | 313           | 297            | 283           | 263            |  | 1156  | 994            |
| 9 to 10  | 229           | 228            | 221           | 230            |  | 908   | 781            |
| 10 to 11 | 242           | 206            | 230           | 215            |  | 893   | 768            |
| 11 to 12 | 225           | 228            | 230           | 245            |  | 928   | 798            |
|          |               |                |               |                |  |       |                |
| 12 to 13 | 227           | 232            | 265           | 240            |  | 964   | 829            |
| 13 to 14 | 278           | 244            | 261           | 263            |  | 1046  | 899            |
| 14 to 15 | 257           | 293            | 292           | 261            |  | 1103  | 948            |
| 15 to 16 | 262           | 322            | 305           | 308            |  | 1197  | 1029           |
| 16 to 17 | 369           | 367            | 355           | 363            |  | 1454  | 1250           |
| 17 to 18 | 345           | 345            | 371           | 316            |  | 1377  | 1184           |
| 18 to 19 | 293           | 270            | 258           | 228            |  | 1049  | 902            |
| 19 to 20 | 214           | 245            | 221           | 170            |  | 850   | 731            |
| 20 to 21 | 194           | 183            | 193           | 183            |  | 753   | 647            |
| 21 to 22 | 177           | 162            | 140           | 170            |  | 649   | 558            |
| 22 to 23 | 80            | 76             | 69            | 57             |  | 282   | 242            |
| 23 to 24 | 55            | 69             | 46            | 31             |  | 201   | 173            |
| Total    | 4286          | 4439           | 4482          | 4250           |  | 17457 | 15010          |

|                         |      |        |       |
|-------------------------|------|--------|-------|
| Monthly Factor:         | 0.95 | Total: | 17457 |
| Daily Factor: Wednesday | 0.91 | AADT:  | 15010 |
| Thursday                | 0.9  |        |       |



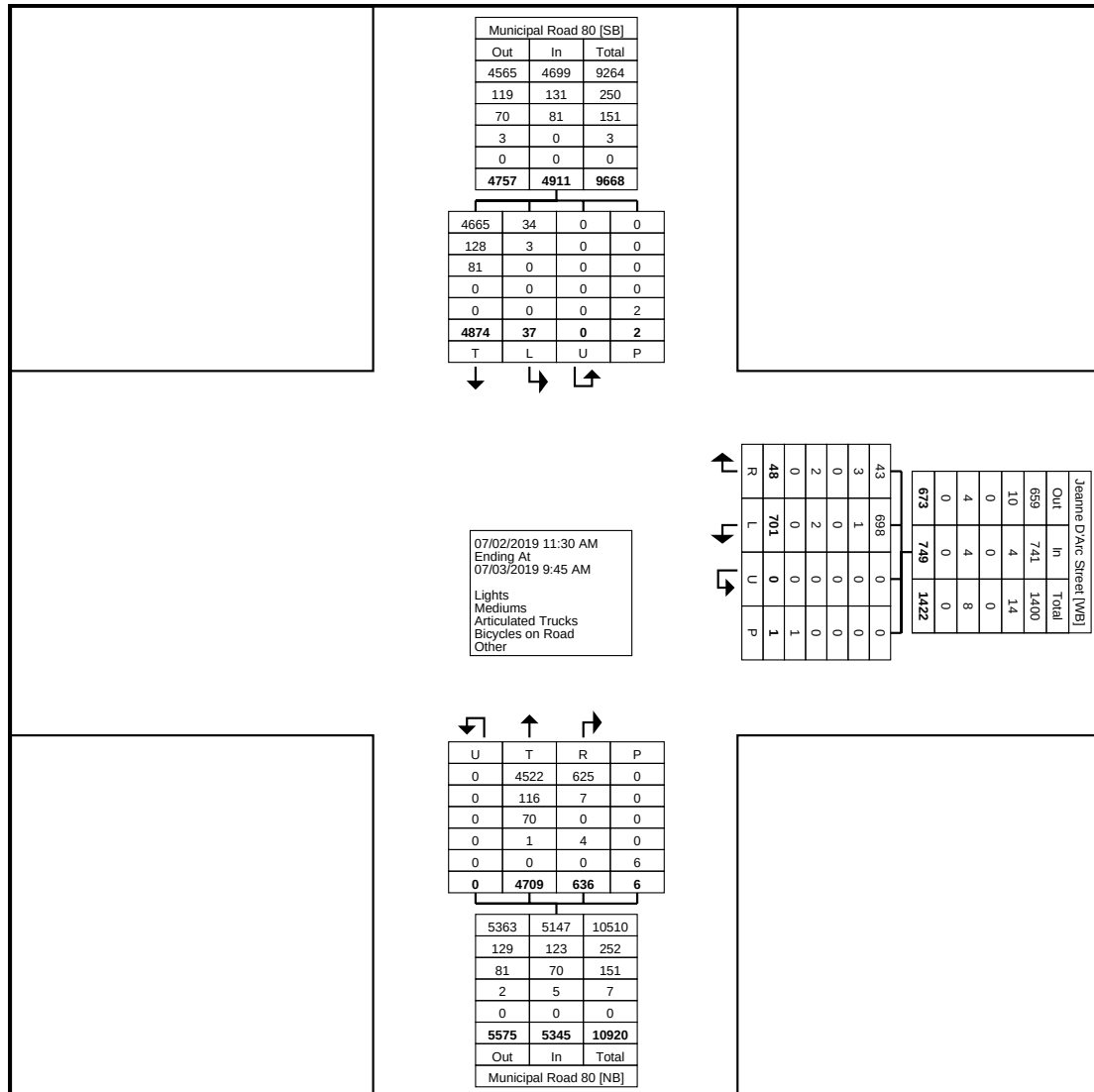
Traffic and Transportation Engineering Services  
1800 Frobisher Street  
PO Box 5000, STN A  
Sudbury, Ontario, Canada P3A 5P3  
705-674-4455

Count Name: Jeanne D'Arc  
Street @ Municipal Road 80  
Site Code: 00812103  
Start Date: 07/02/2019  
Page No: 1

## Turning Movement Data

| Start Time            | Municipal Road 80<br>Southbound |      |        |      |            | Jeanne D'Arc Street<br>Westbound |      |        |      |            | Municipal Road 80<br>Northbound |      |        |      |            | Int. Total |
|-----------------------|---------------------------------|------|--------|------|------------|----------------------------------|------|--------|------|------------|---------------------------------|------|--------|------|------------|------------|
|                       | Thru                            | Left | U-Turn | Peds | App. Total | Right                            | Left | U-Turn | Peds | App. Total | Right                           | Thru | U-Turn | Peds | App. Total |            |
| 11:30 AM              | 130                             | 1    | 0      | 0    | 131        | 0                                | 13   | 0      | 0    | 13         | 18                              | 116  | 0      | 0    | 134        | 278        |
| 11:45 AM              | 136                             | 4    | 0      | 0    | 140        | 1                                | 20   | 0      | 0    | 21         | 18                              | 135  | 0      | 0    | 153        | 314        |
| Hourly Total          | 266                             | 5    | 0      | 0    | 271        | 1                                | 33   | 0      | 0    | 34         | 36                              | 251  | 0      | 0    | 287        | 592        |
| 12:00 PM              | 125                             | 1    | 0      | 0    | 126        | 2                                | 18   | 0      | 0    | 20         | 7                               | 174  | 0      | 0    | 181        | 327        |
| 12:15 PM              | 152                             | 2    | 0      | 0    | 154        | 1                                | 22   | 0      | 0    | 23         | 24                              | 150  | 0      | 0    | 174        | 351        |
| 12:30 PM              | 176                             | 1    | 0      | 0    | 177        | 2                                | 25   | 0      | 0    | 27         | 15                              | 148  | 0      | 0    | 163        | 367        |
| 12:45 PM              | 172                             | 0    | 0      | 1    | 172        | 4                                | 13   | 0      | 0    | 17         | 13                              | 145  | 0      | 0    | 158        | 347        |
| Hourly Total          | 625                             | 4    | 0      | 1    | 629        | 9                                | 78   | 0      | 0    | 87         | 59                              | 617  | 0      | 0    | 676        | 1392       |
| 1:00 PM               | 138                             | 1    | 0      | 0    | 139        | 1                                | 15   | 0      | 0    | 16         | 11                              | 136  | 0      | 0    | 147        | 302        |
| 1:15 PM               | 136                             | 0    | 0      | 1    | 136        | 1                                | 10   | 0      | 0    | 11         | 15                              | 119  | 0      | 0    | 134        | 281        |
| 1:30 PM               | 0                               | 0    | 0      | 0    | 0          | 0                                | 0    | 0      | 0    | 0          | 0                               | 0    | 0      | 0    | 0          | 0          |
| *** BREAK ***         | -                               | -    | -      | -    | -          | -                                | -    | -      | -    | -          | -                               | -    | -      | -    | -          | -          |
| Hourly Total          | 274                             | 1    | 0      | 1    | 275        | 2                                | 25   | 0      | 0    | 27         | 26                              | 255  | 0      | 0    | 281        | 583        |
| 3:00 PM               | 165                             | 0    | 0      | 0    | 165        | 0                                | 14   | 0      | 0    | 14         | 23                              | 168  | 0      | 0    | 191        | 370        |
| 3:15 PM               | 113                             | 0    | 0      | 0    | 113        | 2                                | 17   | 0      | 0    | 19         | 36                              | 221  | 0      | 0    | 257        | 389        |
| 3:30 PM               | 132                             | 0    | 0      | 0    | 132        | 3                                | 16   | 0      | 0    | 19         | 28                              | 243  | 0      | 1    | 271        | 422        |
| 3:45 PM               | 153                             | 1    | 0      | 0    | 154        | 0                                | 18   | 0      | 0    | 18         | 39                              | 238  | 0      | 0    | 277        | 449        |
| Hourly Total          | 563                             | 1    | 0      | 0    | 564        | 5                                | 65   | 0      | 0    | 70         | 126                             | 870  | 0      | 1    | 996        | 1630       |
| 4:00 PM               | 134                             | 2    | 0      | 0    | 136        | 3                                | 17   | 0      | 0    | 20         | 34                              | 232  | 0      | 0    | 266        | 422        |
| 4:15 PM               | 121                             | 3    | 0      | 0    | 124        | 1                                | 21   | 0      | 0    | 22         | 39                              | 255  | 0      | 1    | 294        | 440        |
| 4:30 PM               | 136                             | 3    | 0      | 0    | 139        | 1                                | 30   | 0      | 0    | 31         | 44                              | 261  | 0      | 2    | 305        | 475        |
| 4:45 PM               | 133                             | 1    | 0      | 0    | 134        | 3                                | 12   | 0      | 0    | 15         | 47                              | 268  | 0      | 1    | 315        | 464        |
| Hourly Total          | 524                             | 9    | 0      | 0    | 533        | 8                                | 80   | 0      | 0    | 88         | 164                             | 1016 | 0      | 4    | 1180       | 1801       |
| 5:00 PM               | 164                             | 3    | 0      | 0    | 167        | 0                                | 22   | 0      | 0    | 22         | 49                              | 272  | 0      | 0    | 321        | 510        |
| 5:15 PM               | 120                             | 2    | 0      | 0    | 122        | 0                                | 16   | 0      | 0    | 16         | 37                              | 239  | 0      | 0    | 276        | 414        |
| 5:30 PM               | 128                             | 4    | 0      | 0    | 132        | 1                                | 28   | 0      | 0    | 29         | 31                              | 212  | 0      | 0    | 243        | 404        |
| 5:45 PM               | 123                             | 1    | 0      | 0    | 124        | 3                                | 20   | 0      | 0    | 23         | 30                              | 204  | 0      | 0    | 234        | 381        |
| Hourly Total          | 535                             | 10   | 0      | 0    | 545        | 4                                | 86   | 0      | 0    | 90         | 147                             | 927  | 0      | 0    | 1074       | 1709       |
| 6:00 PM               | 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          |
| 6:30 AM               | 224                             | 1    | 0      | 0    | 225        | 0                                | 18   | 0      | 0    | 18         | 3                               | 32   | 0      | 0    | 35         | 278        |
| 6:45 AM               | 167                             | 1    | 0      | 0    | 168        | 0                                | 23   | 0      | 0    | 23         | 5                               | 39   | 0      | 1    | 44         | 235        |
| Hourly Total          | 391                             | 2    | 0      | 0    | 393        | 0                                | 41   | 0      | 0    | 41         | 8                               | 71   | 0      | 1    | 79         | 513        |
| 7:00 AM               | 200                             | 0    | 0      | 0    | 200        | 1                                | 31   | 0      | 1    | 32         | 6                               | 33   | 0      | 0    | 39         | 271        |
| 7:15 AM               | 197                             | 0    | 0      | 0    | 197        | 0                                | 34   | 0      | 0    | 34         | 5                               | 70   | 0      | 0    | 75         | 306        |
| 7:30 AM               | 194                             | 1    | 0      | 0    | 195        | 0                                | 39   | 0      | 0    | 39         | 6                               | 53   | 0      | 0    | 59         | 293        |
| 7:45 AM               | 191                             | 0    | 0      | 0    | 191        | 2                                | 27   | 0      | 0    | 29         | 5                               | 74   | 0      | 0    | 79         | 299        |
| Hourly Total          | 782                             | 1    | 0      | 0    | 783        | 3                                | 131  | 0      | 1    | 134        | 22                              | 230  | 0      | 0    | 252        | 1169       |
| 8:00 AM               | 189                             | 0    | 0      | 0    | 189        | 1                                | 32   | 0      | 0    | 33         | 11                              | 74   | 0      | 0    | 85         | 307        |
| 8:15 AM               | 179                             | 1    | 0      | 0    | 180        | 3                                | 34   | 0      | 0    | 37         | 10                              | 74   | 0      | 0    | 84         | 301        |
| 8:30 AM               | 142                             | 0    | 0      | 0    | 142        | 3                                | 31   | 0      | 0    | 34         | 5                               | 83   | 0      | 0    | 88         | 264        |
| 8:45 AM               | 158                             | 2    | 0      | 0    | 160        | 3                                | 24   | 0      | 0    | 27         | 7                               | 90   | 0      | 0    | 97         | 284        |
| Hourly Total          | 668                             | 3    | 0      | 0    | 671        | 10                               | 121  | 0      | 0    | 131        | 33                              | 321  | 0      | 0    | 354        | 1156       |
| 9:00 AM               | 108                             | 1    | 0      | 0    | 109        | 3                                | 14   | 0      | 0    | 17         | 10                              | 81   | 0      | 0    | 91         | 217        |
| 9:15 AM               | 138                             | 0    | 0      | 0    | 138        | 3                                | 27   | 0      | 0    | 30         | 5                               | 70   | 0      | 0    | 75         | 243        |
| 9:30 AM               | 0                               | 0    | 0      | 0    | 0          | 0                                | 0    | 0      | 0    | 0          | 0                               | 0    | 0      | 0    | 0          | 0          |
| Grand Total           | 4874                            | 37   | 0      | 2    | 4911       | 48                               | 701  | 0      | 1    | 749        | 636                             | 4709 | 0      | 6    | 5345       | 11005      |
| Approach %            | 99.2                            | 0.8  | 0.0    | -    | -          | 6.4                              | 93.6 | 0.0    | -    | -          | 11.9                            | 88.1 | 0.0    | -    | -          | -          |
| Total %               | 44.3                            | 0.3  | 0.0    | -    | 44.6       | 0.4                              | 6.4  | 0.0    | -    | 6.8        | 5.8                             | 42.8 | 0.0    | -    | 48.6       | -          |
| Lights                | 4665                            | 34   | 0      | -    | 4699       | 43                               | 698  | 0      | -    | 741        | 625                             | 4522 | 0      | -    | 5147       | 10587      |
| % Lights              | 95.7                            | 91.9 | -      | -    | 95.7       | 89.6                             | 99.6 | -      | -    | 98.9       | 98.3                            | 96.0 | -      | -    | 96.3       | 96.2       |
| Mediums               | 128                             | 3    | 0      | -    | 131        | 3                                | 1    | 0      | -    | 4          | 7                               | 116  | 0      | -    | 123        | 258        |
| % Mediums             | 2.6                             | 8.1  | -      | -    | 2.7        | 6.3                              | 0.1  | -      | -    | 0.5        | 1.1                             | 2.5  | -      | -    | 2.3        | 2.3        |
| Articulated Trucks    | 81                              | 0    | 0      | -    | 81         | 0                                | 0    | 0      | -    | 0          | 0                               | 70   | 0      | -    | 70         | 151        |
| % Articulated Trucks  | 1.7                             | 0.0  | -      | -    | 1.6        | 0.0                              | 0.0  | -      | -    | 0.0        | 0.0                             | 1.5  | -      | -    | 1.3        | 1.4        |
| Bicycles on Road      | 0                               | 0    | 0      | -    | 0          | 2                                | 2    | 0      | -    | 4          | 4                               | 1    | 0      | -    | 5          | 9          |
| % Bicycles on Road    | 0.0                             | 0.0  | -      | -    | 0.0        | 4.2                              | 0.3  | -      | -    | 0.5        | 0.6                             | 0.0  | -      | -    | 0.1        | 0.1        |
| Bicycles on Crosswalk | -                               | -    | -      | 2    | -          | -                                | -    | -      | 1    | -          | -                               | -    | -      | 0    | -          | -          |

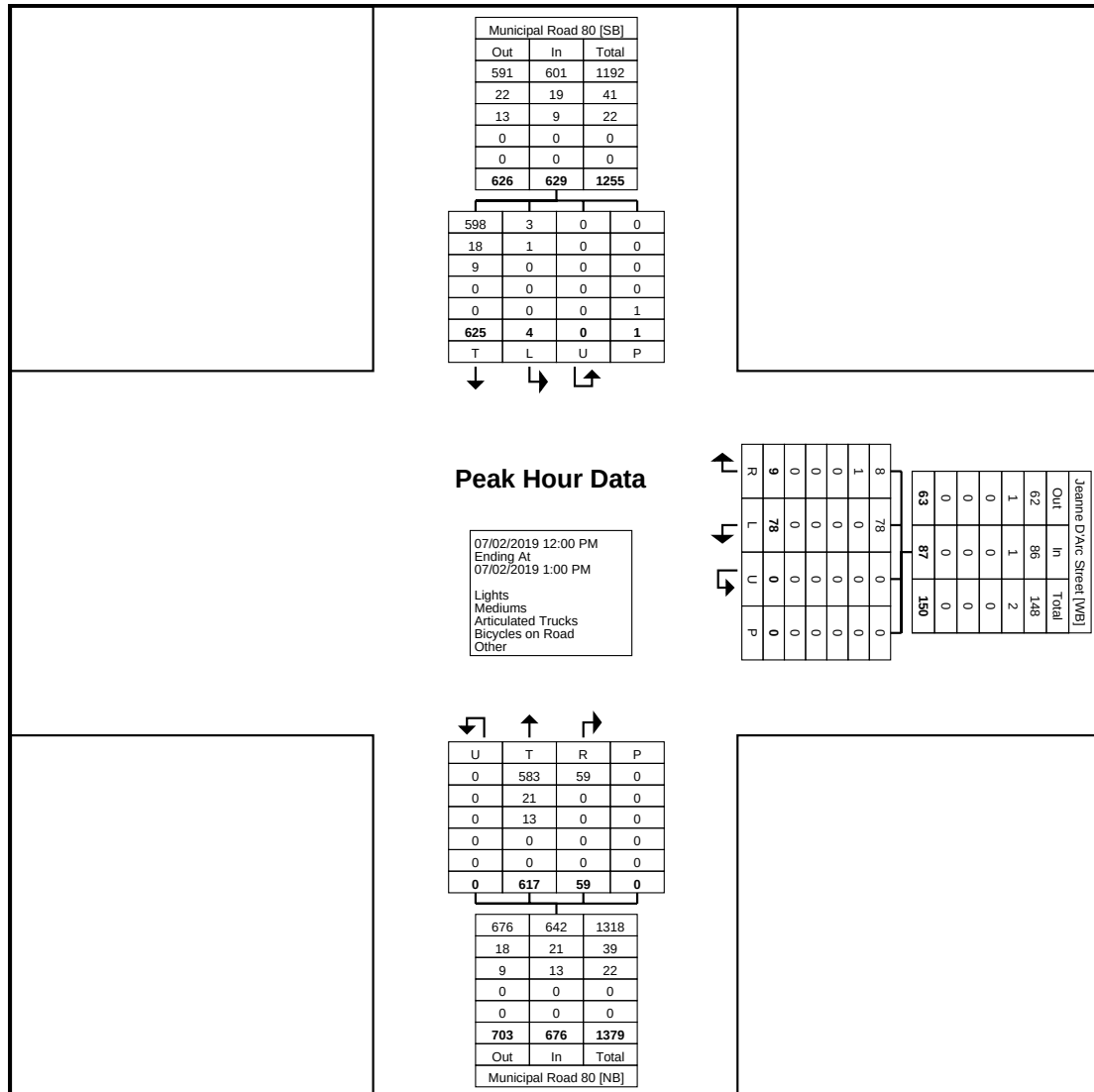
|                         |   |   |   |       |   |   |   |   |       |   |   |   |   |       |   |   |
|-------------------------|---|---|---|-------|---|---|---|---|-------|---|---|---|---|-------|---|---|
| % Bicycles on Crosswalk | - | - | - | 100.0 | - | - | - | - | 100.0 | - | - | - | - | 0.0   | - | - |
| Pedestrians             | - | - | - | 0     | - | - | - | - | 0     | - | - | - | - | 6     | - | - |
| % Pedestrians           | - | - | - | 0.0   | - | - | - | - | 0.0   | - | - | - | - | 100.0 | - | - |



Turning Movement Data Plot



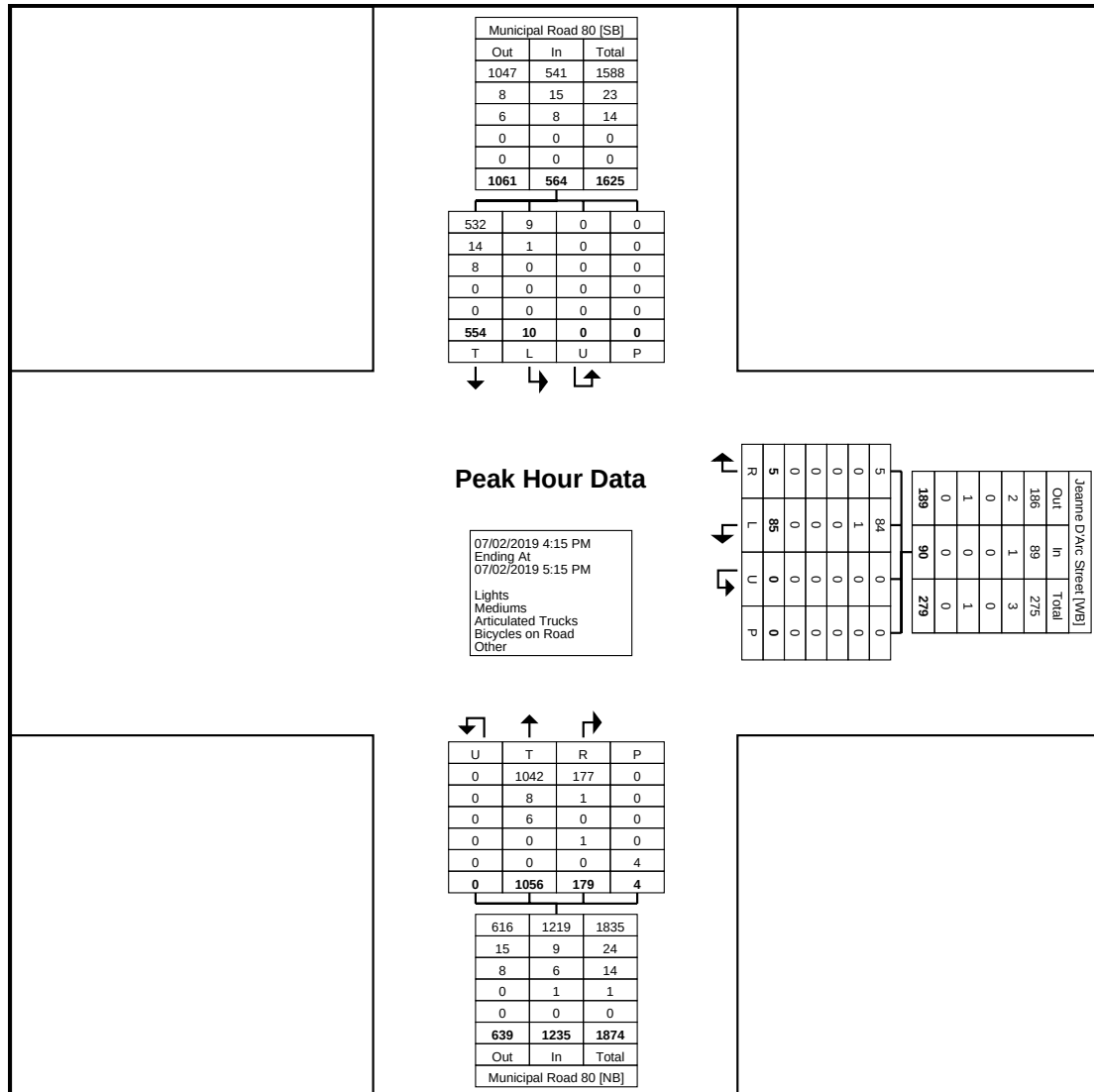




Turning Movement Peak Hour Data Plot (12:00 PM)

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

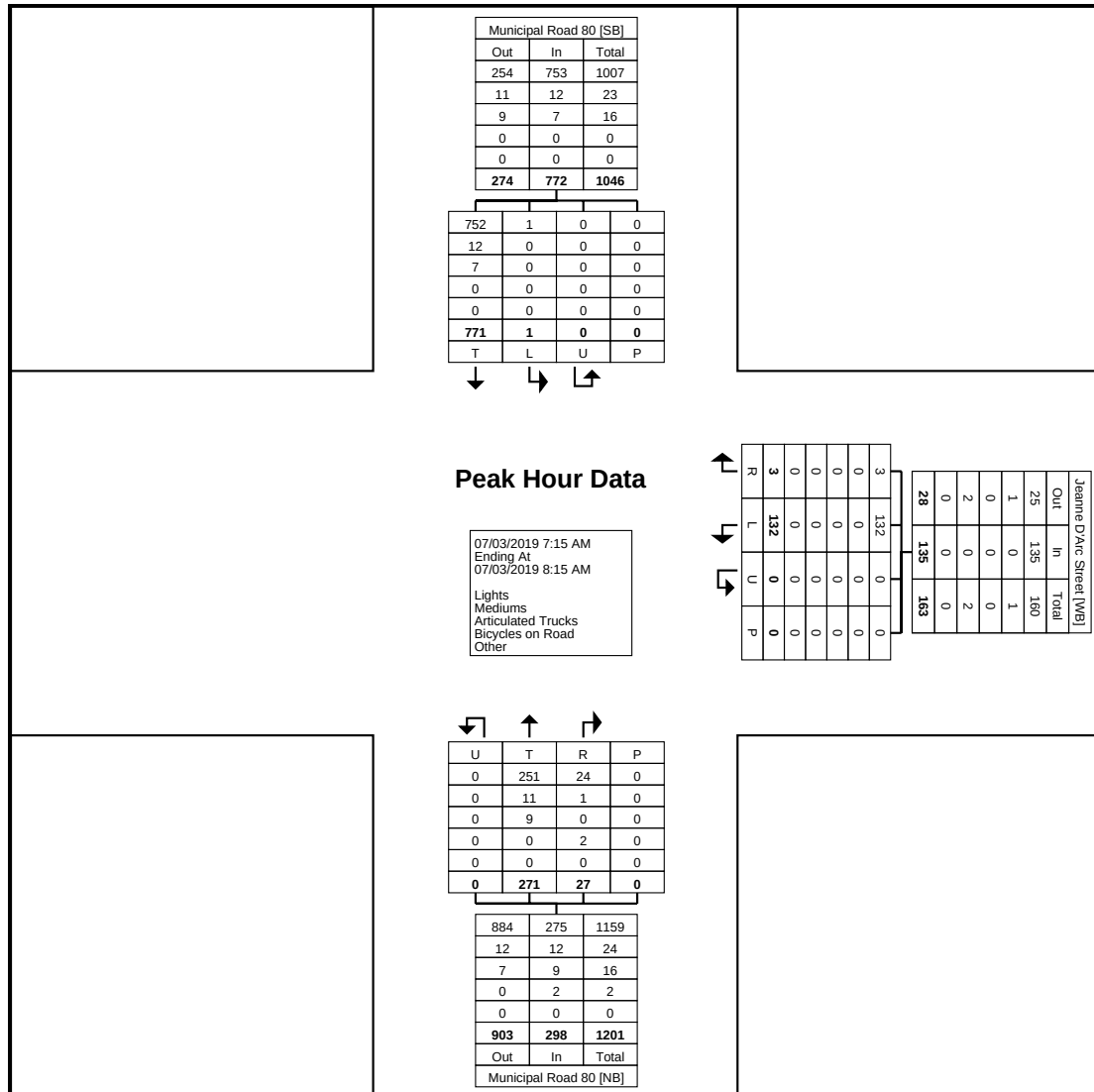
| Start Time              | Municipal Road 80<br>Southbound |       |        |      |            | Jeanne D'Arc Street<br>Westbound |       |        |      |            | Municipal Road 80<br>Northbound |       |        |       |            | Int. Total |
|-------------------------|---------------------------------|-------|--------|------|------------|----------------------------------|-------|--------|------|------------|---------------------------------|-------|--------|-------|------------|------------|
|                         | Thru                            | Left  | U-Turn | Peds | App. Total | Right                            | Left  | U-Turn | Peds | App. Total | Right                           | Thru  | U-Turn | Peds  | App. Total |            |
| 4:15 PM                 | 121                             | 3     | 0      | 0    | 124        | 1                                | 21    | 0      | 0    | 22         | 39                              | 255   | 0      | 1     | 294        | 440        |
| 4:30 PM                 | 136                             | 3     | 0      | 0    | 139        | 1                                | 30    | 0      | 0    | 31         | 44                              | 261   | 0      | 2     | 305        | 475        |
| 4:45 PM                 | 133                             | 1     | 0      | 0    | 134        | 3                                | 12    | 0      | 0    | 15         | 47                              | 268   | 0      | 1     | 315        | 464        |
| 5:00 PM                 | 164                             | 3     | 0      | 0    | 167        | 0                                | 22    | 0      | 0    | 22         | 49                              | 272   | 0      | 0     | 321        | 510        |
| Total                   | 554                             | 10    | 0      | 0    | 564        | 5                                | 85    | 0      | 0    | 90         | 179                             | 1056  | 0      | 4     | 1235       | 1889       |
| Approach %              | 98.2                            | 1.8   | 0.0    | -    | -          | 5.6                              | 94.4  | 0.0    | -    | -          | 14.5                            | 85.5  | 0.0    | -     | -          | -          |
| Total %                 | 29.3                            | 0.5   | 0.0    | -    | 29.9       | 0.3                              | 4.5   | 0.0    | -    | 4.8        | 9.5                             | 55.9  | 0.0    | -     | 65.4       | -          |
| PHF                     | 0.845                           | 0.833 | 0.000  | -    | 0.844      | 0.417                            | 0.708 | 0.000  | -    | 0.726      | 0.913                           | 0.971 | 0.000  | -     | 0.962      | 0.926      |
| Lights                  | 532                             | 9     | 0      | -    | 541        | 5                                | 84    | 0      | -    | 89         | 177                             | 1042  | 0      | -     | 1219       | 1849       |
| % Lights                | 96.0                            | 90.0  | -      | -    | 95.9       | 100.0                            | 98.8  | -      | -    | 98.9       | 98.9                            | 98.7  | -      | -     | 98.7       | 97.9       |
| Mediums                 | 14                              | 1     | 0      | -    | 15         | 0                                | 1     | 0      | -    | 1          | 1                               | 8     | 0      | -     | 9          | 25         |
| % Mediums               | 2.5                             | 10.0  | -      | -    | 2.7        | 0.0                              | 1.2   | -      | -    | 1.1        | 0.6                             | 0.8   | -      | -     | 0.7        | 1.3        |
| Articulated Trucks      | 8                               | 0     | 0      | -    | 8          | 0                                | 0     | 0      | -    | 0          | 0                               | 6     | 0      | -     | 6          | 14         |
| % Articulated Trucks    | 1.4                             | 0.0   | -      | -    | 1.4        | 0.0                              | 0.0   | -      | -    | 0.0        | 0.0                             | 0.6   | -      | -     | 0.5        | 0.7        |
| Bicycles on Road        | 0                               | 0     | 0      | -    | 0          | 0                                | 0     | 0      | -    | 0          | 1                               | 0     | 0      | -     | 1          | 1          |
| % Bicycles on Road      | 0.0                             | 0.0   | -      | -    | 0.0        | 0.0                              | 0.0   | -      | -    | 0.0        | 0.6                             | 0.0   | -      | -     | 0.1        | 0.1        |
| Bicycles on Crosswalk   | -                               | -     | -      | 0    | -          | -                                | -     | -      | 0    | -          | -                               | -     | -      | 0     | -          | -          |
| % Bicycles on Crosswalk | -                               | -     | -      | -    | -          | -                                | -     | -      | -    | -          | -                               | -     | -      | 0.0   | -          | -          |
| Pedestrians             | -                               | -     | -      | 0    | -          | -                                | -     | -      | 0    | -          | -                               | -     | -      | 4     | -          | -          |
| % Pedestrians           | -                               | -     | -      | -    | -          | -                                | -     | -      | -    | -          | -                               | -     | -      | 100.0 | -          | -          |



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

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

[illegible]



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

## **APPENDIX B**

**Collision Data  
provided by City Traffic Office**

| Location                                    | Initial Impact Type | Accident No. | Vehicle 1 Type                 | Vehicle 2 Type | Apparent Driver 1 Action |
|---------------------------------------------|---------------------|--------------|--------------------------------|----------------|--------------------------|
| Municipal Road 80 @ Shirley Avenue (144034) | 07 - SMV other      | 17-012590    | 01 - Automobile, station wagon |                | 10 - Lost control        |
| Municipal Road 80 @ Shirley Avenue (144034) | 03 - Rear end       | 14044288     |                                |                |                          |
| Municipal Road 80 @ Shirley Avenue (144034) | 04 - Sideswipe      | 14036994     |                                |                |                          |
|                                             |                     |              |                                |                |                          |

| Driver One Disobey Signal | Apparent Driver 2 Action | Driver Two Disobey Signal | Accident Date | Accident Year | Pedestrian 2 Action | Pedestrian 1 Action | Accident Time |
|---------------------------|--------------------------|---------------------------|---------------|---------------|---------------------|---------------------|---------------|
| Unchecked                 |                          | Unchecked                 | 26/03/2017    | 2017          |                     |                     | 10:10         |
| Unchecked                 |                          | Unchecked                 | 24/09/2014    | 2014          |                     |                     | 16:00         |
| Unchecked                 |                          | Unchecked                 | 13/08/2014    | 2014          |                     |                     | 6:20          |
|                           |                          |                           |               |               |                     |                     |               |



| Vehicle 1 First Event | Vehicle 1 Second Event          | Initial Direction Of Travel One | Initial Direction Of Travel Two | Vehicle 1 Third Event | Vehicle 1 Manoeuver      |
|-----------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------|--------------------------|
| 21 - Skidding/sliding | 54 - Pole (sign, parking meter) | North                           | None                            | 60 - Ditch            | 02 - Slowing or stopping |
|                       |                                 | South                           | South                           |                       |                          |
|                       |                                 | South                           | North                           |                       |                          |
|                       |                                 |                                 |                                 |                       |                          |

| Vehicle 2 Manoeuver | Accident Location         | Impact Location | Road 1 Condition | Thru Lane No | Environment Condition 1 | Environment Condition 2 | Light         |
|---------------------|---------------------------|-----------------|------------------|--------------|-------------------------|-------------------------|---------------|
|                     | 02 - Intersection related | 99 - Other      | 02 - Poor        | 0            | 04 - Freezing Rain      |                         | 01 - Daylight |
| 00 - Unknown        | 02 - Intersection related | 02 - Thru lane  | 01 - Good        | 0            | 01 - Clear              |                         | 01 - Daylight |
| 00 - Unknown        | 02 - Intersection related | 02 - Thru lane  | 01 - Good        | 0            | 02 - Rain               |                         | 01 - Daylight |
|                     |                           |                 |                  |              |                         |                         |               |

| Traffic Control     | Traffic Control Condition | Road Jurisdiction               | Road 2 Condition | Classification Of Accident | Road 1 Surface Condition | Last Edited By |
|---------------------|---------------------------|---------------------------------|------------------|----------------------------|--------------------------|----------------|
| 02 - Stop sign      | 01 - Functioning          | 01 - Municipal (excl. Twp. Rd.) | 02 - Poor        | 03 - P.D. only             | 06 - Ice                 | tes            |
| 01 - Traffic signal | 01 - Functioning          |                                 | 01 - Good        |                            | 01 - Dry                 | tes            |
| 02 - Stop sign      | 01 - Functioning          |                                 | 01 - Good        |                            | 02 - Wet                 | tes            |
|                     |                           | 3                               |                  |                            |                          |                |

| Road 2 Surface Condition | Validated | Collision Type |
|--------------------------|-----------|----------------|
| 06 - Ice                 | Checked   | PDO            |
| 01 - Dry                 | Checked   | PDO            |
| 02 - Wet                 | Checked   | PDO            |
|                          |           |                |

## **APPENDIX C**

### **School Traffic Counts by Tranplan Associates**

- a) Ecole Jean Paul II (Val Caron)**
- b) Ecoles Ste Therese & St Joseph**
- c) Ecole Notre Dame and Total of Three  
Existing Schools**

Jean Paul II Elementary School, Val Caron  
Date: October 3, 4, 7, 8, 2019

Tranplan

| TIME          | Cars<br>In Out | Schoolbuses<br>In Out | Bicycles<br>In Out | Pedestrians<br>In Out | TOTAL<br>(15 min ) | TOTAL<br>(60 min ) |
|---------------|----------------|-----------------------|--------------------|-----------------------|--------------------|--------------------|
| Oct 4&8, 2019 |                |                       |                    |                       |                    |                    |
| 7:30 - 7:45   | 15 3           | 0 0                   | 0 0                | 0 0                   | 18                 |                    |
| 7:45 - 8:00   | 44 4           | 1 1                   | 1 0                | 1 0                   | 52                 |                    |
| 8:00 - 8:15   | 37 14          | 0 0                   | 1 0                | 0 0                   | 52                 |                    |
| 8:15 - 8:30   | 29 21          | 1 0                   | 6 0                | 14 0                  | 71                 | 193                |
| 8:30 - 8:45   | 43 41          | 14 14                 | 4 0                | 6 0                   | 122                | 297                |
| 8:45 - 9:00   | 10 16          | 1 2                   | 0 0                | 0 0                   | 29                 | 274                |
| AM Pk Hr      | 153 80         | 16 15                 | 12 0               | 21 0                  | 7:45 - 8:45 am     |                    |
| 11:00 - 11:15 | 4 5            | 0 0                   | 0 0                | 0 0                   | 9                  |                    |
| 11:15 - 11:30 | 5 3            | 0 0                   | 0 0                | 2 0                   | 10                 |                    |
| 11:30 - 11:45 | 7 7            | 1 0                   | 0 0                | 0 0                   | 15                 |                    |
| 11:45 - 12:00 | 1 1            | 1 1                   | 0 0                | 0 0                   | 4                  | 38                 |
| 12:00 - 12:15 | 2 3            | 0 0                   | 0 0                | 0 1                   | 6                  | 35                 |
| 12:15 - 12:30 | 2 6            | 0 0                   | 0 0                | 0 0                   | 8                  | 33                 |
| 12:30 - 12:45 | 4 3            | 0 0                   | 0 0                | 0 0                   | 7                  | 25                 |
| 12:45 - 1:00  | 6 2            | 0 0                   | 0 0                | 0 0                   | 8                  | 29                 |
| Oct 3&7, 2019 |                |                       |                    |                       |                    |                    |
| 2:30 - 2:45   | 5 0            | 0 0                   | 0 1                | 0 1                   | 7                  |                    |
| 2:45 - 3:00   | 28 3           | 0 0                   | 0 4                | 1 4                   | 40                 |                    |
| 3:00 - 3:15   | 21 43          | 9 3                   | 0 4                | 0 17                  | 97                 |                    |
| 3:15 - 3:30   | 6 24           | 7 10                  | 0 0                | 0 2                   | 49                 | 193                |
| 3:30 - 3:45   | 11 33          | 1 3                   | 0 1                | 0 0                   | 49                 | 235                |
| 3:45 - 4:00   | 7 20           | 0 0                   | 0 0                | 0 0                   | 27                 | 222                |
| 4:00 - 4:15   | 8 12           | 0 0                   | 0 0                | 0 0                   | 20                 | 145                |
| 4:15 - 4:30   | 7 8            | 0 0                   | 0 0                | 0 0                   | 15                 | 111                |
| 4:30 - 4:45   | 10 12          | 0 0                   | 0 0                | 0 0                   | 22                 | 84                 |
| 4:45 - 5:00   | 7 12           | 0 0                   | 0 0                | 1 1                   | 21                 | 78                 |
| 5:00 - 5:15   | 2 9            | 0 0                   | 0 0                | 0 1                   | 12                 | 70                 |
| 5:15 - 5:30   | 1 6            | 0 0                   | 0 0                | 0 0                   | 7                  | 62                 |
| PM Pk Hr      | 66 103         | 17 16                 | 0 9                | 1 23                  | 2:45 - 3:45 pm     |                    |

Ecole Ste Therese, Val Therese (Grades 4-8 plus Day Care )  
Date: October 4, 2019

Tranplan

| TIME        | Cars<br>In Out | Schoolbuses<br>In Out | Bicycles<br>In Out | Pedestrians<br>In Out | TOTAL<br>(15 min ) | TOTAL<br>(60 min ) |
|-------------|----------------|-----------------------|--------------------|-----------------------|--------------------|--------------------|
| 7:45 - 8:00 | 3 1            | 0 0                   | 0 0                | 0 0                   | 4                  |                    |
| 8:00 - 8:15 | 2 1            | 0 0                   | 2 0                | 0 0                   | 5                  |                    |
| 8:15 - 8:30 | 7 7            | 0 0                   | 0 0                | 11 0                  | 25                 |                    |
| 8:30 - 8:45 | 14 14          | 5 5                   | 0 0                | 2 0                   | 40                 | 74                 |
| 8:45 - 9:00 | 3 3            | 0 0                   | 0 0                | 0 0                   | 6                  | 76                 |
| AM Pk Hr    | 26 25          | 5 5                   | 2 0                | 13 0                  | 8:00 - 9:00 am     |                    |
| 2:30 - 2:45 | 1 0            | 0 0                   | 0 0                | 0 0                   | 1                  |                    |
| 2:45 - 3:00 | 1 1            | 0 0                   | 0 0                | 0 0                   | 2                  |                    |
| 3:00 - 3:15 | 16 0           | 0 0                   | 0 0                | 0 0                   | 16                 |                    |
| 3:15 - 3:30 | 3 19           | 5 5                   | 0 0                | 0 0                   | 32                 | 51                 |
| 3:30 - 3:45 | 0 1            | 0 0                   | 0 0                | 0 0                   | 1                  | 51                 |
| 3:45 - 4:00 | 2 4            | 0 0                   | 0 0                | 0 0                   | 6                  | 55                 |
| PM Pk Hr    | 21 24          | 5 5                   | 0 0                | 0 0                   | 3:00 - 4:00 pm     |                    |

Ecole St Joseph, Hanmer  
Date: October 7, 2019

Tranplan

| TIME        | Cars<br>In Out | Schoolbuses<br>In Out | Bicycles<br>In Out | Pedestrians<br>In Out | TOTAL<br>(15 min ) | TOTAL<br>(60 min ) |
|-------------|----------------|-----------------------|--------------------|-----------------------|--------------------|--------------------|
| 7:30 - 7:45 | 12 7           | 0 0                   | 0 0                | 0 0                   | 19                 |                    |
| 7:45 - 8:00 | 5 2            | 0 0                   | 0 0                | 0 0                   | 7                  |                    |
| 8:00 - 8:15 | 3 3            | 0 0                   | 0 0                | 0 0                   | 6                  |                    |
| 8:15 - 8:30 | 15 10          | 1 1                   | 0 0                | 2 0                   | 29                 | 61                 |
| 8:30 - 8:45 | 20 21          | 5 5                   | 0 0                | 0 0                   | 51                 | 93                 |
| 8:45 - 9:00 | 0 4            | 0 0                   | 0 0                | 1 0                   | 5                  | 91                 |
| AM Pk Hr    | 43 36          | 6 6                   | 0 0                | 2 0                   | 7:45 - 8:45 am     |                    |
| 2:30 - 2:45 | 0 0            | 0 0                   | 0 0                | 0 0                   | 0                  |                    |
| 2:45 - 3:00 | 5 0            | 1 0                   | 0 0                | 0 0                   | 6                  |                    |
| 3:00 - 3:15 | 14 15          | 2 2                   | 0 0                | 1 1                   | 35                 |                    |
| 3:15 - 3:30 | 0 3            | 2 3                   | 0 0                | 0 0                   | 8                  | 49                 |
| 3:30 - 3:45 | 1 4            | 0 0                   | 0 0                | 0 0                   | 5                  | 54                 |
| 3:45 - 4:00 | 0 4            | 0 0                   | 0 0                | 0 0                   | 4                  | 52                 |
| 4:00 - 4:15 | 0 2            | 0 0                   | 0 0                | 0 0                   | 2                  | 19                 |
| PM Pk Hr    | 20 22          | 5 5                   | 0 0                | 1 1                   | 2:45 - 3:45 pm     |                    |

Ecole Notre Dame, Hanmer  
Date: October 8, 2019

Tranplan

| TIME        | Cars |     | Schoolbuses |     | Bicycles |     | Pedestrians |     | TOTAL<br>(15 min ) | TOTAL<br>(60 min ) |
|-------------|------|-----|-------------|-----|----------|-----|-------------|-----|--------------------|--------------------|
|             | In   | Out | In          | Out | In       | Out | In          | Out |                    |                    |
| 7:45 - 8:00 | 16   | 4   | 0           | 0   | 0        | 0   | 0           | 0   | 20                 |                    |
| 8:00 - 8:15 | 8    | 0   | 0           | 0   | 0        | 0   | 0           | 0   | 8                  |                    |
| 8:15 - 8:30 | 10   | 8   | 0           | 0   | 3        | 0   | 1           | 0   | 22                 |                    |
| 8:30 - 8:45 | 23   | 20  | 8           | 8   | 6        | 0   | 8           | 0   | 73                 | 123                |
| 8:45 - 9:00 | 11   | 10  | 1           | 1   | 0        | 0   | 0           | 0   | 23                 | 126                |
| 9:00 - 9:15 | 5    | 3   | 0           | 0   | 0        | 0   | 0           | 0   | 8                  | 126                |
| 9:15 - 9:30 | 1    | 4   | 0           | 0   | 0        | 0   | 0           | 0   | 5                  | 109                |
| AM Pk Hr    | 52   | 38  | 9           | 9   | 9        | 0   | 9           | 0   | 8:00 - 9:00 am     |                    |
| 2:00 - 2:15 | 3    | 0   | 0           | 0   | 0        | 0   | 0           | 0   | 3                  |                    |
| 2:15 - 2:30 | 5    | 4   | 1           | 0   | 0        | 0   | 0           | 0   | 10                 |                    |
| 2:30 - 2:45 | 7    | 6   | 6           | 6   | 0        | 4   | 0           | 13  | 42                 |                    |
| 2:45 - 3:00 | 13   | 4   | 1           | 0   | 0        | 0   | 0           | 0   | 18                 | 73                 |
| 3:00 - 3:15 | 7    | 17  | 6           | 6   | 2        | 7   | 0           | 7   | 52                 | 122                |
| 3:15 - 3:30 | 1    | 10  | 1           | 3   | 0        | 0   | 0           | 0   | 15                 | 127                |
| 3:30 - 3:45 | 6    | 11  | 0           | 0   | 0        | 0   | 0           | 0   | 17                 | 102                |
| PM Pk Hr    | 28   | 37  | 14          | 15  | 2        | 11  | 0           | 20  | 2:30 - 3:30 pm     |                    |

Ecole Ste Therese+Ecole St Joseph+Ecole Notre Dame

| TIME        | Cars |     | Schoolbuses |     | Bicycles |     | Pedestrians |     | TOTAL<br>(15 min ) | TOTAL<br>(60 min ) |
|-------------|------|-----|-------------|-----|----------|-----|-------------|-----|--------------------|--------------------|
|             | In   | Out | In          | Out | In       | Out | In          | Out |                    |                    |
| 7:45 - 8:00 | 24   | 7   | 0           | 0   | 0        | 0   | 0           | 0   | 31                 |                    |
| 8:00 - 8:15 | 13   | 4   | 0           | 0   | 2        | 0   | 0           | 0   | 19                 |                    |
| 8:15 - 8:30 | 32   | 25  | 1           | 1   | 3        | 0   | 14          | 0   | 76                 |                    |
| 8:30 - 8:45 | 57   | 55  | 18          | 18  | 6        | 0   | 10          | 0   | 164                | 290                |
| 8:45 - 9:00 | 14   | 17  | 1           | 1   | 0        | 0   | 1           | 0   | 34                 | 293                |
| AM Pk Hr    | 116  | 101 | 20          | 20  | 11       | 0   | 25          | 0   | 8:00 - 9:00 am     |                    |
| 2:30 - 2:45 | 8    | 6   | 6           | 6   | 0        | 4   | 0           | 13  | 43                 |                    |
| 2:45 - 3:00 | 19   | 5   | 2           | 0   | 0        | 0   | 0           | 0   | 26                 |                    |
| 3:00 - 3:15 | 37   | 32  | 8           | 8   | 2        | 7   | 1           | 8   | 103                |                    |
| 3:15 - 3:30 | 4    | 32  | 8           | 11  | 0        | 0   | 0           | 0   | 55                 | 227                |
| 3:30 - 3:45 | 7    | 16  | 0           | 0   | 0        | 0   | 0           | 0   | 23                 | 207                |
| 3:45 - 4:00 | 2    | 8   | 0           | 0   | 0        | 0   | 0           | 0   | 10                 | 191                |
| PM Pk Hr    | 68   | 75  | 24          | 25  | 2        | 11  | 1           | 21  | 2:30 - 3:30 pm     |                    |



## **APPENDIX D**

### **MR 80 / Shirley Avenue Intersection Capacity Analysis Synchro Reports**

- a) Existing Conditions 2019**
- b) Background Traffic 2026**
- c) Total Traffic 2026 (Unsignalized)**
- d) Total Traffic 2026 (Signalized)**

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 22                                                                                | 4                                                                                 | 322                                                                               | 6                                                                                 | 2                                                                                 | 916                                                                               |
| 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                                                                                | 4                                                                                 | 350                                                                               | 7                                                                                 | 2                                                                                 | 996                                                                               |
| 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            | 855                                                                               | 178                                                                               |                                                                                   |                                                                                   | 357                                                                               |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 855                                                                               | 178                                                                               |                                                                                   |                                                                                   | 357                                                                               |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 92                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 297                                                                               | 834                                                                               |                                                                                   |                                                                                   | 1199                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 28                                                                                | 233                                                                               | 123                                                                               | 2                                                                                 | 498                                                                               | 498                                                                               |
| Volume Left                       | 24                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 4                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 329                                                                               | 1700                                                                              | 1700                                                                              | 1199                                                                              | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.09                                                                              | 0.14                                                                              | 0.07                                                                              | 0.00                                                                              | 0.29                                                                              | 0.29                                                                              |
| Queue Length 95th (m)             | 2.2                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| Control Delay (s)                 | 17.0                                                                              | 0.0                                                                               | 0.0                                                                               | 8.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 17.0                                                                              | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 35.3%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 16                                                                                | 4                                                                                 | 1128                                                                              | 53                                                                                | 4                                                                                 | 525                                                                               |
| 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)            | 17                                                                                | 4                                                                                 | 1226                                                                              | 58                                                                                | 4                                                                                 | 571                                                                               |
| 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            | 1549                                                                              | 642                                                                               |                                                                                   |                                                                                   | 1284                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1549                                                                              | 642                                                                               |                                                                                   |                                                                                   | 1284                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 83                                                                                | 99                                                                                |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |
| cM capacity (veh/h)               | 104                                                                               | 417                                                                               |                                                                                   |                                                                                   | 536                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 22                                                                                | 817                                                                               | 466                                                                               | 4                                                                                 | 285                                                                               | 285                                                                               |
| Volume Left                       | 17                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 4                                                                                 | 0                                                                                 | 58                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 122                                                                               | 1700                                                                              | 1700                                                                              | 536                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.18                                                                              | 0.48                                                                              | 0.27                                                                              | 0.01                                                                              | 0.17                                                                              | 0.17                                                                              |
| Queue Length 95th (m)             | 5.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.2                                                                               | 0.0                                                                               | 0.0                                                                               |
| Control Delay (s)                 | 40.7                                                                              | 0.0                                                                               | 0.0                                                                               | 11.8                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 40.7                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.5                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 42.9%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 24                                                                                | 4                                                                                 | 357                                                                               | 7                                                                                 | 2                                                                                 | 1017                                                                              |
| 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)            | 26                                                                                | 4                                                                                 | 388                                                                               | 8                                                                                 | 2                                                                                 | 1105                                                                              |
| 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            | 949                                                                               | 198                                                                               |                                                                                   |                                                                                   | 396                                                                               |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 949                                                                               | 198                                                                               |                                                                                   |                                                                                   | 396                                                                               |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 90                                                                                | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |
| cM capacity (veh/h)               | 258                                                                               | 810                                                                               |                                                                                   |                                                                                   | 1159                                                                              |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 30                                                                                | 259                                                                               | 137                                                                               | 2                                                                                 | 553                                                                               | 553                                                                               |
| Volume Left                       | 26                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 4                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 286                                                                               | 1700                                                                              | 1700                                                                              | 1159                                                                              | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.11                                                                              | 0.15                                                                              | 0.08                                                                              | 0.00                                                                              | 0.33                                                                              | 0.33                                                                              |
| Queue Length 95th (m)             | 2.8                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| Control Delay (s)                 | 19.1                                                                              | 0.0                                                                               | 0.0                                                                               | 8.1                                                                               | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 19.1                                                                              | 0.0                                                                               |                                                                                   | 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                                                                                |                                                                                   |                                                                                   |                                                                                   |

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 18                                                                                | 4                                                                                 | 1252                                                                              | 59                                                                                | 4                                                                                 | 583                                                                               |
| 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                                                                                | 4                                                                                 | 1361                                                                              | 64                                                                                | 4                                                                                 | 634                                                                               |
| 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            | 1718                                                                              | 712                                                                               |                                                                                   |                                                                                   | 1425                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1718                                                                              | 712                                                                               |                                                                                   |                                                                                   | 1425                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 76                                                                                | 99                                                                                |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |
| cM capacity (veh/h)               | 80                                                                                | 375                                                                               |                                                                                   |                                                                                   | 473                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 24                                                                                | 907                                                                               | 518                                                                               | 4                                                                                 | 317                                                                               | 317                                                                               |
| Volume Left                       | 20                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 4                                                                                 | 0                                                                                 | 64                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 93                                                                                | 1700                                                                              | 1700                                                                              | 473                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.26                                                                              | 0.53                                                                              | 0.30                                                                              | 0.01                                                                              | 0.19                                                                              | 0.19                                                                              |
| Queue Length 95th (m)             | 7.5                                                                               | 0.0                                                                               | 0.0                                                                               | 0.2                                                                               | 0.0                                                                               | 0.0                                                                               |
| Control Delay (s)                 | 56.4                                                                              | 0.0                                                                               | 0.0                                                                               | 12.7                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 56.4                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 46.5%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 58                                                                                | 12                                                                                | 47                                                                                | 24                                                                                | 18                                                                                | 4                                                                                 | 73                                                                                  | 357                                                                                 | 7                                                                                   | 2                                                                                   | 1017                                                                                | 90                                                                                  |
| 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)            | 63                                                                                | 13                                                                                | 51                                                                                | 26                                                                                | 20                                                                                | 4                                                                                 | 79                                                                                  | 388                                                                                 | 8                                                                                   | 2                                                                                   | 1105                                                                                | 98                                                                                  |
| 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            | 1526                                                                              | 1713                                                                              | 602                                                                               | 1165                                                                              | 1758                                                                              | 198                                                                               | 1203                                                                                |                                                                                     |                                                                                     | 396                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1526                                                                              | 1713                                                                              | 602                                                                               | 1165                                                                              | 1758                                                                              | 198                                                                               | 1203                                                                                |                                                                                     |                                                                                     | 396                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 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 %                   | 0                                                                                 | 83                                                                                | 88                                                                                | 75                                                                                | 73                                                                                | 99                                                                                | 86                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 57                                                                                | 77                                                                                | 443                                                                               | 103                                                                               | 72                                                                                | 810                                                                               | 576                                                                                 |                                                                                     |                                                                                     | 1159                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                                | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 76                                                                                | 51                                                                                | 50                                                                                | 79                                                                                | 259                                                                               | 137                                                                               | 2                                                                                   | 737                                                                                 | 466                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 63                                                                                | 0                                                                                 | 26                                                                                | 79                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 51                                                                                | 4                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                   | 0                                                                                   | 98                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 60                                                                                | 443                                                                               | 94                                                                                | 576                                                                               | 1700                                                                              | 1700                                                                              | 1159                                                                                | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.28                                                                              | 0.12                                                                              | 0.53                                                                              | 0.14                                                                              | 0.15                                                                              | 0.08                                                                              | 0.00                                                                                | 0.43                                                                                | 0.27                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 51.8                                                                              | 3.1                                                                               | 19.0                                                                              | 3.8                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 324.1                                                                             | 14.2                                                                              | 79.8                                                                              | 12.3                                                                              | 0.0                                                                               | 0.0                                                                               | 8.1                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | B                                                                                 | F                                                                                 | B                                                                                 |                                                                                   |                                                                                   | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 199.6                                                                             |                                                                                   | 79.8                                                                              | 2.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 16.3                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 54.2%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 68                                                                                | 14                                                                                | 55                                                                                | 17                                                                                | 10                                                                                | 7                                                                                 | 42                                                                                 | 946                                                                                 | 29                                                                                  | 2                                                                                   | 635                                                                                 | 51                                                                                  |
| 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)            | 74                                                                                | 15                                                                                | 60                                                                                | 18                                                                                | 11                                                                                | 8                                                                                 | 46                                                                                 | 1028                                                                                | 32                                                                                  | 2                                                                                   | 690                                                                                 | 55                                                                                  |
| 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            | 1341                                                                              | 1873                                                                              | 373                                                                               | 1552                                                                              | 1885                                                                              | 530                                                                               | 746                                                                                |                                                                                     |                                                                                     | 1060                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1341                                                                              | 1873                                                                              | 373                                                                               | 1552                                                                              | 1885                                                                              | 530                                                                               | 746                                                                                |                                                                                     |                                                                                     | 1060                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 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 %                   | 19                                                                                | 77                                                                                | 90                                                                                | 66                                                                                | 84                                                                                | 98                                                                                | 95                                                                                 |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 91                                                                                | 67                                                                                | 625                                                                               | 55                                                                                | 66                                                                                | 494                                                                               | 858                                                                                |                                                                                     |                                                                                     | 653                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                               | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 89                                                                                | 60                                                                                | 37                                                                                | 46                                                                                | 686                                                                               | 374                                                                               | 2                                                                                  | 460                                                                                 | 286                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 74                                                                                | 0                                                                                 | 18                                                                                | 46                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                  | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 60                                                                                | 8                                                                                 | 0                                                                                 | 0                                                                                 | 32                                                                                | 0                                                                                  | 0                                                                                   | 55                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 86                                                                                | 625                                                                               | 72                                                                                | 858                                                                               | 1700                                                                              | 1700                                                                              | 653                                                                                | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.04                                                                              | 0.10                                                                              | 0.52                                                                              | 0.05                                                                              | 0.40                                                                              | 0.22                                                                              | 0.00                                                                               | 0.27                                                                                | 0.17                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 47.9                                                                              | 2.5                                                                               | 17.1                                                                              | 1.3                                                                               | 0.0                                                                               | 0.0                                                                               | 0.1                                                                                | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 195.3                                                                             | 11.4                                                                              | 99.7                                                                              | 9.4                                                                               | 0.0                                                                               | 0.0                                                                               | 10.5                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | B                                                                                 | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   | B                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 121.5                                                                             |                                                                                   | 99.7                                                                              | 0.4                                                                               |                                                                                   |                                                                                   | 0.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 10.9                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.0%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 19                                                                                | 4                                                                                 | 16                                                                                | 18                                                                                | 2                                                                                 | 4                                                                                 | 10                                                                                  | 1252                                                                                | 59                                                                                  | 4                                                                                   | 583                                                                                 | 11                                                                                  |
| 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)            | 21                                                                                | 4                                                                                 | 17                                                                                | 20                                                                                | 2                                                                                 | 4                                                                                 | 11                                                                                  | 1361                                                                                | 64                                                                                  | 4                                                                                   | 634                                                                                 | 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            | 1356                                                                              | 2095                                                                              | 323                                                                               | 1760                                                                              | 2069                                                                              | 712                                                                               | 646                                                                                 |                                                                                     |                                                                                     | 1425                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1356                                                                              | 2095                                                                              | 323                                                                               | 1760                                                                              | 2069                                                                              | 712                                                                               | 646                                                                                 |                                                                                     |                                                                                     | 1425                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 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 %                   | 80                                                                                | 91                                                                                | 97                                                                                | 59                                                                                | 96                                                                                | 99                                                                                | 99                                                                                  |                                                                                     |                                                                                     | 99                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 102                                                                               | 50                                                                                | 673                                                                               | 48                                                                                | 52                                                                                | 375                                                                               | 936                                                                                 |                                                                                     |                                                                                     | 473                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                                | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 25                                                                                | 17                                                                                | 26                                                                                | 11                                                                                | 907                                                                               | 518                                                                               | 4                                                                                   | 422                                                                                 | 223                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 21                                                                                | 0                                                                                 | 20                                                                                | 11                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 17                                                                                | 4                                                                                 | 0                                                                                 | 0                                                                                 | 64                                                                                | 0                                                                                   | 0                                                                                   | 12                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 86                                                                                | 673                                                                               | 57                                                                                | 936                                                                               | 1700                                                                              | 1700                                                                              | 473                                                                                 | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.29                                                                              | 0.03                                                                              | 0.46                                                                              | 0.01                                                                              | 0.53                                                                              | 0.30                                                                              | 0.01                                                                                | 0.25                                                                                | 0.13                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 8.6                                                                               | 0.6                                                                               | 14.0                                                                              | 0.3                                                                               | 0.0                                                                               | 0.0                                                                               | 0.2                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 62.8                                                                              | 10.5                                                                              | 113.8                                                                             | 8.9                                                                               | 0.0                                                                               | 0.0                                                                               | 12.7                                                                                | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | B                                                                                 | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 41.3                                                                              |                                                                                   | 113.8                                                                             | 0.1                                                                               |                                                                                   |                                                                                   | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | E                                                                                 |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 2.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.2%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



|                                   |  |  |  |  |  |  |    |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (vph)                      | 58                                                                                | 12                                                                                | 47                                                                                | 24                                                                                | 18                                                                                | 4                                                                                 | 73                                                                                  | 357                                                                                 | 7                                                                                   | 2                                                                                   | 1017                                                                                | 90                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              |                                                                                   | 0.99                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.96                                                                              | 1.00                                                                              |                                                                                   | 0.97                                                                              |                                                                                   | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1789                                                                              | 1583                                                                              |                                                                                   | 1796                                                                              |                                                                                   | 1770                                                                                | 3528                                                                                |                                                                                     | 1770                                                                                | 3496                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.79                                                                              | 1.00                                                                              |                                                                                   | 0.80                                                                              |                                                                                   | 0.22                                                                                | 1.00                                                                                |                                                                                     | 0.52                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1463                                                                              | 1583                                                                              |                                                                                   | 1468                                                                              |                                                                                   | 403                                                                                 | 3528                                                                                |                                                                                     | 966                                                                                 | 3496                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 63                                                                                | 13                                                                                | 51                                                                                | 26                                                                                | 20                                                                                | 4                                                                                 | 79                                                                                  | 388                                                                                 | 8                                                                                   | 2                                                                                   | 1105                                                                                | 98                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 46                                                                                | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 76                                                                                | 5                                                                                 | 0                                                                                 | 46                                                                                | 0                                                                                 | 79                                                                                  | 395                                                                                 | 0                                                                                   | 2                                                                                   | 1198                                                                                | 0                                                                                   |
| Turn Type                         | Perm                                                                              |                                                                                   | Perm                                                                              | Perm                                                                              |                                                                                   |                                                                                   | Perm                                                                                |                                                                                     |                                                                                     | Perm                                                                                |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 8.9                                                                               | 8.9                                                                               |                                                                                   | 8.9                                                                               |                                                                                   | 69.6                                                                                | 69.6                                                                                |                                                                                     | 69.6                                                                                | 69.6                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 8.9                                                                               | 8.9                                                                               |                                                                                   | 8.9                                                                               |                                                                                   | 69.6                                                                                | 69.6                                                                                |                                                                                     | 69.6                                                                                | 69.6                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.10                                                                              | 0.10                                                                              |                                                                                   | 0.10                                                                              |                                                                                   | 0.79                                                                                | 0.79                                                                                |                                                                                     | 0.79                                                                                | 0.79                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 147                                                                               | 159                                                                               |                                                                                   | 148                                                                               |                                                                                   | 317                                                                                 | 2775                                                                                |                                                                                     | 760                                                                                 | 2749                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 0.11                                                                                |                                                                                     |                                                                                     | c0.34                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.05                                                                             | 0.00                                                                              |                                                                                   | 0.03                                                                              |                                                                                   | 0.20                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.52                                                                              | 0.03                                                                              |                                                                                   | 0.31                                                                              |                                                                                   | 0.25                                                                                | 0.14                                                                                |                                                                                     | 0.00                                                                                | 0.44                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 37.8                                                                              | 35.9                                                                              |                                                                                   | 37.0                                                                              |                                                                                   | 2.5                                                                                 | 2.3                                                                                 |                                                                                     | 2.0                                                                                 | 3.1                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 3.1                                                                               | 0.1                                                                               |                                                                                   | 1.2                                                                               |                                                                                   | 1.9                                                                                 | 0.1                                                                                 |                                                                                     | 0.0                                                                                 | 0.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 40.8                                                                              | 36.0                                                                              |                                                                                   | 38.2                                                                              |                                                                                   | 4.4                                                                                 | 2.4                                                                                 |                                                                                     | 2.0                                                                                 | 3.6                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 | D                                                                                 |                                                                                   | D                                                                                 |                                                                                   | A                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 38.9                                                                              |                                                                                   |                                                                                   | 38.2                                                                              |                                                                                   |                                                                                     | 2.7                                                                                 |                                                                                     |                                                                                     | 3.6                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 6.7                                                                               |                                                                                   |                                                                                   |                                                                                   | HCM Level of Service                                                                |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.5                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 58.5%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (vph)                      | 68                                                                                | 14                                                                                | 55                                                                                | 17                                                                                | 10                                                                                | 7                                                                                 | 42                                                                                 | 946                                                                                 | 29                                                                                  | 2                                                                                   | 635                                                                                 | 51                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              |                                                                                   | 0.97                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 0.99                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.96                                                                              | 1.00                                                                              |                                                                                   | 0.98                                                                              |                                                                                   | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1788                                                                              | 1583                                                                              |                                                                                   | 1765                                                                              |                                                                                   | 1770                                                                               | 3523                                                                                |                                                                                     | 1770                                                                                | 3500                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.74                                                                              | 1.00                                                                              |                                                                                   | 0.82                                                                              |                                                                                   | 0.37                                                                               | 1.00                                                                                |                                                                                     | 0.25                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1372                                                                              | 1583                                                                              |                                                                                   | 1477                                                                              |                                                                                   | 682                                                                                | 3523                                                                                |                                                                                     | 475                                                                                 | 3500                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 74                                                                                | 15                                                                                | 60                                                                                | 18                                                                                | 11                                                                                | 8                                                                                 | 46                                                                                 | 1028                                                                                | 32                                                                                  | 2                                                                                   | 690                                                                                 | 55                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 53                                                                                | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 5                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 89                                                                                | 7                                                                                 | 0                                                                                 | 30                                                                                | 0                                                                                 | 46                                                                                 | 1058                                                                                | 0                                                                                   | 2                                                                                   | 740                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              |                                                                                   | Perm                                                                              | Perm                                                                              |                                                                                   |                                                                                   | Perm                                                                               |                                                                                     |                                                                                     | Perm                                                                                |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 9.7                                                                               | 9.7                                                                               |                                                                                   | 9.7                                                                               |                                                                                   | 69.1                                                                               | 69.1                                                                                |                                                                                     | 69.1                                                                                | 69.1                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 9.7                                                                               | 9.7                                                                               |                                                                                   | 9.7                                                                               |                                                                                   | 69.1                                                                               | 69.1                                                                                |                                                                                     | 69.1                                                                                | 69.1                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.11                                                                              | 0.11                                                                              |                                                                                   | 0.11                                                                              |                                                                                   | 0.78                                                                               | 0.78                                                                                |                                                                                     | 0.78                                                                                | 0.78                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 150                                                                               | 173                                                                               |                                                                                   | 161                                                                               |                                                                                   | 531                                                                                | 2741                                                                                |                                                                                     | 370                                                                                 | 2724                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | c0.30                                                                               |                                                                                     |                                                                                     | 0.21                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.06                                                                             | 0.00                                                                              |                                                                                   | 0.02                                                                              |                                                                                   | 0.07                                                                               |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.59                                                                              | 0.04                                                                              |                                                                                   | 0.19                                                                              |                                                                                   | 0.09                                                                               | 0.39                                                                                |                                                                                     | 0.01                                                                                | 0.27                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 37.7                                                                              | 35.4                                                                              |                                                                                   | 36.0                                                                              |                                                                                   | 2.3                                                                                | 3.1                                                                                 |                                                                                     | 2.2                                                                                 | 2.8                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 6.2                                                                               | 0.1                                                                               |                                                                                   | 0.6                                                                               |                                                                                   | 0.3                                                                                | 0.4                                                                                 |                                                                                     | 0.0                                                                                 | 0.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 43.8                                                                              | 35.5                                                                              |                                                                                   | 36.5                                                                              |                                                                                   | 2.7                                                                                | 3.5                                                                                 |                                                                                     | 2.2                                                                                 | 3.0                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 | D                                                                                 |                                                                                   | D                                                                                 |                                                                                   | A                                                                                  | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 40.5                                                                              |                                                                                   |                                                                                   | 36.5                                                                              |                                                                                   |                                                                                    | 3.5                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 6.6                                                                               |                                                                                   |                                                                                   |                                                                                   | HCM Level of Service                                                               |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.41                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 88.8                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.8%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |  |  |  |  |  |  |
| Volume (vph)                      | 19                                                                                | 4                                                                                 | 16                                                                                | 18                                                                                | 2                                                                                 | 4                                                                                 | 10                                                                                 | 1252                                                                                | 59                                                                                  | 4                                                                                   | 583                                                                                 | 11                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                |                                                                                     |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              |                                                                                   | 0.98                                                                              |                                                                                   | 1.00                                                                               | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 0.96                                                                              | 1.00                                                                              |                                                                                   | 0.96                                                                              |                                                                                   | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1788                                                                              | 1583                                                                              |                                                                                   | 1756                                                                              |                                                                                   | 1770                                                                               | 3515                                                                                |                                                                                     | 1770                                                                                | 3529                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.78                                                                              | 1.00                                                                              |                                                                                   | 0.76                                                                              |                                                                                   | 0.41                                                                               | 1.00                                                                                |                                                                                     | 0.17                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1458                                                                              | 1583                                                                              |                                                                                   | 1385                                                                              |                                                                                   | 757                                                                                | 3515                                                                                |                                                                                     | 323                                                                                 | 3529                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 21                                                                                | 4                                                                                 | 17                                                                                | 20                                                                                | 2                                                                                 | 4                                                                                 | 11                                                                                 | 1361                                                                                | 64                                                                                  | 4                                                                                   | 634                                                                                 | 12                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 16                                                                                | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 1                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 25                                                                                | 1                                                                                 | 0                                                                                 | 22                                                                                | 0                                                                                 | 11                                                                                 | 1423                                                                                | 0                                                                                   | 4                                                                                   | 645                                                                                 | 0                                                                                   |
| Turn Type                         | Perm                                                                              |                                                                                   | Perm                                                                              | Perm                                                                              |                                                                                   |                                                                                   | Perm                                                                               |                                                                                     |                                                                                     | Perm                                                                                |                                                                                     |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   | 4                                                                                 | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 4.7                                                                               | 4.7                                                                               |                                                                                   | 4.7                                                                               |                                                                                   | 75.0                                                                               | 75.0                                                                                |                                                                                     | 75.0                                                                                | 75.0                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 4.7                                                                               | 4.7                                                                               |                                                                                   | 4.7                                                                               |                                                                                   | 75.0                                                                               | 75.0                                                                                |                                                                                     | 75.0                                                                                | 75.0                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.05                                                                              | 0.05                                                                              |                                                                                   | 0.05                                                                              |                                                                                   | 0.84                                                                               | 0.84                                                                                |                                                                                     | 0.84                                                                                | 0.84                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 76                                                                                | 83                                                                                |                                                                                   | 73                                                                                |                                                                                   | 633                                                                                | 2939                                                                                |                                                                                     | 270                                                                                 | 2951                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | c0.40                                                                               |                                                                                     |                                                                                     | 0.18                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.02                                                                             | 0.00                                                                              |                                                                                   | 0.02                                                                              |                                                                                   | 0.01                                                                               |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.33                                                                              | 0.01                                                                              |                                                                                   | 0.30                                                                              |                                                                                   | 0.02                                                                               | 0.48                                                                                |                                                                                     | 0.01                                                                                | 0.22                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 41.0                                                                              | 40.3                                                                              |                                                                                   | 40.9                                                                              |                                                                                   | 1.2                                                                                | 2.0                                                                                 |                                                                                     | 1.2                                                                                 | 1.5                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 2.5                                                                               | 0.1                                                                               |                                                                                   | 2.4                                                                               |                                                                                   | 0.1                                                                                | 0.6                                                                                 |                                                                                     | 0.1                                                                                 | 0.2                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 43.5                                                                              | 40.3                                                                              |                                                                                   | 43.3                                                                              |                                                                                   | 1.3                                                                                | 2.6                                                                                 |                                                                                     | 1.3                                                                                 | 1.6                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | D                                                                                 | D                                                                                 |                                                                                   | D                                                                                 |                                                                                   | A                                                                                  | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 42.2                                                                              |                                                                                   |                                                                                   | 43.3                                                                              |                                                                                   |                                                                                    | 2.6                                                                                 |                                                                                     |                                                                                     | 1.6                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   |                                                                                   | HCM Level of Service                                                               |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.47                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 89.7                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 52.8%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## **APPENDIX E**

### **Ontario Traffic Signal Warrants MR 80 / Shirley Avenue**

- a) Projected 2026 Total Traffic**
- b) Sensitivity Test 1 (Shirley Avenue traffic doubled)**
- c) Sensitivity Test 2 (North approach weighted)**
- d) Sensitivity Test 3 (Pedestrian/bike volume doubled)**
- e) Sensitivity Test 4 (Combination of 1, 2 and 3)**
- f) Sensitivity Test 5 (WB LTs increased by 50%)**
- g) Sensitivity Test 6 (WB LTs increased by 100%)**

## Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic (Base Case)

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending | Main Northbound Approach |       |     | Minor Eastbound Approach |    |     | Main Southbound Approach |       |     | Minor Westbound Approach |    |    | Pedestrians Crossing Main Road |
|-------------|--------------------------|-------|-----|--------------------------|----|-----|--------------------------|-------|-----|--------------------------|----|----|--------------------------------|
|             | LT                       | TH    | RT  | LT                       | TH | RT  | LT                       | TH    | RT  | LT                       | TH | RT |                                |
| 8:00        | 31                       | 344   | 37  | 6                        | 1  | 5   | 1                        | 1,029 | 39  | 23                       | 8  | 4  | 2                              |
| 9:00        | 62                       | 414   | 74  | 62                       | 12 | 50  | 3                        | 811   | 78  | 26                       | 16 | 1  | 31                             |
| 12:00       | 9                        | 571   | 6   | 10                       | 2  | 8   | 3                        | 568   | 11  | 14                       | 2  | 3  | 4                              |
| 13:00       | 6                        | 607   | 17  | 8                        | 2  | 6   | 3                        | 618   | 8   | 20                       | 2  | 6  | 4                              |
| 15:00       | 16                       | 727   | 19  | 2                        | 0  | 2   | 6                        | 628   | 20  | 19                       | 4  | 3  | 12                             |
| 16:00       | 29                       | 946   | 34  | 78                       | 16 | 63  | 2                        | 635   | 36  | 17                       | 7  | 7  | 24                             |
| 17:00       | 15                       | 1,231 | 35  | 25                       | 5  | 20  | 3                        | 579   | 18  | 26                       | 4  | 4  | 3                              |
| 18:00       | 3                        | 1,070 | 25  | 13                       | 3  | 11  | 2                        | 526   | 3   | 14                       | 1  | 6  | 1                              |
| Total       | 171                      | 5,910 | 247 | 204                      | 41 | 165 | 23                       | 5,394 | 213 | 159                      | 44 | 34 | 81                             |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                     | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|-----------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                     | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| Total 8 hour pedestrian volume                      | 0        | 81         | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| Factored 8 hour pedestrian volume                   | 81       |            | 0        |            | 0                  |            | 0                  |            |        |
| % Assigned to crossing rate                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| Net 8 Hour Pedestrian Volume at Crossing            |          |            |          |            |                    |            |                    |            | 19     |
| Net 8 Hour Vehicular Volume on Street Being Crossed |          |            |          |            |                    |            |                    |            | 10,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                          | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|----------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                          | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| Total 8 hour pedestrian volume                           | 0        | 81         | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Total 8 hour pedestrians delayed greater than 10 seconds | 0        | 75         | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Factored volume of total pedestrians                     | 81       |            | 0        |            | 0                  |            | 0                  |            |       |
| Factored volume of delayed pedestrians                   | 75       |            | 0        |            | 0                  |            | 0                  |            |       |
| % Assigned to Crossing Rate                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| Net 8 Hour Volume of Total Pedestrians                   |          |            |          |            |                    |            |                    |            | 19    |
| Net 8 Hour Volume of Delayed Pedestrians                 |          |            |          |            |                    |            |                    |            | 17    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Base Case)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent |                                        |  |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-----------------|----------------------------------------|--|
|                         | 1 Lanes                               |                                         | 2 or More Lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                              |                 |                                        |  |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                 |                                        |  |
| 1A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,528                                                     | 1,609 | 1,207 | 1,303 | 1,446 | 1,870 | 1,965 | 1,677 |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100             |                                        |  |
| 1B                      | 120                                   | 170                                     | 120                                              | 170                                     | 47                                                        | 167   | 39    | 44    | 30    | 188   | 84    | 48    |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 39                                                        | 100   | 33    | 37    | 25    | 100   | 70    | 40    | 443                          | 55              |                                        |  |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |
| Signal Justification 1: |                                       |                                         |                                                  |                                         | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                            | Section Percent                        |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-----------------------------------------|----------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                                         |                                        |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                                         |                                        |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,481                                                     | 1,442 | 1,168 | 1,259 | 1,416 | 1,682 | 1,881 | 1,629 |                                         |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                                     | 100                                    |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 39                                                        | 135   | 30    | 34    | 37    | 135   | 59    | 31    |                                         |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 78                                                        | 100   | 60    | 68    | 74    | 100   | 100   | 62    | 642                                     | 80                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value               | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|------------------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X<br>1,481                             | Y (actual)<br>35        | Y (warrant threshold)<br>115 | 30 %                 | 49 %                 |
|                 | 16:00       | 1,682                                  | 157                     | 115                          | 100 %                |                      |
|                 | 17:00       | 1,881                                  | 50                      | 115                          | 43 %                 |                      |
|                 | 18:00       | 1,629                                  | 27                      | 115                          | 23 %                 |                      |

# Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Base Case)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
|                             |                   |            |   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % |                          |                                     |
|                             | B Crossing Volume | 55         | % |                          |                                     |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % |                          |                                     |
|                             | B Crossing Road   | 80         | % |                          |                                     |
| 3. Combination              | A Justificaton 1  | 55         | % |                          |                                     |
|                             | B Justification 2 | 80         | % |                          |                                     |
| 4. 4-Hr Volume              |                   | 49         | % |                          |                                     |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met |                          |                                     |

## Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic Adj1(ShirleyX2)

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending  | Main Northbound Approach |              |            | Minor Eastbound Approach |           |            | Main Southbound Approach |              |            | Minor Westbound Approach |           |           | Pedestrians Crossing Main Road |
|--------------|--------------------------|--------------|------------|--------------------------|-----------|------------|--------------------------|--------------|------------|--------------------------|-----------|-----------|--------------------------------|
|              | LT                       | TH           | RT         | LT                       | TH        | RT         | LT                       | TH           | RT         | LT                       | TH        | RT        |                                |
| 8:00         | 25                       | 344          | 37         | 5                        | 2         | 5          | 1                        | 1,029        | 31         | 23                       | 14        | 4         | 2                              |
| 9:00         | 53                       | 414          | 74         | 60                       | 38        | 47         | 3                        | 811          | 67         | 26                       | 30        | 1         | 31                             |
| 12:00        | 9                        | 571          | 6          | 10                       | 4         | 8          | 3                        | 568          | 11         | 14                       | 6         | 3         | 4                              |
| 13:00        | 6                        | 607          | 17         | 8                        | 4         | 6          | 3                        | 618          | 8          | 20                       | 4         | 6         | 4                              |
| 15:00        | 13                       | 727          | 19         | 2                        | 2         | 2          | 6                        | 628          | 18         | 19                       | 10        | 3         | 12                             |
| 16:00        | 27                       | 946          | 34         | 70                       | 32        | 54         | 2                        | 635          | 35         | 17                       | 16        | 7         | 24                             |
| 17:00        | 14                       | 1,231        | 35         | 23                       | 10        | 18         | 3                        | 579          | 18         | 26                       | 8         | 4         | 3                              |
| 18:00        | 3                        | 1,070        | 25         | 11                       | 4         | 8          | 2                        | 526          | 3          | 14                       | 2         | 6         | 1                              |
| <b>Total</b> | <b>150</b>               | <b>5,910</b> | <b>247</b> | <b>189</b>               | <b>96</b> | <b>148</b> | <b>23</b>                | <b>5,394</b> | <b>191</b> | <b>159</b>               | <b>90</b> | <b>34</b> | <b>81</b>                      |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                            | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|------------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                            | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| <b>Total 8 hour pedestrian volume</b>                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| <b>Factored 8 hour pedestrian volume</b>                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| <b>% Assigned to crossing rate</b>                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| <b>Net 8 Hour Pedestrian Volume at Crossing</b>            |          |            |          |            |                    |            |                    |            | 36     |
| <b>Net 8 Hour Vehicular Volume on Street Being Crossed</b> |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                                 | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|-----------------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                                 | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| <b>Total 8 hour pedestrian volume</b>                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| <b>Total 8 hour pedestrians delayed greater than 10 seconds</b> | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| <b>Factored volume of total pedestrians</b>                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| <b>Factored volume of delayed pedestrians</b>                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| <b>% Assigned to Crossing Rate</b>                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| <b>Net 8 Hour Volume of Total Pedestrians</b>                   |          |            |          |            |                    |            |                    |            | 36    |
| <b>Net 8 Hour Volume of Delayed Pedestrians</b>                 |          |            |          |            |                    |            |                    |            | 33    |



# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic Adj1(ShirleyX2)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes                          |                                                    |                                                             |                                                    | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent |                                        |  |
|-------------------------|--------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-----------------|----------------------------------------|--|
|                         | 1 Lanes                                          |                                                    | 2 or More Lanes                                             |                                                    | Hour Ending                                               |       |       |       |       |       |       |       |                              |                 |                                        |  |
| Flow Condition          | FREE FLOW<br><div><input type="checkbox"/></div> | RESTR. FLOW<br><div><input type="checkbox"/></div> | FREE FLOW<br><div><input checked="" type="checkbox"/></div> | RESTR. FLOW<br><div><input type="checkbox"/></div> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                 |                                        |  |
| 1A                      | 480                                              | 720                                                | 600                                                         | 900                                                | 1,520                                                     | 1,624 | 1,213 | 1,307 | 1,449 | 1,875 | 1,969 | 1,674 |                              |                 |                                        |  |
|                         | COMPLIANCE %                                     |                                                    |                                                             |                                                    | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100             |                                        |  |
| 1B                      | 120                                              | 170                                                | 120                                                         | 170                                                | 53                                                        | 202   | 45    | 48    | 38    | 196   | 89    | 45    |                              |                 |                                        |  |
|                         | COMPLIANCE %                                     |                                                    |                                                             |                                                    | 44                                                        | 100   | 38    | 40    | 32    | 100   | 74    | 38    | 465                          | 58              |                                        |  |
| Free Flow               |                                                  |                                                    |                                                             |                                                    | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |
| Signal Justification 1: |                                                  |                                                    |                                                             |                                                    | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                            | Section Percent                        |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-----------------------------------------|----------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                                         |                                        |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                                         |                                        |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,467                                                     | 1,422 | 1,168 | 1,259 | 1,411 | 1,679 | 1,880 | 1,629 | 800                                     | 100                                    |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   |                                         |                                        |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 44                                                        | 155   | 34    | 36    | 43    | 143   | 62    | 30    |                                         |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 88                                                        | 100   | 68    | 72    | 86    | 100   | 100   | 60    | 674                                     | 84                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value        | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|-----------------------|----------------------|----------------------|
|                 |             | X                                      | Y (actual)              | Y (warrant threshold) |                      |                      |
| Justification 4 | 8:00        | 1,467                                  | 41                      | 115                   | 36 %                 | 50 %                 |
|                 | 16:00       | 1,679                                  | 156                     | 115                   | 100 %                |                      |
|                 | 17:00       | 1,880                                  | 51                      | 115                   | 44 %                 |                      |
|                 | 18:00       | 1,629                                  | 23                      | 115                   | 20 %                 |                      |

# Results Sheet

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[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic Adj1(ShirleyX2)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 58         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 84         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 58         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 84         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 50         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

## Input Data Sheet

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What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic (Adj.2 70% from North)

North

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending | Main Northbound Approach |       |     | Minor Eastbound Approach |    |    | Main Southbound Approach |       |     | Minor Westbound Approach |    |    | Pedestrians Crossing Main Road |
|-------------|--------------------------|-------|-----|--------------------------|----|----|--------------------------|-------|-----|--------------------------|----|----|--------------------------------|
|             | LT                       | TH    | RT  | LT                       | TH | RT | LT                       | TH    | RT  | LT                       | TH | RT |                                |
| 8:00        | 14                       | 344   | 37  | 8                        | 1  | 3  | 1                        | 1,029 | 49  | 23                       | 7  | 4  | 2                              |
| 9:00        | 30                       | 414   | 74  | 98                       | 19 | 28 | 3                        | 811   | 105 | 26                       | 15 | 1  | 31                             |
| 12:00       | 5                        | 571   | 6   | 15                       | 2  | 5  | 3                        | 568   | 18  | 14                       | 3  | 3  | 4                              |
| 13:00       | 4                        | 607   | 17  | 12                       | 2  | 4  | 3                        | 618   | 12  | 20                       | 2  | 6  | 4                              |
| 15:00       | 9                        | 727   | 19  | 4                        | 1  | 1  | 6                        | 32    | 19  | 5                        | 3  | 12 |                                |
| 16:00       | 16                       | 946   | 34  | 109                      | 16 | 31 | 2                        | 635   | 54  | 17                       | 8  | 7  | 24                             |
| 17:00       | 8                        | 1,231 | 35  | 36                       | 5  | 10 | 3                        | 579   | 28  | 26                       | 4  | 4  | 3                              |
| 18:00       | 2                        | 1,070 | 25  | 16                       | 2  | 5  | 2                        | 526   | 5   | 14                       | 1  | 6  | 1                              |
| Total       | 88                       | 5,910 | 247 | 298                      | 48 | 87 | 23                       | 5,394 | 303 | 159                      | 45 | 34 | 81                             |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                     | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|-----------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                     | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| Total 8 hour pedestrian volume                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| Factored 8 hour pedestrian volume                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| % Assigned to crossing rate                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| Net 8 Hour Pedestrian Volume at Crossing            |          |            |          |            |                    |            |                    |            | 36     |
| Net 8 Hour Vehicular Volume on Street Being Crossed |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                          | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|----------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                          | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| Total 8 hour pedestrian volume                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Total 8 hour pedestrians delayed greater than 10 seconds | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Factored volume of total pedestrians                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| Factored volume of delayed pedestrians                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| % Assigned to Crossing Rate                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| Net 8 Hour Volume of Total Pedestrians                   |          |            |          |            |                    |            |                    |            | 36    |
| Net 8 Hour Volume of Delayed Pedestrians                 |          |            |          |            |                    |            |                    |            | 33    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj.2 70% from North)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent |                                        |  |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-----------------|----------------------------------------|--|
|                         | 1 Lanes                               |                                         | 2 or More Lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                              |                 |                                        |  |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                 |                                        |  |
| 1A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,520                                                     | 1,624 | 1,213 | 1,307 | 1,454 | 1,875 | 1,969 | 1,674 |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100             |                                        |  |
| 1B                      | 120                                   | 170                                     | 120                                              | 170                                     | 46                                                        | 187   | 42    | 46    | 33    | 188   | 85    | 44    |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 38                                                        | 100   | 35    | 38    | 28    | 100   | 71    | 37    | 447                          | 56              |                                        |  |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |
| Signal Justification 1: |                                       |                                         |                                                  |                                         | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across | Section Percent                     |    |                                     |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|-------------------------------------|----|-------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |              |                                     |    |                                     |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |              |                                     |    |                                     |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,474                                                     | 1,437 | 1,171 | 1,261 | 1,421 | 1,687 | 1,884 | 1,630 |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800          | 100                                 |    |                                     |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 40                                                        | 174   | 36    | 38    | 40    | 166   | 70    | 33    |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 80                                                        | 100   | 72    | 76    | 80    | 100   | 100   | 66    | 674          | 84                                  |    |                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes          | <input type="checkbox"/>            | No | <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes          | <input checked="" type="checkbox"/> | No | <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value               | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|------------------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X<br>1,474                             | Y (actual)<br>34        | Y (warrant threshold)<br>115 | 30 %                 | 48 %                 |
|                 | 16:00       | 1,687                                  | 156                     | 115                          | 100 %                |                      |
|                 | 17:00       | 1,884                                  | 51                      | 115                          | 44 %                 |                      |
|                 | 18:00       | 1,630                                  | 23                      | 115                          | 20 %                 |                      |

# Results Sheet

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[Proposed Collision](#)
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Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj.2 70% from North)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 56         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 84         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 56         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 84         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 48         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

## Input Data Sheet

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What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic (Adj 3 PedsX2)

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending | Main Northbound Approach |       |     | Minor Eastbound Approach |    |     | Main Southbound Approach |       |     | Minor Westbound Approach |    |    | Pedestrians Crossing Main Road |
|-------------|--------------------------|-------|-----|--------------------------|----|-----|--------------------------|-------|-----|--------------------------|----|----|--------------------------------|
|             | LT                       | TH    | RT  | LT                       | TH | RT  | LT                       | TH    | RT  | LT                       | TH | RT |                                |
| 8:00        | 28                       | 344   | 37  | 6                        | 1  | 5   | 1                        | 1,029 | 35  | 23                       | 7  | 4  | 2                              |
| 9:00        | 60                       | 414   | 74  | 70                       | 19 | 56  | 3                        | 811   | 75  | 26                       | 15 | 1  | 60                             |
| 12:00       | 10                       | 571   | 6   | 11                       | 2  | 9   | 3                        | 568   | 13  | 14                       | 3  | 3  | 4                              |
| 13:00       | 7                        | 607   | 17  | 9                        | 2  | 7   | 3                        | 618   | 9   | 20                       | 2  | 6  | 4                              |
| 15:00       | 18                       | 727   | 19  | 3                        | 1  | 2   | 6                        | 628   | 23  | 19                       | 5  | 3  | 20                             |
| 16:00       | 31                       | 946   | 34  | 78                       | 16 | 62  | 2                        | 635   | 39  | 17                       | 8  | 7  | 46                             |
| 17:00       | 16                       | 1,231 | 35  | 26                       | 5  | 20  | 3                        | 579   | 20  | 26                       | 4  | 4  | 3                              |
| 18:00       | 3                        | 1,070 | 25  | 12                       | 2  | 9   | 2                        | 526   | 4   | 14                       | 1  | 6  | 1                              |
| Total       | 173                      | 5,910 | 247 | 215                      | 48 | 170 | 23                       | 5,394 | 218 | 159                      | 45 | 34 | 140                            |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                     | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|-----------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                     | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| Total 8 hour pedestrian volume                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| Factored 8 hour pedestrian volume                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| % Assigned to crossing rate                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| Net 8 Hour Pedestrian Volume at Crossing            |          |            |          |            |                    |            |                    |            | 36     |
| Net 8 Hour Vehicular Volume on Street Being Crossed |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                          | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|----------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                          | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| Total 8 hour pedestrian volume                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Total 8 hour pedestrians delayed greater than 10 seconds | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Factored volume of total pedestrians                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| Factored volume of delayed pedestrians                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| % Assigned to Crossing Rate                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| Net 8 Hour Volume of Total Pedestrians                   |          |            |          |            |                    |            |                    |            | 36    |
| Net 8 Hour Volume of Delayed Pedestrians                 |          |            |          |            |                    |            |                    |            | 33    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 3 PedsX2)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent                        |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|----------------------------------------|
|                         | 1 Lanes                               |                                         | 2 or More Lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                              |                                        |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                                        |
| 1A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,520                                                     | 1,624 | 1,213 | 1,307 | 1,454 | 1,875 | 1,969 | 1,674 |                              |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100                                    |
| 1B                      | 120                                   | 170                                     | 120                                              | 170                                     | 46                                                        | 187   | 42    | 46    | 33    | 188   | 85    | 44    |                              |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 38                                                        | 100   | 35    | 38    | 28    | 100   | 71    | 37    | 447                          | 56                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| Signal Justification 1: |                                       |                                         |                                                  |                                         | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across | Section Percent                     |    |                                     |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|-------------------------------------|----|-------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |              |                                     |    |                                     |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |              |                                     |    |                                     |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,474                                                     | 1,437 | 1,171 | 1,261 | 1,421 | 1,687 | 1,884 | 1,630 | 800          | 100                                 |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   |              |                                     |    |                                     |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 38                                                        | 175   | 32    | 35    | 47    | 157   | 60    | 29    |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 76                                                        | 100   | 64    | 70    | 94    | 100   | 100   | 58    | 662          | 83                                  |    |                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes          | <input type="checkbox"/>            | No | <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes          | <input checked="" type="checkbox"/> | No | <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value               | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|------------------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X<br>1,474                             | Y (actual)<br>34        | Y (warrant threshold)<br>115 | 30 %                 | 48 %                 |
|                 | 16:00       | 1,687                                  | 156                     | 115                          | 100 %                |                      |
|                 | 17:00       | 1,884                                  | 51                      | 115                          | 44 %                 |                      |
|                 | 18:00       | 1,630                                  | 23                      | 115                          | 20 %                 |                      |

# Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 3 PedsX2)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 56         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 83         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 56         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 83         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 48         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |



## Input Data Sheet

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What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic Adj1+2+3

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending  | Main Northbound Approach |              |            | Minor Eastbound Approach |           |           | Main Southbound Approach |              |            | Minor Westbound Approach |           |           | Pedestrians Crossing Main Road |
|--------------|--------------------------|--------------|------------|--------------------------|-----------|-----------|--------------------------|--------------|------------|--------------------------|-----------|-----------|--------------------------------|
|              | LT                       | TH           | RT         | LT                       | TH        | RT        | LT                       | TH           | RT         | LT                       | TH        | RT        |                                |
| 8:00         | 13                       | 344          | 37         | 7                        | 2         | 3         | 1                        | 1,029        | 43         | 23                       | 14        | 4         | 2                              |
| 9:00         | 27                       | 414          | 74         | 83                       | 38        | 24        | 3                        | 811          | 93         | 26                       | 30        | 1         | 60                             |
| 12:00        | 5                        | 571          | 6          | 14                       | 4         | 4         | 3                        | 568          | 15         | 14                       | 6         | 3         | 4                              |
| 13:00        | 3                        | 607          | 17         | 11                       | 4         | 3         | 3                        | 618          | 11         | 20                       | 4         | 6         | 4                              |
| 15:00        | 7                        | 727          | 19         | 3                        | 2         | 1         | 6                        | 628          | 24         | 19                       | 10        | 3         | 20                             |
| 16:00        | 14                       | 946          | 34         | 97                       | 32        | 27        | 2                        | 635          | 48         | 17                       | 16        | 7         | 46                             |
| 17:00        | 7                        | 1,231        | 35         | 32                       | 10        | 9         | 3                        | 579          | 25         | 26                       | 8         | 4         | 3                              |
| 18:00        | 2                        | 1,070        | 25         | 15                       | 4         | 4         | 2                        | 526          | 4          | 14                       | 2         | 6         | 1                              |
| <b>Total</b> | <b>78</b>                | <b>5,910</b> | <b>247</b> | <b>262</b>               | <b>96</b> | <b>75</b> | <b>23</b>                | <b>5,394</b> | <b>263</b> | <b>159</b>               | <b>90</b> | <b>34</b> | <b>140</b>                     |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                            | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|------------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                            | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| <b>Total 8 hour pedestrian volume</b>                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| <b>Factored 8 hour pedestrian volume</b>                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| <b>% Assigned to crossing rate</b>                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| <b>Net 8 Hour Pedestrian Volume at Crossing</b>            |          |            |          |            |                    |            |                    |            | 36     |
| <b>Net 8 Hour Vehicular Volume on Street Being Crossed</b> |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                                 | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|-----------------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                                 | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| <b>Total 8 hour pedestrian volume</b>                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| <b>Total 8 hour pedestrians delayed greater than 10 seconds</b> | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| <b>Factored volume of total pedestrians</b>                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| <b>Factored volume of delayed pedestrians</b>                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| <b>% Assigned to Crossing Rate</b>                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| <b>Net 8 Hour Volume of Total Pedestrians</b>                   |          |            |          |            |                    |            |                    |            | 36    |
| <b>Net 8 Hour Volume of Delayed Pedestrians</b>                 |          |            |          |            |                    |            |                    |            | 33    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic Adj1+2+3

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent                        |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|----------------------------------------|
|                         | 1 Lanes                               |                                         | 2 or More Lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                              |                                        |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                                        |
| 1A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,520                                                     | 1,624 | 1,213 | 1,307 | 1,449 | 1,875 | 1,969 | 1,674 |                              |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100                                    |
| 1B                      | 120                                   | 170                                     | 120                                              | 170                                     | 53                                                        | 202   | 45    | 48    | 38    | 196   | 89    | 45    |                              |                                        |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 44                                                        | 100   | 38    | 40    | 32    | 100   | 74    | 38    | 465                          | 58                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| Signal Justification 1: |                                       |                                         |                                                  |                                         | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across | Section Percent                     |    |                                     |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|-------------------------------------|----|-------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |              |                                     |    |                                     |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |              |                                     |    |                                     |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,467                                                     | 1,422 | 1,168 | 1,259 | 1,411 | 1,679 | 1,880 | 1,629 |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800          | 100                                 |    |                                     |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 46                                                        | 207   | 38    | 39    | 52    | 192   | 71    | 34    |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 92                                                        | 100   | 76    | 78    | 100   | 100   | 100   | 68    | 714          | 89                                  |    |                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes          | <input type="checkbox"/>            | No | <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes          | <input checked="" type="checkbox"/> | No | <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value        | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|-----------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X                                      | Y (actual)              | Y (warrant threshold) |                      | 50 %                 |
|                 | 16:00       | 1,467                                  | 41                      | 115                   | 36 %                 |                      |
|                 | 17:00       | 1,679                                  | 156                     | 115                   | 100 %                |                      |
|                 | 18:00       | 1,880                                  | 51                      | 115                   | 44 %                 |                      |
|                 |             | 1,629                                  | 23                      | 115                   | 20 %                 |                      |

# Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic Adj1+2+3

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 58         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 89         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 58         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 89         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 50         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

## Input Data Sheet

[Analysis Sheet](#)
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What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic (Adj 4 Non-school LT+50%)

T+5

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending | Main Northbound Approach |       |     | Minor Eastbound Approach |    |     | Main Southbound Approach |       |     | Minor Westbound Approach |    |    | Pedestrians Crossing Main Road |
|-------------|--------------------------|-------|-----|--------------------------|----|-----|--------------------------|-------|-----|--------------------------|----|----|--------------------------------|
|             | LT                       | TH    | RT  | LT                       | TH | RT  | LT                       | TH    | RT  | LT                       | TH | RT |                                |
| 8:00        | 28                       | 344   | 37  | 6                        | 1  | 5   | 1                        | 1,029 | 35  | 35                       | 7  | 4  | 2                              |
| 9:00        | 60                       | 414   | 74  | 70                       | 19 | 56  | 3                        | 811   | 75  | 39                       | 15 | 1  | 31                             |
| 12:00       | 10                       | 571   | 6   | 11                       | 2  | 9   | 3                        | 568   | 13  | 21                       | 3  | 3  | 4                              |
| 13:00       | 7                        | 607   | 17  | 9                        | 2  | 7   | 3                        | 618   | 9   | 30                       | 2  | 6  | 4                              |
| 15:00       | 18                       | 727   | 19  | 3                        | 1  | 2   | 6                        | 628   | 23  | 29                       | 5  | 3  | 12                             |
| 16:00       | 31                       | 946   | 34  | 78                       | 16 | 62  | 2                        | 635   | 39  | 26                       | 8  | 7  | 24                             |
| 17:00       | 16                       | 1,231 | 35  | 26                       | 5  | 20  | 3                        | 579   | 20  | 39                       | 4  | 4  | 3                              |
| 18:00       | 3                        | 1,070 | 25  | 12                       | 2  | 9   | 2                        | 526   | 4   | 21                       | 1  | 6  | 1                              |
| Total       | 173                      | 5,910 | 247 | 215                      | 48 | 170 | 23                       | 5,394 | 218 | 240                      | 45 | 34 | 81                             |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                     | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|-----------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                     | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| Total 8 hour pedestrian volume                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| Factored 8 hour pedestrian volume                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| % Assigned to crossing rate                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| Net 8 Hour Pedestrian Volume at Crossing            |          |            |          |            |                    |            |                    |            | 36     |
| Net 8 Hour Vehicular Volume on Street Being Crossed |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                          | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|----------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                          | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| Total 8 hour pedestrian volume                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Total 8 hour pedestrians delayed greater than 10 seconds | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Factored volume of total pedestrians                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| Factored volume of delayed pedestrians                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| % Assigned to Crossing Rate                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| Net 8 Hour Volume of Total Pedestrians                   |          |            |          |            |                    |            |                    |            | 36    |
| Net 8 Hour Volume of Delayed Pedestrians                 |          |            |          |            |                    |            |                    |            | 33    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 4 Non-school LT+50%)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes                          |                                                    |                                                             |                                                    | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent |                                        |  |
|-------------------------|--------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-----------------|----------------------------------------|--|
|                         | 1 Lanes                                          |                                                    | 2 or More Lanes                                             |                                                    | Hour Ending                                               |       |       |       |       |       |       |       |                              |                 |                                        |  |
| Flow Condition          | FREE FLOW<br><div><input type="checkbox"/></div> | RESTR. FLOW<br><div><input type="checkbox"/></div> | FREE FLOW<br><div><input checked="" type="checkbox"/></div> | RESTR. FLOW<br><div><input type="checkbox"/></div> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                 |                                        |  |
| 1A                      | 480                                              | 720                                                | 600                                                         | 900                                                | 1,532                                                     | 1,637 | 1,220 | 1,317 | 1,464 | 1,884 | 1,982 | 1,681 |                              |                 |                                        |  |
|                         | COMPLIANCE %                                     |                                                    |                                                             |                                                    | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100             |                                        |  |
| 1B                      | 120                                              | 170                                                | 120                                                         | 170                                                | 58                                                        | 200   | 49    | 56    | 43    | 197   | 98    | 51    |                              |                 |                                        |  |
|                         | COMPLIANCE %                                     |                                                    |                                                             |                                                    | 48                                                        | 100   | 41    | 47    | 36    | 100   | 82    | 43    | 496                          | 62              |                                        |  |
| Free Flow               |                                                  |                                                    |                                                             |                                                    | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |
| Signal Justification 1: |                                                  |                                                    |                                                             |                                                    | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across | Section Percent                     |    |                                     |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|-------------------------------------|----|-------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |              |                                     |    |                                     |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |              |                                     |    |                                     |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,474                                                     | 1,437 | 1,171 | 1,261 | 1,421 | 1,687 | 1,884 | 1,630 | 800          | 100                                 |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   |              |                                     |    |                                     |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 50                                                        | 159   | 39    | 45    | 49    | 144   | 73    | 36    |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 78    | 90    | 98    | 100   | 100   | 72    | 738          | 92                                  |    |                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes          | <input type="checkbox"/>            | No | <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes          | <input checked="" type="checkbox"/> | No | <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value               | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|------------------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X<br>1,474                             | Y (actual)<br>46        | Y (warrant threshold)<br>115 | 40 %                 | 52 %                 |
|                 | 16:00       | 1,687                                  | 156                     | 115                          | 100 %                |                      |
|                 | 17:00       | 1,884                                  | 51                      | 115                          | 44 %                 |                      |
|                 | 18:00       | 1,630                                  | 28                      | 115                          | 24 %                 |                      |

# Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 4 Non-school LT+50%)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 62         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 92         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 62         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 92         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 52         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

## Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

MR 80 at Shirley Avenue

What is the direction of the Main Road street?

North-South

When was the data collected?

2026 Total Traffic (Adj 5 Non-school LT+100%)

T+1

### Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population &lt; 10,000

AND

Speed &gt;= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

| Hour Ending | Main Northbound Approach |       |     | Minor Eastbound Approach |    |     | Main Southbound Approach |       |     | Minor Westbound Approach |    |    | Pedestrians Crossing Main Road |
|-------------|--------------------------|-------|-----|--------------------------|----|-----|--------------------------|-------|-----|--------------------------|----|----|--------------------------------|
|             | LT                       | TH    | RT  | LT                       | TH | RT  | LT                       | TH    | RT  | LT                       | TH | RT |                                |
| 8:00        | 28                       | 344   | 37  | 6                        | 1  | 5   | 1                        | 1,029 | 35  | 46                       | 7  | 4  | 2                              |
| 9:00        | 60                       | 414   | 74  | 70                       | 19 | 56  | 3                        | 811   | 75  | 52                       | 15 | 1  | 31                             |
| 12:00       | 10                       | 571   | 6   | 11                       | 2  | 9   | 3                        | 568   | 13  | 28                       | 3  | 3  | 4                              |
| 13:00       | 7                        | 607   | 17  | 9                        | 2  | 7   | 3                        | 618   | 9   | 40                       | 2  | 6  | 4                              |
| 15:00       | 18                       | 727   | 19  | 3                        | 1  | 2   | 6                        | 628   | 23  | 38                       | 5  | 3  | 12                             |
| 16:00       | 31                       | 946   | 34  | 78                       | 16 | 62  | 2                        | 635   | 39  | 34                       | 8  | 7  | 24                             |
| 17:00       | 16                       | 1,231 | 35  | 26                       | 5  | 20  | 3                        | 579   | 20  | 52                       | 4  | 4  | 3                              |
| 18:00       | 3                        | 1,070 | 25  | 12                       | 2  | 9   | 2                        | 526   | 4   | 28                       | 1  | 6  | 1                              |
| Total       | 173                      | 5,910 | 247 | 215                      | 48 | 170 | 23                       | 5,394 | 218 | 318                      | 45 | 34 | 81                             |

### Justification 5: Collision Experience

| Preceding Months | Number of Collisions* |
|------------------|-----------------------|
| 1-12             | 0                     |
| 13-24            | 1                     |
| 25-36            | 0                     |

\* Include only collisions that are susceptible to correction through the installation of traffic signal control

### Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                     | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total  |
|-----------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|--------|
|                                                     | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |        |
| Total 8 hour pedestrian volume                      | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |        |
| Factored 8 hour pedestrian volume                   | 156      |            | 0        |            | 0                  |            | 0                  |            |        |
| % Assigned to crossing rate                         | 23%      |            | 34%      |            | 30%                |            | 100%               |            |        |
| Net 8 Hour Pedestrian Volume at Crossing            |          |            |          |            |                    |            |                    |            | 36     |
| Net 8 Hour Vehicular Volume on Street Being Crossed |          |            |          |            |                    |            |                    |            | 13,000 |

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

|                                                          | Zone 1   |            | Zone 2   |            | Zone 3 (if needed) |            | Zone 4 (if needed) |            | Total |
|----------------------------------------------------------|----------|------------|----------|------------|--------------------|------------|--------------------|------------|-------|
|                                                          | Assisted | Unassisted | Assisted | Unassisted | Assisted           | Unassisted | Assisted           | Unassisted |       |
| Total 8 hour pedestrian volume                           | 75       | 6          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Total 8 hour pedestrians delayed greater than 10 seconds | 70       | 5          | 0        | 0          | 0                  | 0          | 0                  | 0          |       |
| Factored volume of total pedestrians                     | 156      |            | 0        |            | 0                  |            | 0                  |            |       |
| Factored volume of delayed pedestrians                   | 145      |            | 0        |            | 0                  |            | 0                  |            |       |
| % Assigned to Crossing Rate                              | 23%      |            | 34%      |            | 30%                |            | 100%               |            |       |
| Net 8 Hour Volume of Total Pedestrians                   |          |            |          |            |                    |            |                    |            | 36    |
| Net 8 Hour Volume of Delayed Pedestrians                 |          |            |          |            |                    |            |                    |            | 33    |

# Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 5 Non-school LT+100%)

## Justification 1: Minimum Vehicle Volumes

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across                 | Section Percent |                                        |  |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------|-----------------|----------------------------------------|--|
|                         | 1 Lanes                               |                                         | 2 or More Lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |                              |                 |                                        |  |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |                              |                 |                                        |  |
| 1A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,543                                                     | 1,650 | 1,227 | 1,327 | 1,473 | 1,892 | 1,995 | 1,688 |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 800                          | 100             |                                        |  |
| 1B                      | 120                                   | 170                                     | 120                                              | 170                                     | 69                                                        | 213   | 56    | 66    | 52    | 205   | 111   | 58    |                              |                 |                                        |  |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 58                                                        | 100   | 47    | 55    | 43    | 100   | 93    | 48    | 543                          | 68              |                                        |  |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 1A and 1B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |
| Signal Justification 1: |                                       |                                         |                                                  |                                         | Lesser of 1A or 1B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes <input type="checkbox"/> |                 | No <input checked="" type="checkbox"/> |  |

## Justification 2: Delay to Cross Traffic

### Free Flow Rural Conditions

| Justification           | Guidance Approach Lanes               |                                         |                                                  |                                         | Percentage Warrant                                        |       |       |       |       |       |       |       | Total Across | Section Percent                     |    |                                     |
|-------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|-------------------------------------|----|-------------------------------------|
|                         | 1 lanes                               |                                         | 2 or More lanes                                  |                                         | Hour Ending                                               |       |       |       |       |       |       |       |              |                                     |    |                                     |
| Flow Condition          | FREE FLOW<br><input type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | FREE FLOW<br><input checked="" type="checkbox"/> | RESTR. FLOW<br><input type="checkbox"/> | 8:00                                                      | 9:00  | 12:00 | 13:00 | 15:00 | 16:00 | 17:00 | 18:00 |              |                                     |    |                                     |
| 2A                      | 480                                   | 720                                     | 600                                              | 900                                     | 1,474                                                     | 1,437 | 1,171 | 1,261 | 1,421 | 1,687 | 1,884 | 1,630 | 800          | 100                                 |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 100   | 100   | 100   | 100   | 100   | 100   |              |                                     |    |                                     |
| 2B                      | 50                                    | 75                                      | 50                                               | 75                                      | 61                                                        | 172   | 46    | 55    | 58    | 152   | 86    | 43    |              |                                     |    |                                     |
|                         | COMPLIANCE %                          |                                         |                                                  |                                         | 100                                                       | 100   | 92    | 100   | 100   | 100   | 100   | 86    | 778          | 97                                  |    |                                     |
| Free Flow               |                                       |                                         |                                                  |                                         | Both 2A and 2B 100% Fulfilled each of 8 hours             |       |       |       |       |       |       |       | Yes          | <input type="checkbox"/>            | No | <input checked="" type="checkbox"/> |
| Signal Justification 2: |                                       |                                         |                                                  |                                         | Lesser of 2A or 2B at least 80% fulfilled each of 8 hours |       |       |       |       |       |       |       | Yes          | <input checked="" type="checkbox"/> | No | <input type="checkbox"/>            |

## Justification 3: Combination

### Combination Justification 1 and 2

| Justification Satisfied 80% or More |                          |                                         |                                        | Two Justifications Satisfied 80% or More |                                        |
|-------------------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------|
| Justification 1                     | Minimun Vehicular Volume | YES <input type="checkbox"/>            | NO <input checked="" type="checkbox"/> | YES <input type="checkbox"/>             | NO <input checked="" type="checkbox"/> |
| Justification 2                     | Delay Cross Traffic      | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/>            |                                          | NOT JUSTIFIED                          |

## Justification 4: Four Hour Volume

| Justification   | Time Period | Total Volume of Both Approaches (Main) | Heaviest Minor Approach | Required Value               | Average % Compliance | Overall % Compliance |
|-----------------|-------------|----------------------------------------|-------------------------|------------------------------|----------------------|----------------------|
| Justification 4 | 8:00        | X<br>1,474                             | Y (actual)<br>57        | Y (warrant threshold)<br>115 | 50 %                 | 58 %                 |
|                 | 16:00       | 1,687                                  | 156                     | 115                          | 100 %                |                      |
|                 | 17:00       | 1,884                                  | 60                      | 115                          | 52 %                 |                      |
|                 | 18:00       | 1,630                                  | 35                      | 115                          | 30 %                 |                      |



# Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

Intersection: MR 80 at Shirley Avenue

Count Date: 2026 Total Traffic (Adj 5 Non-school LT+100%)

## Summary Results

| Justification               |                   | Compliance |   | Signal Justified?        |                                     |
|-----------------------------|-------------------|------------|---|--------------------------|-------------------------------------|
|                             |                   |            |   | YES                      | NO                                  |
| 1. Minimum Vehicular Volume | A Total Volume    | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Volume | 68         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Delay to Cross Traffic   | A Main Road       | 100        | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Crossing Road   | 97         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Combination              | A Justificaton 1  | 68         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                             | B Justification 2 | 97         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. 4-Hr Volume              |                   | 58         | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

|                         |   |   |                          |                                     |
|-------------------------|---|---|--------------------------|-------------------------------------|
| 5. Collision Experience | 7 | % | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-------------------------|---|---|--------------------------|-------------------------------------|

|                |          |                       |                          |                                     |
|----------------|----------|-----------------------|--------------------------|-------------------------------------|
| 6. Pedestrians | A Volume | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|                | B Delay  | Justification not met | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

## **APPENDIX F**

### **Ontario Pedestrian Signal Warrants MR 80 / Shirley Avenue**

## 4.9 Justification 6 – Pedestrian Volume and Delay

### Purpose

The minimum pedestrian volume conditions are intended for applications where the traffic volume on a main road is so heavy that pedestrians experience excessive delay or hazard in crossing the main road, or where high pedestrian crossing volumes produce the likelihood of such delays.

The justification is applicable to an unsignalized intersection or a mid-block location.

Once justification has been established, determination of the appropriate crossing protection device should be subject to site-specific engineering judgement (see Guideline 3 for options).

### Standard

The need for a traffic control device at an intersection or mid-block location must be considered if both the following minimum pedestrian volume and delay criteria are met:

1. The total eight-hour pedestrian volume crossing the main road at an intersection or mid-block location during the highest eight hours of pedestrian traffic fulfils the

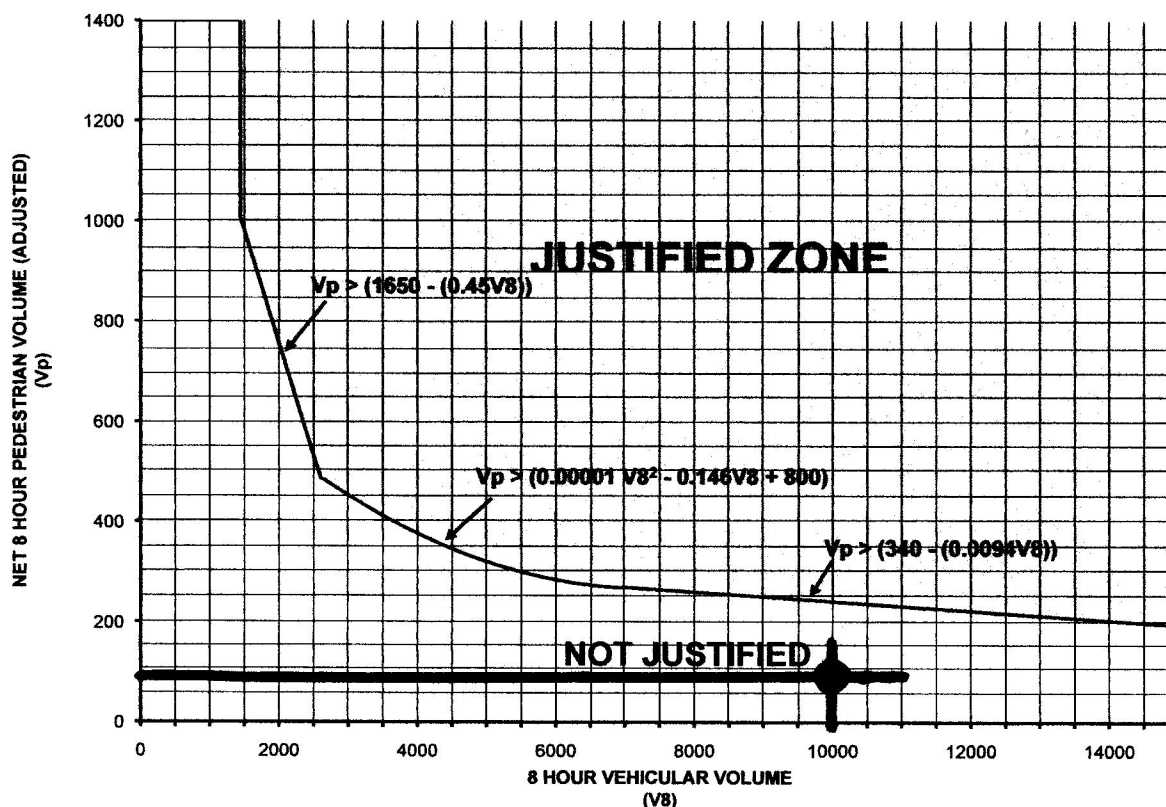


Figure 22 – Justification 6 – Pedestrian Volume

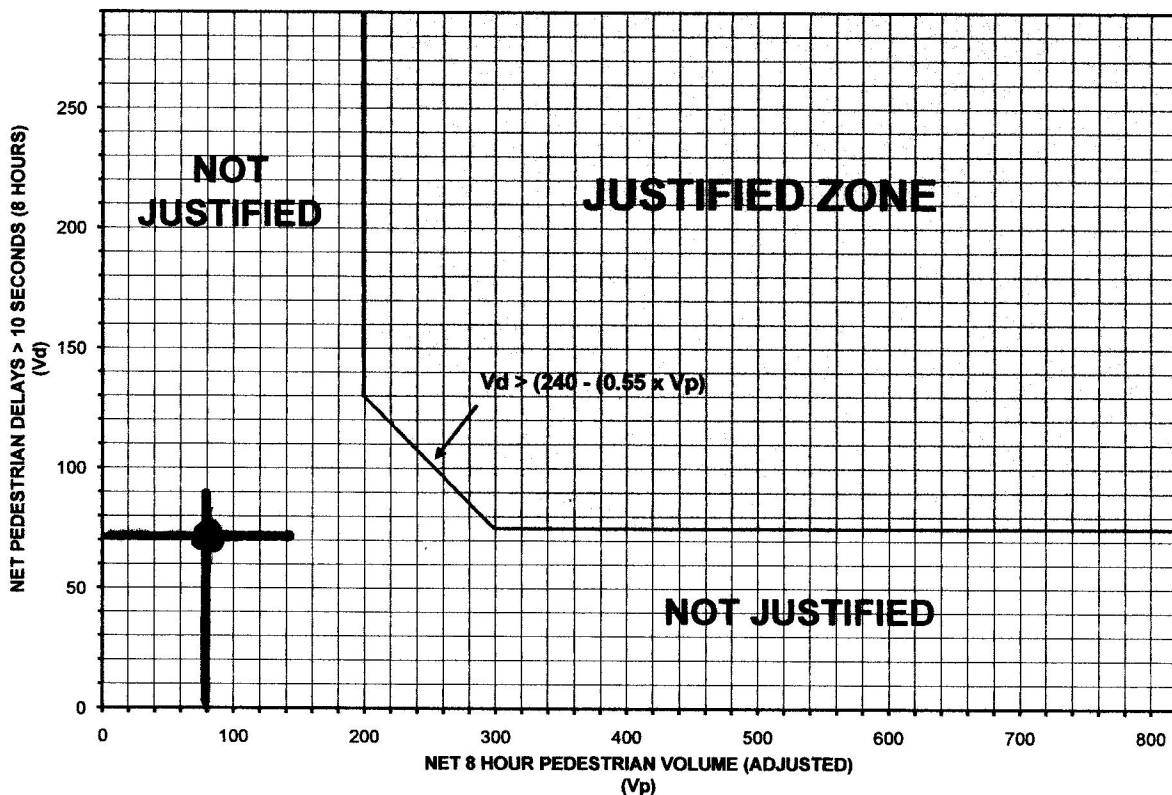


Figure 23 – Justification 6 – Pedestrian Delay

justification requirement identified in Figure 22. A tabular form of the justification values is provided in Table 18.

2. The total 8-hour volume of pedestrians experiencing delays of ten seconds or more in crossing the road during the highest eight hours of pedestrian traffic fulfils the justification requirement identified in Figure 23. A tabular form of the justification values is provided in Table 19.

### Guidelines

1. If a roadway is crossed by pedestrians at several locations, and the introduction of a signal-protected crossing is likely to

consolidate the crossings at a single point, the road segment may be divided into zones, with an appropriate proportion of crossings in each zone reassigned to the signal-protected crossing zone included in Tables 16 and 17.

2. In the case of a divided roadway with a raised median at least 1.2 m wide, the justification may be calculated separately for each side. The "worst case" will govern the outcome: such that if a protected crossing is justified for one side, the entire crossing will be justified.
3. If both Justification 6 and a traffic engineering study determine that protection of pedestrian traffic crossing a roadway is appropriate, consideration may be given to the variety of options. Consistent municipal practice