Transportation Impact Assessment – Step 4: Analysis

Spring Valley Trails Phases 5 & 6

Prepared for Claridge Homes
by IBI Group
February 18, 2020

TIA Plan Reports - Certification

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associate documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below:

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;

2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;

3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and

4. I am either a licensed[1] or registered[1] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering □ or transportation planning □.

[1] **License or registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

Dated at Ottawa this 18th day of February, 2020.
(City)

Name: David Hook, P.Eng.

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Signature of Individual certifier that she/he meets the above four criteria

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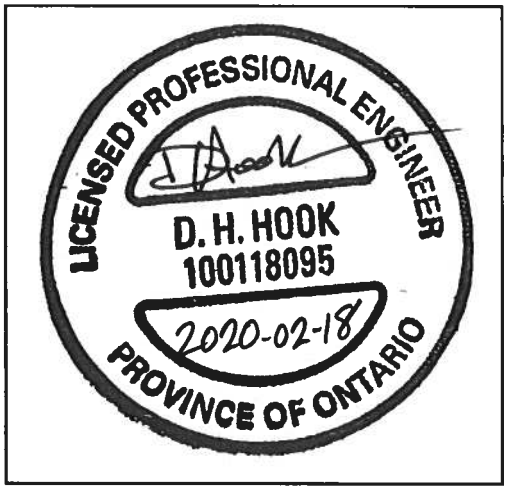

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Executive Summary

IBI Group (IBI) was retained by Claridge Homes to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for the proposed Spring Valley Trails Phases 5 & 6 residential development to be located at 3252 Navan Road, Ottawa. The proposed development consists 11 single-family homes, 262 townhomes and 48 condominium units. The development is expected to be fully built out in a single phase and occupied by 2023. The horizon year of the study was therefore taken as 2028, representing 5 years beyond the expected full build-out of the site. Access to the development will be provided through numerous local road connections with the adjacent Spring Valley subdivision, as well as the extension of Joshua Street.

Based on the traffic analysis results, the proposed development is expected to generate up to 325 and 371 two-way person-trips during the weekday morning and afternoon peak hours, respectively. These person-trips were subdivided into local trips and regional trips and assigned separate mode share targets and trip distributions, consistent with Orleans Traffic Assessment Zone (TAZ) in the 2011 O-D Survey. The resulting two-way vehicular trip generation is, therefore, 172 and 196 vehicles per hour during the weekday morning and afternoon peak hour, respectively.

The Draft Plan was developed with a long term lens, provisioning for the future extension of Joshua Street and its connection to Navan Road, while maintaining consistency with the conceptual alignment presented in the East Urban Community Phase 1 Community Design Plan (CDP).

Based on intersection capacity analysis completed for the intersection of Joshua/ Percifor Way & Renaud, traffic signals are operationally required under Existing conditions and warranted under Future (2028) Total Traffic conditions. Sensitivity analysis, however, indicates that traffic signals are on the verge of being warranted under Future (2028) Background Traffic conditions, requiring a nominal increase of just 5 vehicles on any of the sidestreet movements to trigger the warrant. As such, the traffic signal warrants are primarily triggered by background traffic volumes.

As indicated by analysis conducted for this study, the intersection of Saddleridge & Renaud is expected to operate at an acceptable level of service (i.e. LOS ‘D’ or better) during weekday peak hours under with its existing configuration as a stop-controlled intersection.

The results of the intersection capacity analysis indicate that the intersection of Navan & Renaud is expected to operate at acceptable levels of service (i.e. LOS ‘D’ or better) during the weekday morning and afternoon peak hours. Auxiliary lane analysis indicates that queues associated with background traffic volume projections on the southbound left-turn may spillback beyond its 20m of parallel lane. The proposed development, however, is not expected to contribute traffic volumes to the southbound left-turn movement, therefore any potential operational issues will not be exacerbated by site-generated traffic. The City is currently monitoring the Navan & Renaud intersection on an annual basis for traffic operational issues, and is planning to introduce a roundabout at this location once it approaches its theoretical capacity. It is recommended that traffic operations on the southbound approach be considered as part of the City’s annual monitoring plan for this intersection to help determine the appropriate timing for the conversion of this intersection to a roundabout configuration.

Within the timeframe of this study, the Navan & Spring Valley/ Elizabeth Cosgrove Private intersection is expected to operate slightly above acceptable capacity (i.e. LOS ‘E’) during the weekday afternoon peak hour with two-way stop control. Sensitivity analysis conducted at the study horizon year indicates that reductions of just 30 vehicles and 10 vehicles, respectively, would improve the Level of Service to ‘D’. Observations of existing traffic volumes indicate that the high left-turning volume during the weekday morning peak hour may be attributed to cut-through traffic as a means of avoiding delays at the Navan/ Renaud intersection. Future improvements to the Navan/ Renaud intersection should resolve this issue. Furthermore, as the proposed development is expected to contribute nominal volumes to the northbound left-turn movement, an auxiliary lane is not recommended.

Based on the right-turn lane criteria and confirmed through intersection capacity analysis, auxiliary right-turns with at least 15m of storage should be considered on the eastbound approach at the intersection of Joshua/ Percifor Way & Renaud and on the westbound approach at the intersection of Navan & Renaud, with each configured as a signalized intersection. It should be noted, however, that these right-turn lanes are required to support existing and background traffic volume projections only and neither are triggered as a direct result of the proposed development.

Multi-Modal Level of Service (MMLOS) analysis was also conducted for all existing boundary streets and all existing and future proposed signalized intersections to determine the roadway and intersection design elements required for these facilities to achieve their MMLOS targets as best as possible. The future configuration of this intersection as a roundabout is expected to help improve the user experience for all travel modes by addressing deficiencies identified in the multi-modal analysis, however it is not required to safely accommodate the proposed development.

The analysis conducted as part of this study indicates that no off-site geometric improvements are triggered as a direct result of the proposed development, and as such an RMA will not be required. It is expected that the City will promptly address the existing capacity limitations in the study area to accommodate ongoing growth.

Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network with the recommended actions and modifications in place.

1 Introduction

IBI Group (IBI) was retained by Claridge Homes to undertake a Transportation Impact Assessment (TIA) in support of a Draft Plan of Subdivision application for the proposed Spring Valley Trails Phases 5 & 6 residential development to be located at 3252 Navan Road, Ottawa.

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, published in June 2017, the following report is divided into four major components:

- **Screening** – Prior to the commencement of a TIA, an initial assessment of the proposed development is undertaken to establish the need for a comprehensive review of the site based on three triggers: Trip Generation, Location and Safety.
- **Scoping** – This component of the TIA report describes both the existing and planned conditions in the vicinity of the development and defines study parameters such as the study area, analysis periods and analysis years of the development. It also provides an opportunity to identify any scope exemptions that would eliminate elements of scope described in the TIA Guidelines but not relevant to the development proposal, based on consultation with City staff.
- **Forecasting** – The Forecasting component of the TIA is intended to review both the development-generated travel demand and the background network travel demand. It also provides an opportunity to rationalize this demand to ensure projections are within the capacity constraints of the transportation network.
- **Analysis** – This component documents the results of any analyses undertaken to ensure that the transportation related features of the proposed development are in conformance with prescribed technical standards and that its impacts on the transportation network are both sustainable and effectively managed. It also identifies a development strategy to ensure that what is being proposed is aligned with the City of Ottawa's policies and city-building objectives.

Throughout the development of a TIA report, each of the four study components above are submitted in draft form to the City of Ottawa and undergo a review by a designated Transportation Project Manager. Any comments received are addressed to the satisfaction of the City's Transportation Project Manager before proceeding with subsequent components of the study. All technical comments and responses throughout this process are included in **Appendix A**.

Dependent on the findings of this report, the complete submission of this Transportation Impact Assessment may also require Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA). The submission may also require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for these two elements will be confirmed through the analysis undertaken for this report.

2 TIA Screening

An initial screening was completed to confirm the need for a Transportation Impact Assessment by reviewing the following three triggers:

- **Trip Generation**: Based on the proposed number of residential units, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location**: The proposed development will use three existing access intersections, two on Renaud Road and one on Navan Road. Navan Road is a 'Spine Cycling Route' therefore the Location trigger is satisfied.
- **Safety**: Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. Based on this review, there is no elevated potential for safety concerns adjacent to the site, therefore the Safety trigger is not satisfied.

As the proposed development meets the Trip Generation and Location triggers, the need to undertake a Transportation Impact Assessment is confirmed.

A copy of the Screening Form is provided in **Appendix B**.

3 Project Scoping

3.1 Description of Proposed Development

3.1.1 Site Location

The proposed development represents Phase 5 and 6 of the Spring Valley Trails subdivision. These two phases occupy approximately 12.67 hectares and are generally bound by Navan Road to the north, the existing phases of the Spring Valley Trails subdivision to the west, the Navan Landfill to the east and the Prescott-Russell Trail Link to the south.

The site location and its surrounding context is illustrated in **Exhibit 1**.

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Spring Valley Trails Phases 5 & 6
Transportation Impact Assessment

Exhibit 1:
Site Location

PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.

3.1.2 Land Use Details

Table 1 summarizes the proposed land uses included in this development.

Table 1 - Land Use Statistics

LAND USE	SIZE
Single-Family Homes	11 units
Townhomes	262 units
Condominiums	48 units

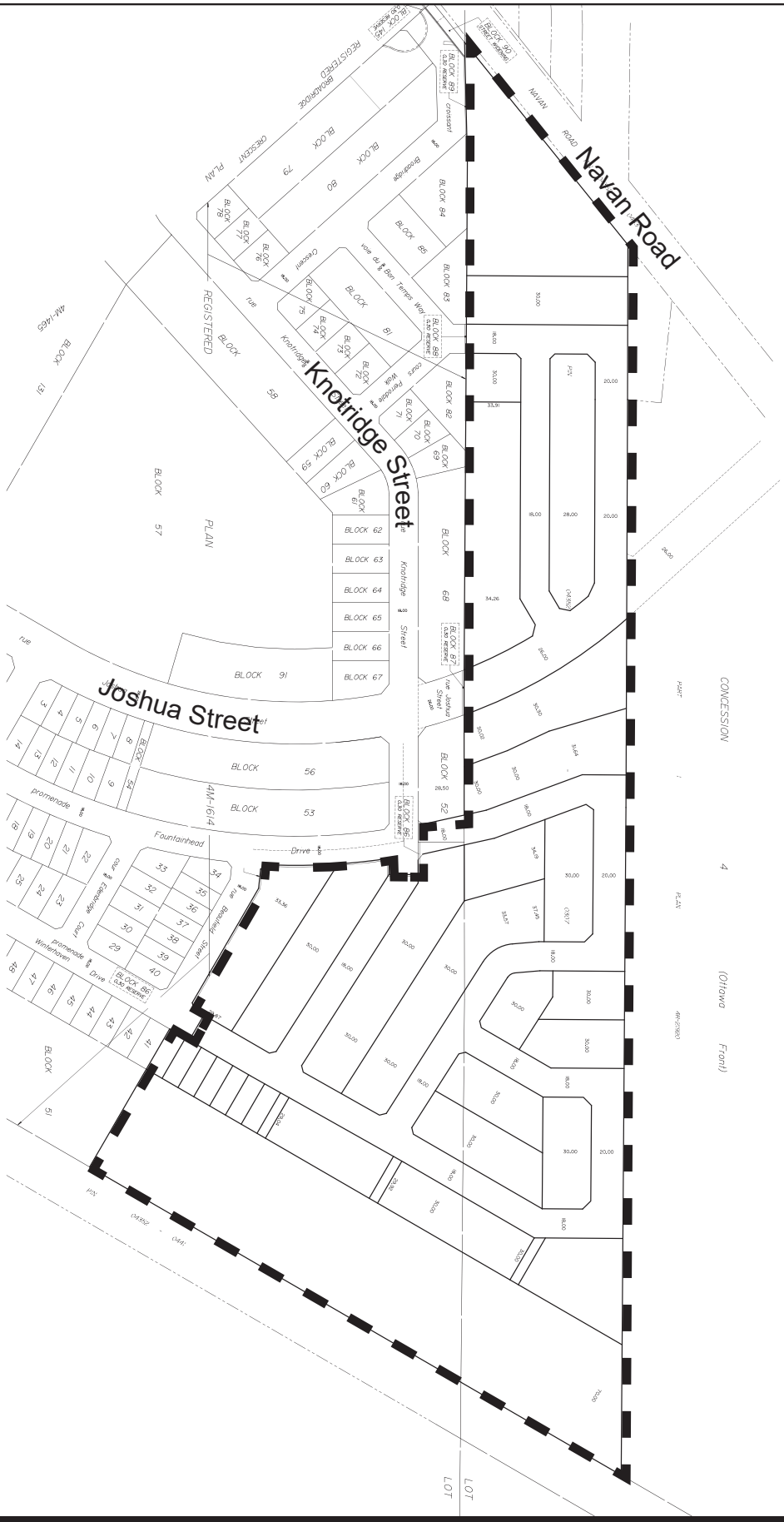
The Draft Plan of Subdivision for the proposed development is illustrated in **Exhibit 2**.

Access to the proposed development will be provided via the existing access intersections for the Spring Valley Trails subdivision: Renaud Road & Joshua Street / Percifor Way, Renaud Road & Saddleridge Drive and Navan Road & Spring Valley Drive. The site will integrate with the adjacent subdivision through numerous local road connections, as well as an extension of Joshua Street.

The subject site is currently an undeveloped greenfield site and, according to GeoOttawa, is zoned DR – Development Reserve Zone.

3.1.3 Development Phasing & Date of Occupancy

The proposed Spring Valley Trails Phases 5 & 6 development is expected to be fully built out in a single phase and occupied by 2023.



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Spring Valley Trails Phases 5 & 6
Transportation Impact Assessment

Exhibit 2:
Proposed Development

PROJECT No. 123888
DATE: February 2020
SCALE: 0m 60m 120m

3.2 Existing Conditions

3.2.1 Existing Road Network

3.2.1.1 Roadways

Table 2 below summarizes the relevant details of the roadways within the context area.

Table 2 - Existing Roadway Details

Roadway Name	Class	Jurisdiction	Orientation	From-To	Cross-Section	Speed Limit	Right-of-way
Navan Road	Arterial	City of Ottawa	Northwest-Southeast	Blackburn Hamlet Bypass to Trim Road	2 Lane Rural	60 km/h	37.5m
Renaud Road	Collector	City of Ottawa	Southwest-Northeast	Anderson Road to Mer Bleue Road	2 Lane Urban	50 km/h	24m
Joshua Street	Collector	City of Ottawa	East-West	Renaud Road to Knotridge Street	2 Lane Urban	50 km/h	26m
Saddleridge Drive [1]	Collector	City of Ottawa	North-South	Renaud Road to Felicity Crescent	2 Lane Urban	50 km/h	26m
Spring Valley Drive	Local	City of Ottawa	North-South	Navan Road to Joshua Street	2 Lane Urban	50 km/h	26m
Knotridge Street	Local	City of Ottawa	Northwest-Southeast	Rolling Meadow Crescent to Fountainhead Drive	2 Lane Urban	50 km/h	18m

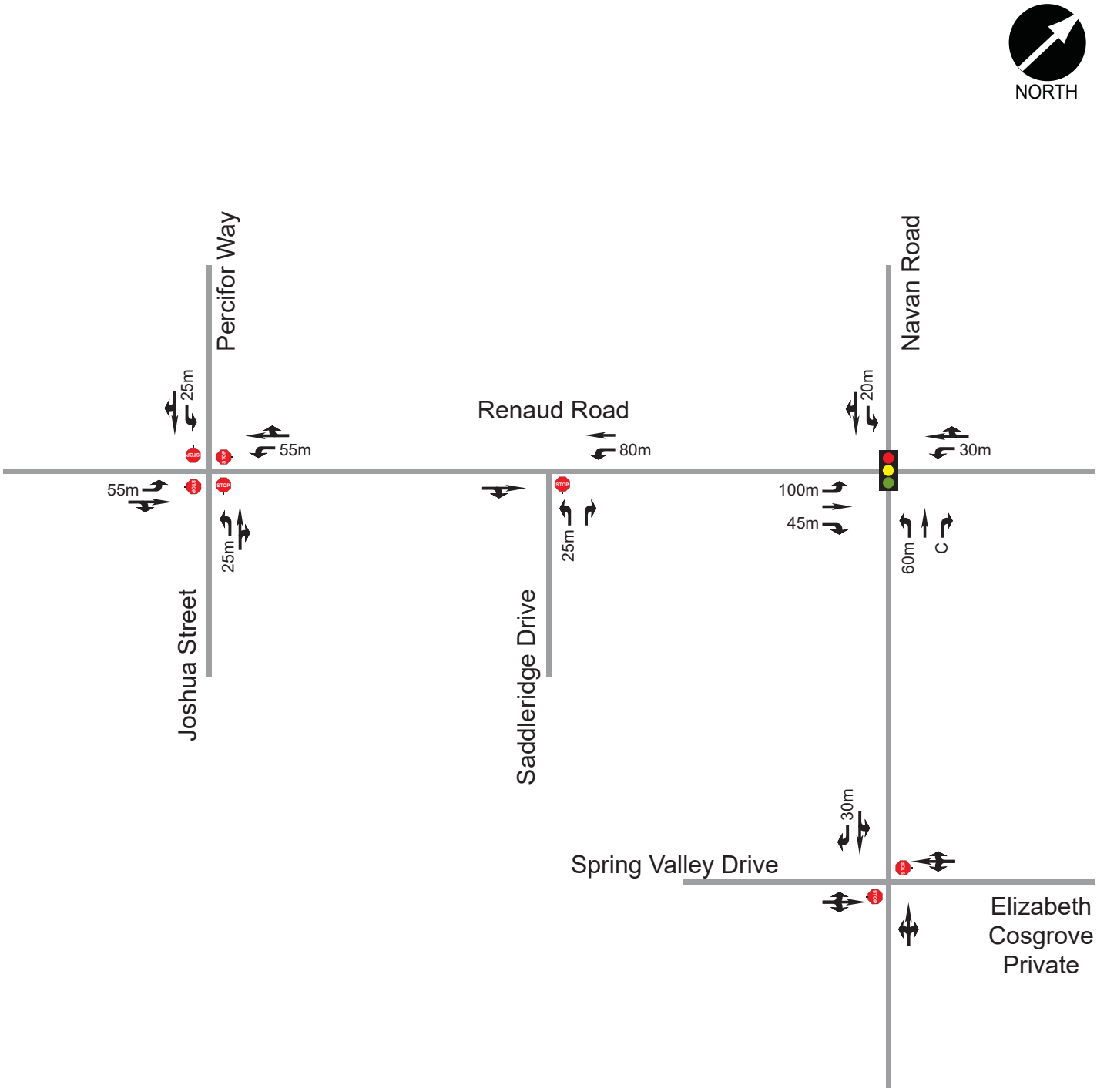
[1] *South of Joshua Street, Saddleridge Drive transitions to a local road with an 18m right-of-way.*

3.2.1.2 Intersections

The following existing intersections have been identified as having the greatest potential to be impacted by the proposed development:

- Navan Road & Renaud Road
- Navan Road & Spring Valley Drive
- Renaud Road & Joshua Street / Percifor Way
- Renaud Road & Saddleridge Drive

The intersection control and lane configurations of each intersection are shown in **Exhibit 3**.



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Transportation Impact Assessment

Exhibit 3:
Existing Lane Configurations and Intersection Controls

PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.

3.2.1.3 Driveways Adjacent to Development Access

The proposed development will be accessed from the regional road network via three existing intersections:

- Renaud Road & Joshua Street / Percifor Way
- Renaud Road & Saddleridge Drive
- Navan Road & Spring Valley Drive

With the exception of Elizabeth Cosgrove Private, a private road serving a residential condominium complex immediately north of the Navan Road & Spring Valley Drive intersection, all existing private approaches within 200m of these access intersections serve single-family homes.

3.2.1.4 Traffic Management Measures

The following traffic management or traffic calming measures exist within the context area:

- On-road painted messaging indicating a 50 km/h speed limit and flexible bollards on Renaud Road between Saddleridge Drive and Joshua Street / Percifor Way.
- Transverse markings on Renaud Road west of Joshua Street / Percifor Way (eastbound lane).
- Flexible bollards on Joshua Street between Renaud Road and Lucinda Crescent / Keith Crescent (seasonal).

3.2.1.5 Existing Traffic Volumes

As the proposed development will consist residential land uses, the weekday morning and afternoon peak hour traffic conditions will be most affected by the associated increase in traffic. Weekday morning and afternoon peak hour turning movement counts were therefore obtained from the City of Ottawa at the following intersections:

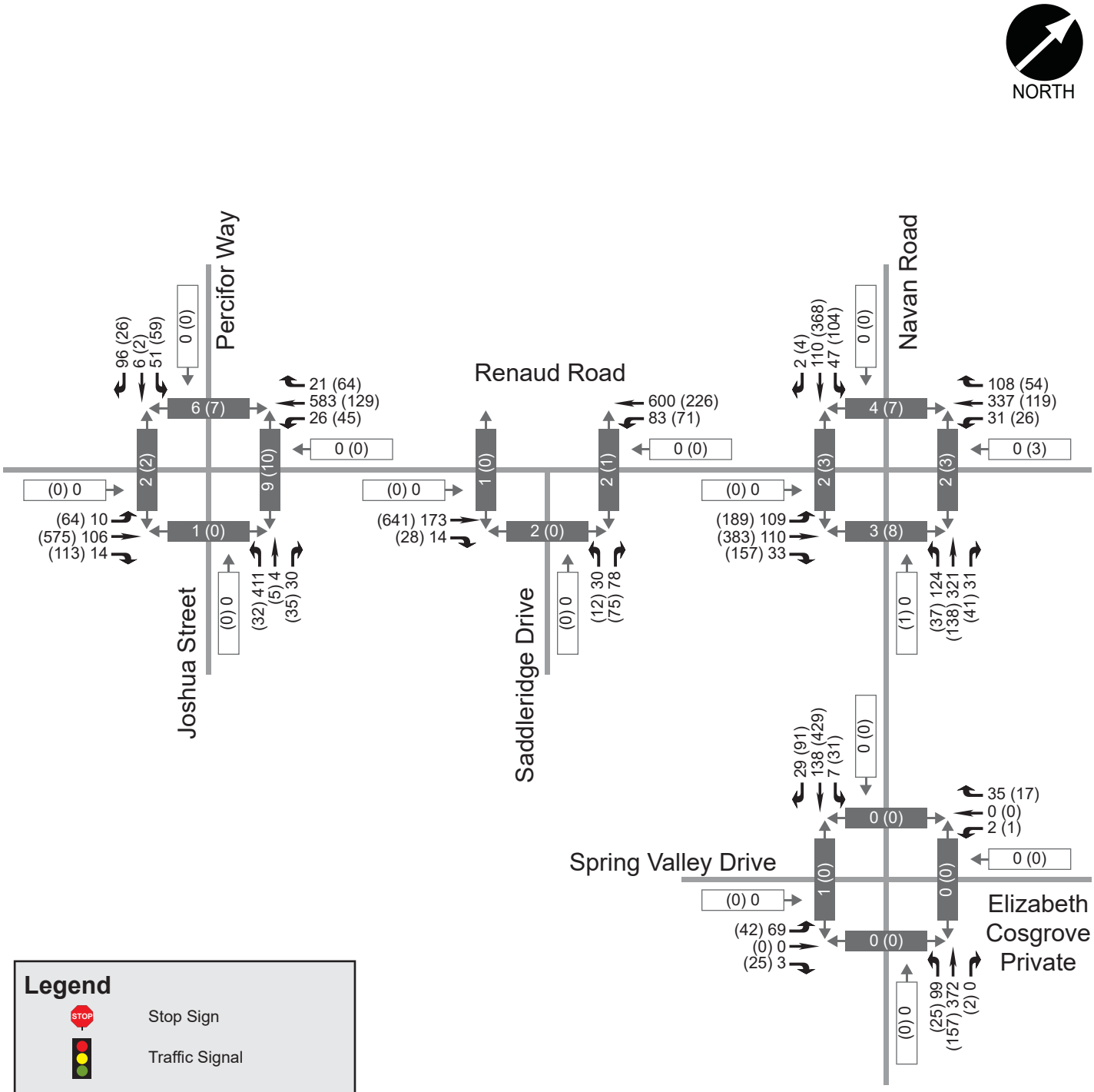
- Navan Road & Renaud Road (City of Ottawa, October 2019)
- Renaud Road & Joshua Street (City of Ottawa, September 2019)

In addition to the above, IBI Group conducted traffic counts of the following two intersections:

- Renaud Road & Saddleridge Drive (IBI Group, June 2017)
- Navan Road & Spring Valley Drive (IBI Group, June 2017)

Since the time of these counts, Phase 3 of the Spring Valley Trails subdivision and the 3143 Navan Road development have been fully built out. In order to account for these developments and estimate existing traffic volumes, the development-generated traffic volume projections from the associated TIAs were combined with the 2017 traffic count volumes at these intersections. Through volumes on Renaud Road and Navan Road were balanced accordingly using the 2019 traffic data.

Peak hour traffic volumes representative of existing conditions are shown in **Exhibit 4**. Traffic count data is provided in **Appendix C**.



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Transportation Impact Assessment

Exhibit 4:
Existing Traffic

PROJECT No. 123888
DATE: February 2020
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3.2.2 Existing Bicycle and Pedestrian Facilities

Within the context area, concrete sidewalks are provided on both sides of Renaud Road, Joshua Street, Saddleridge Drive and Spring Valley Drive. No sidewalks are provided on Navan Road as a result of its rural cross-section.

A few pedestrian pathways have been provided within the subdivision that provide connections to Renaud Road as well as to the Prescott-Russell Trail Link that follows the southern boundary of the subdivision.

Isolated pockets of cycling infrastructure have also been provided within the context area:

- 260m long bike lane on both sides of Renaud Road between Joshua Street / Percifor Way and Saddleridge Drive.
- Eastbound pocket bike lane at the intersection of Navan Road & Renaud Road.
- Southbound bike lane on Navan Road between Renaud Road and Spring Valley Drive.

3.2.3 Existing Transit Facilities and Service

Three transit routes, operated by OC Transpo, exist within the context area of the site:

- **Route #34** provides regular, all-day service between Renaud Road & Saddleridge Drive and Blair Station and operates on a 30-minute headway.
- **Route #225** provides weekday peak period service between Blair Station and Willow Aster Circle and operates on a 20-minute headway.
- **Route #228** provides weekday peak period service between Sarsfield / Navan and Blair Station and operates on a 35-minute headway.

Figure 1 illustrates all the bus stops in the vicinity of the proposed development. Transit service maps of the bus routes that exist within the context area of the site are provided in **Appendix D**.

Figure 1 - Existing Bus Stops

Source: OC Transpo

3.2.4 Collision History

A review of historical collision data has been conducted for the road network surrounding the proposed development. The TIA Guidelines require a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. **Table 3** summarizes all reported collisions between January 1, 2014 and December 31, 2018.

Table 3 – Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
INTERSECTIONS	
Navan Road & Renaud Road	14
Navan Road & Spring Valley Drive	1
Renaud Road & Joshua Street	7
Renaud Road & Saddleridge Drive	4
SEGMENTS	
Navan Road – Renaud Road to Mer Bleue Road	9
Renaud Road – Joshua Street / Percifor Way to Saddleridge Drive	1
Renaud Road – Saddleridge Drive to Navan Road	0

Based on the collision history summarized above, the following intersections and roadway segments may require additional analysis:

- Navan Road & Renaud Road
- Renaud Road & Joshua Street
- Navan Road – Renaud Road to Mer Bleue Road

Detailed collision records are provided in **Appendix E**.

3.3 Planned Conditions

3.3.1 Transportation Network

3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) outlines future road network modifications in the 2031 'Affordable Network'. The following projects were noted that may have an impact on traffic patterns within the vicinity of the site:

- **Blackburn Hamlet Bypass Extension** – New four-lane road from the Blackburn Hamlet Bypass to the intersection of Navan Road & Brian Coburn Boulevard, to be built in two sections. The first section will extend from Orleans Boulevard to Navan Road (Phase 1: 2014-2019) and second section will extend from the Blackburn Hamlet Bypass to Orleans Boulevard (Phase 2: 2020-2025).

In May 2018, the City of Ottawa initiated an Environmental Assessment (EA) study to explore alternative alignments for the Brian Coburn Boulevard Extension (formerly the Blackburn Hamlet Bypass Extension) and western portion of the Cumberland Transitway after a geotechnical analysis concluded that the soil conditions in the area were very poor, which could result in higher construction costs than anticipated for the previously recommended alignment.

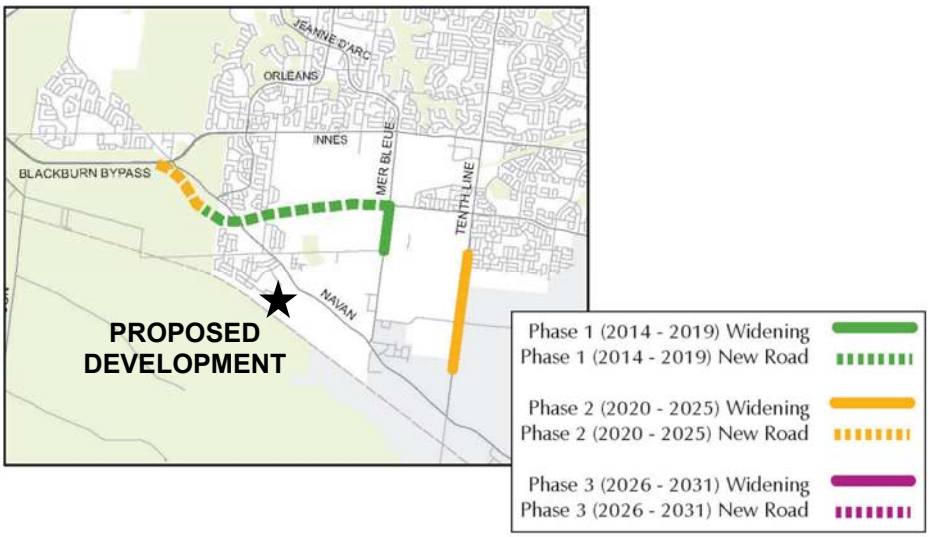
The *2019 City-Wide Development Charges Background Study (March 15, 2019)* identifies the following revisions for the timing of the TMP road network modifications described above:

- **Blackburn Hamlet Bypass Extension** – the timing of construction for the first and second sections have been modified to 2020-2024 and 2025-2029, respectively.

The preferred alignment of the Brian Coburn Boulevard Extension has not yet been determined and therefore its impacts to regional traffic distribution will not be considered in this study.

Figure 2 illustrates the planned changes to the arterial road network projects in the broader area, as per the TMP Affordable Plan. It should be noted that the Brian Coburn Boulevard Extension from Navan Road to Mer Bleue Road is now in place.

Figure 2 - Future Road Network Projects



Source: 2013 Transportation Master Plan – Map 11 '2031 Affordable Network'

Although not part of the '2031 Affordable Network' the TMP 2031 'Network Concept' indicates that Navan Road and the Blackburn Hamlet Bypass may be widened some time beyond the TMP's 2031 horizon.

3.3.1.2 Future Transit Facilities and Services

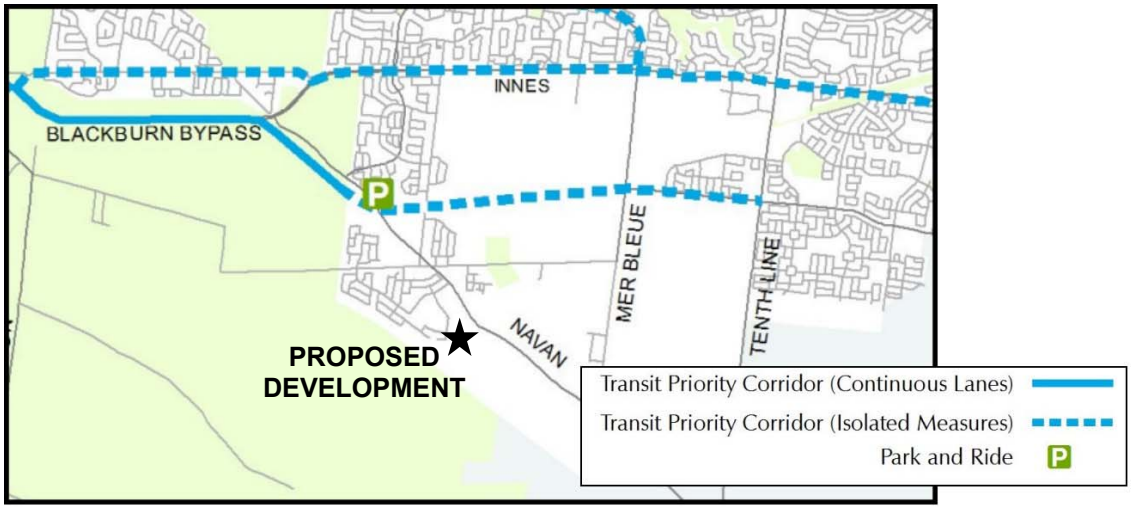
The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following projects were noted in the 'Affordable RTTP Network' that may have a future impact on study area traffic:

- **Blackburn Hamlet Bypass / Brian Coburn Boulevard Transit Priority Corridor** – Continuous bus lanes along the Blackburn Hamlet Bypass and isolated transit priority measures along Brian Coburn Boulevard.

As previously discussed, the preferred alignment of the Brian Coburn Boulevard has not yet been determined and therefore its impacts to regional traffic distribution will not be considered in this study.

Figure 3 shows the transit infrastructure projects in the vicinity of the proposed development that are part of the 2031 'Affordable Network'.

Figure 3 - Future 'Affordable RTTP Network Projects'



Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'

3.3.1.3 Future Cycling and Pedestrian Facilities

The 2013 Ottawa Cycling Plan (OCP) designates Renaud Road as a 'Local Route' and Navan Road and Pagé Road as 'Spine Routes' which form part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa.

No specific cycling or pedestrian infrastructure improvements have been planned within the context area of the proposed development.

3.3.2 Future Adjacent Developments

The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic projections.

The following two significant development applications adjacent to the site have been identified:

- 2983 Navan Road
- Eastboro Phase 1B, 2A & 2B

The locations of these developments are shown in **Exhibit 5**.

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Transportation Impact Assessment

Exhibit 5:
Adjacent Developments

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3.3.3 Network Concept Screenline

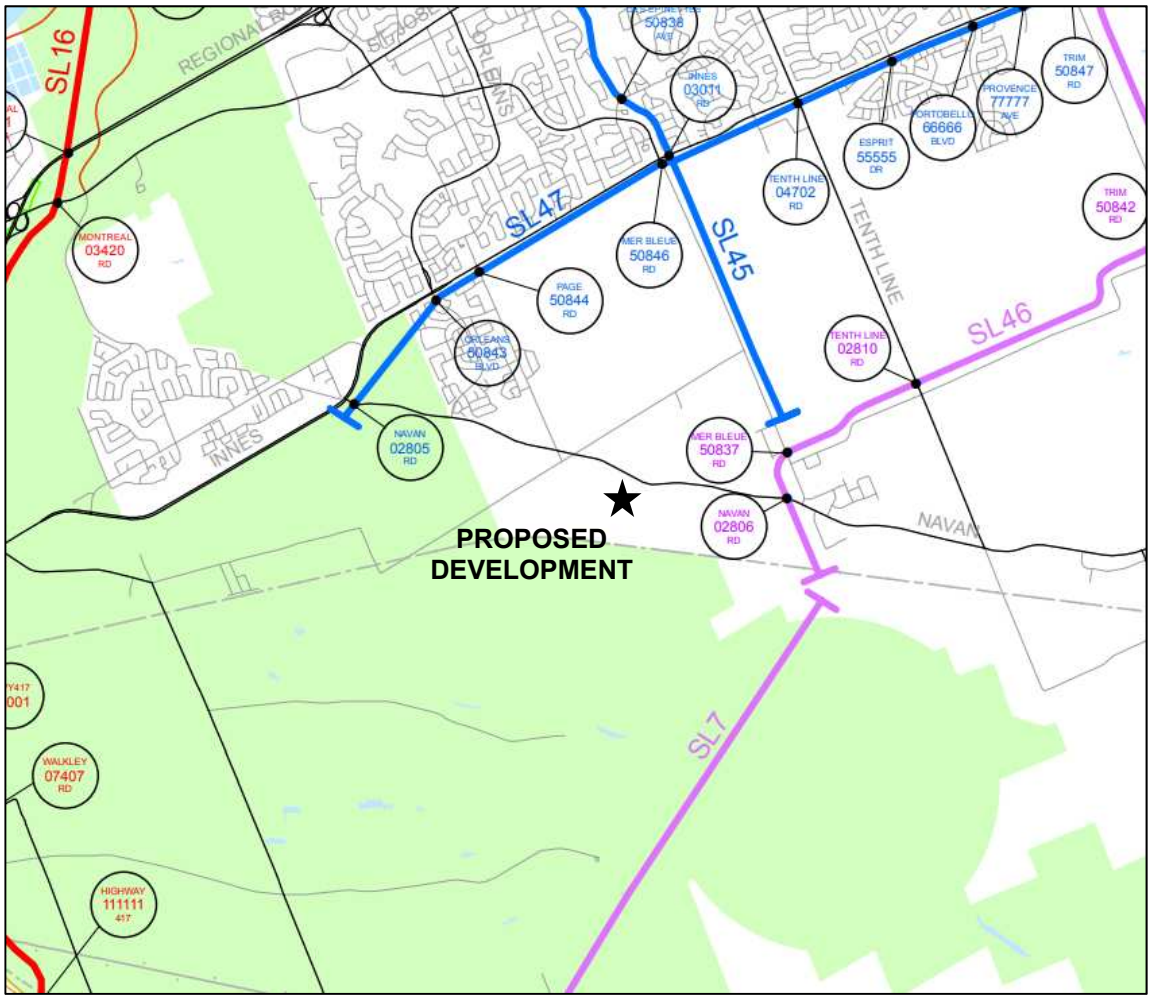
A screenline is an artificial boundary between areas of major traffic generation that captures all significant points of entry from one area to another to compare crossing demand with the available roadway capacity. Screenlines are typically located along geographical barriers such as rivers, rail lines or within the greenbelt where the number of alternative crossing locations are limited. To capture existing flow and model future demand, count stations were established by the City of Ottawa at each crossing point along the screenline.

The nearest City of Ottawa strategic planning screenlines adjacent to the development have been considered in the screenline analysis:

- **SL45 – Bilberry Creek** – This is the nearest north/south screenline to the study area, and it follows Bilberry Creek from the Ottawa River to Wall Road. This screenline has six crossing points: the Ottawa River Pathway, Jeanne d'Arc Boulevard North, Ottawa Road 174, St Joseph Boulevard, Des Épinettes Avenue and Innes Road.
- **SL46 – Frank Kenny** – This is the nearest east/west screenline to the south of the study area. This screenline follows Ted Kelly Lane, Cox County Road from the Ottawa River down to Innes Road, Wall Road westward to Navan Road and ends at the Greenbelt. This screenline has seven crossing points: Ottawa Road 174, Old Montreal Road, Innes Road, Trim Road, Tenth Line Road, Mer Bleue Road and Navan Road.
- **SL47 – Innes** – This is the nearest east/west screenline to the north of the study area, and it follows the southern side of Innes Road from Navan Road to Trim Road. It has nine crossing points: Navan Road, Orleans Boulevard, Pagé Road, Mer Bleue Road, Tenth Line Road, Esprit Drive, Portobello Boulevard, Provence Avenue and Trim Road.

SL45, SL46 and SL47 are shown in **Figure 4**, as determined from the City of Ottawa's Road Network Development Report (2013), a supporting document to the 2013 Transportation Master Plan (TMP). The Network Impact at these screenlines may require assessment in the Analysis section of this report.

Figure 4 - Screenlines



Source: Road Network Development Report (IBI, 2013)

3.4 Study Area

Based on a review of the information presented thus far, a study area bound by Renaud Road, Navan Road and the existing greenspace to the south and east will provide a sufficient assessment of the development's impact on the adjacent transportation network.

The following intersections will therefore be assessed for vehicular capacity as part of this study:

- Navan Road & Renaud Road
- Navan Road & Spring Valley Drive
- Renaud Road & Joshua Street
- Renaud Road & Saddleridge Drive

Multi-modal Level of Service (MMLOS) will be conducted for all signalized intersections within the study area described above as well as the sections of Navan Road and Renaud Road within the study area.

3.5 Time Periods

As the proposed development will consist of residential land uses, traffic generated during the weekday morning and afternoon peak hours is expected to result in the most significant impact to traffic operations on the adjacent network.

3.6 Study Horizon Year

The following future analysis years will be assessed in this study:

- Year 2023 – Full Build-out / Occupancy of Proposed Development
- Year 2028 – 5 years Beyond Full Build-out / Occupancy

3.7 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 4** summarizes the TIA modules that are not applicable to this study.

Table 4 - Exemptions Review

TIA MODULE	ELEMENT	EXEMPTION CONISDERATIONS	REQUIRED
DESIGN REVIEW COMPONENT			
4.1 Development Design	4.1.2 Circulation and Access	• Only required for site plans	✗
	4.1.3 New Street Networks	• Only required for plans of subdivision	✓
4.2 Parking	4.2.1 Parking Supply	• Only required for site plans	✗
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	✗
NETWORK IMPACT COMPONENT			
4.5 Transportation Demand Management	All Elements	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	✓
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	✓
4.8 Network Concept	n/a	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	✓

4 Forecasting

4.1 Development Generated Traffic

4.1.1 Trip Generation Methodology

Peak hour site-generated traffic volumes were developed using the 2009 TRANS Trip Generation Residential Trip Rates Study Report. The TRANS trip generation rates are based on a blended rate derived from 17 trip generation studies undertaken in 2008, the ITE Trip Generation Manual and the 2005 TRANS Origin-Destination (OD) Travel Survey. Separate trip generation rates exist for each of the four general geographic areas in Ottawa: Core, Urban (Inside the Greenbelt), Suburban (Outside the Greenbelt) and Rural. These trip generation rates reflect existing travel behavior by dwelling type and geographic area. The TIA Guidelines recommend that the TRANS trip generation rates be converted to person-trips based on the vehicular mode share proportions detailed in the TRANS Trip Generation study.

The person-trips are subdivided based on representative mode share percentages applicable to the study area to determine the number of vehicle, transit, pedestrian, cycling and other trip types. Target mode shares were developed based on the local mode shares from the 2011 Origin-Destination (OD) Survey.

4.1.2 Trip Generation Results

4.1.2.1 Base Vehicle Trip Generation

Peak hour vehicular traffic volumes associated with the Spring Valley Trails Phases 5 & 6 development were determined using the peak hour trip generation rates in the TRANS Trip Generation study.

The base vehicular trip generation results for the proposed development have been summarized in **Table 5**.

Table 5 - Base Vehicular Trip Generation

LAND USE	SIZE	PERIOD	GENERATED TRIPS (VPH)		
			IN	OUT	TOTAL
Single Family Homes	11 units	AM	2	5	7
		PM	6	4	10
Townhomes	262 units	AM	52	91	143
		PM	99	87	186
Condominiums	48 units	AM	6	16	22
		PM	13	9	22

Note: vph = vehicles per hour

4.1.2.2 Person Trip Generation

The person-trip to vehicle-trip conversion factors for TRANS trip generation rates vary depending on the peak hour, geographic location and land use considered. The vehicular trip generation results for the residential land uses from the previous section were divided by the vehicle mode shares to determine the number of person-trips generated.

The results after applying the corresponding conversion factors have been summarized in **Table 6**.

Table 6 - Person-Trip Generation

LAND USE	AUTO MODE SHARE	PERIOD	PERSON TRIPS (PPH)		
			IN	OUT	TOTAL
Single Family Homes	55%	AM	4	10	14
	64%	PM	10	6	16
Townhomes	55%	AM	95	165	260
	61%	PM	162	143	305
Condominiums	44%	AM	14	37	51
	44%	PM	29	21	50
AM Total			**113**	**212**	**325**
PM Total			**201**	**170**	**371**

Notes: pph = persons per hour

4.1.2.3 Mode Share Proportions

The 2011 TRANS Origin-Destination (O-D) Survey provides approximations of the existing modal share within the Orleans Traffic Assessment Zone (TAZ). Relevant extracts from the 2011 O-D Survey are provided in **Appendix F**.

Based on the 2011 O-D Survey, 46% of trips originating from within the Orleans TAZ remain within the community. The mode share distributions of local and regional trips are significantly different, therefore, the application of separate mode share targets for each trip type was considered more representative of actual conditions.

The local and regional mode share targets were developed by averaging the weekday peak period mode shares of the Orleans TAZ from the 2011 O-D Survey. The Brian Coburn Transit Priority Corridor will be constructed relatively close to the proposed development and although it may reduce transit travel times to/from downtown Ottawa, transit service in close proximity of the proposed development will still rely on local routes and therefore is not likely to have a significant impact on future transit mode shares.

Appropriate mode share targets for the proposed development are outlined in **Table 7**. It should be noted that the mode share targets presented below are the same as the existing mode shares due to the low likelihood that non-auto mode shares will increase in the vicinity of the proposed development.

Table 7 - Proposed Mode Share Targets

TRAVEL MODE	EXISTING MODE SHARES [1]						MODE SHARE TARGETS [2]	
	AM 'FROM'	AM 'TO'	AM 'WITHIN'	PM 'FROM'	PM 'TO'	PM 'WITHIN'	LOCAL (46%)	REGIONAL (54%)
Auto Driver	55%	61%	38%	64%	56%	54%	46%	59%
Auto Passenger	8%	13%	20%	21%	11%	23%	22%	13%
Transit	34%	10%	7%	12%	32%	3%	5%	22%
Cycling	1%	0%	2%	0%	1%	1%	1%	1%
Walking	0%	0%	16%	0%	0%	11%	14%	0%
Other	2%	16%	17%	3%	1%	6%	12%	5%

Notes:

[1] 2011 TRANS O-D Survey for the Orleans Traffic Assessment Zone

[2] Regional is equal to average of 'To/ From' and local is equal to the average of 'Within'.

4.1.2.4 Trip Reduction Factors

Deduction of Existing Development Trips

Not Applicable: The proposed development lands are currently undeveloped, and do not generate any traffic volumes.

Pass-by Traffic

Not Applicable: The proposed development will be entirely residential land uses and will therefore not generate pass-by traffic.

Synergy/ Internalization

Not Applicable: The proposed development is not expected to generate internal trips.

4.1.2.5 Trip Generation by Mode

The mode share targets, as shown in **Table 7** above, were applied to the number of development-generated person-trips to determine the number of trips stratified by travel mode. The results after applying the mode share targets are summarized in **Table 8**.

Table 8 – Peak Hour Person Trips by Mode

MODE	LOCAL (46%)				REGIONAL (54%)			
	AM		PM		AM		PM	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Auto Driver	**24**	**45**	**42**	**36**	**36**	**67**	**64**	**54**
Auto Passenger	11	21	20	17	8	15	14	12
Transit	3	5	5	4	13	25	24	20
Cycling	1	1	1	1	1	1	1	1
Walking	7	14	13	11	0	0	0	0
Other	6	12	11	9	3	6	6	5
Total	**150**		**170**		**175**		**201**	

4.1.3 Trip Distribution and Assignment

Site-generated vehicle trips were distributed in accordance to the following two distributions. The local distribution was determined based on the most logical route from the proposed development to the employment and commercial nodes within Orleans. The regional distribution was determined based on the trip distribution of the Orleans TAZ provided in the 2011 O-D Survey.

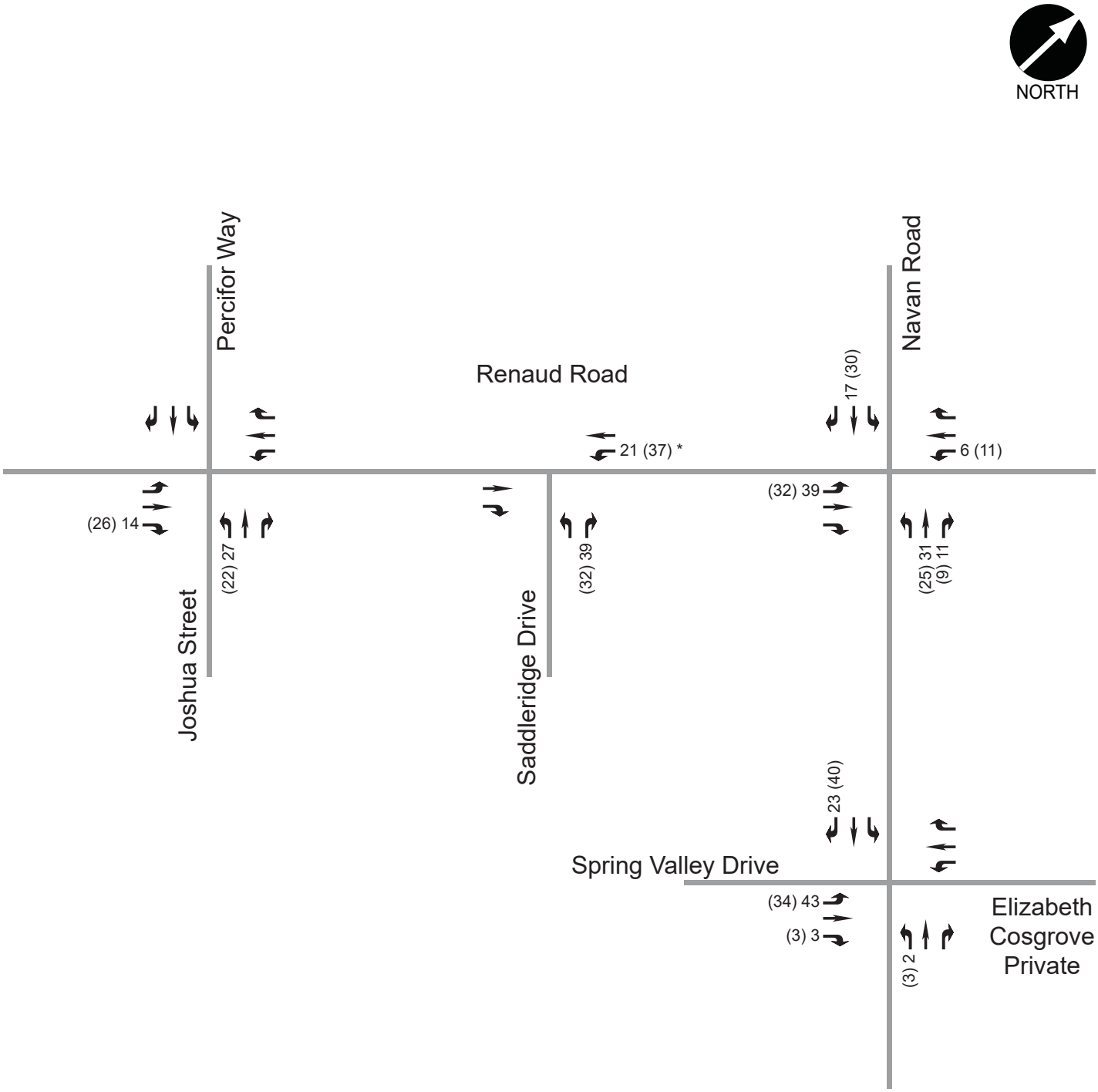
Local Traffic (46%):

- 75% to/from the north via Navan Road
- 25% to/from east via Renaud Road

Regional Traffic (54%):

- 55% to/from the north via Navan Road
- 40% to/from the west via Renaud Road
- 5% to/from the south via Navan Road

Utilizing the estimated number of new auto trips from **Table 8** and applying the above distribution, future site-generated traffic volumes are illustrated for each of the study area intersections in **Exhibit 6**.



LEGEND

Permitted Movements

(xxx) xxx
(xxx) xxx
(xxx) xxx

Weekday AM (PM) Peak Hour Vehicular Volume

* It has been assumed that these vehicles will turn right at Page Road (not shown) rather than at the intersection of Navan Road & Renaud Road.

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Spring Valley Trails Phases 5 & 6
Transportation Impact Assessment

Exhibit 6:
Site-Generated
AM & PM Peak Hour
Traffic Volumes

PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.

4.2 Background Network Traffic

4.2.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area have been considered. The Scoping section of this study reviewed the anticipated changes to the area transportation network based on the Transportation Master Plan (TMP), Capital Budget Forecasts and the *2019 City-Wide Development Charges Background Study* and determined that the following modifications are expected to occur:

- Phases 1 and 2 of the Brian Coburn Extension are expected to be completed by 2020-2024 and 2025-2029, respectively. The Environmental Assessment (EA) for this project is currently underway and a preferred alignment has not been selected yet. The impact this project may have on future travel patterns is therefore unknown. As such, no adjustments have been made to the distribution of site-generated traffic.

4.2.2 General Background Growth Rates

The background growth rate is intended to represent regional growth from outside the study area. The following background growth rate was calculated based on 2016 and 2019 traffic count data for the intersection of Navan Road & Renaud Road.

Table 9 - Background Growth Rate Summary

PERIOD	NORTHBOUND	SOUTHBOUD	EASTBOUND	WESTBOUND	OVERALL
8 Hour	-4%	-4%	2%	-5%	-3%
AM Peak Hour	-11%	-5%	4%	-4%	-6%
PM Peak Hour	-4%	-8%	-1%	-4%	-4%

Overall, the intersection has seen a decline in traffic growth over the three-year period, except for the eastbound approach which has seen a 2% increase in traffic volumes during the same period. The overall decline in traffic growth can likely be attributed to a redistribution of regional traffic patterns following the completion of the Brian Coburn Boulevard extension to Navan Road during this period. Given the level of development planned outside the study area as well as the numerous small developments within the study area, it is expected that background traffic will increase over time. As such, a 2% background growth rate has been applied to Navan Road and Renaud Road to account for regional traffic growth. This is consistent with the background growth rate used in the TIA prepared by Parsons for the 2983 Navan Road development.

4.2.3 Other Area Development

Adjacent developments within the context area of the proposed development have been identified previously in **Exhibit 5**. **Table 10** summarizes the land use details and expected buildout of these developments. Traffic generation associated with these developments is included in the future background traffic volumes presented in this study. The buildout year for the Eastboro Phase 1B, 2A & 2B development is presently unknown therefore it has been assumed that construction of the development will occur at a linear rate between 2020 and the horizon year of this study.

Table 10 - Adjacent Developments

DEVELOPMENT	DESCRIPTION	EXPECTED BUILDOUT
2983 Navan Road	• 3,400m^2 grocery store • 3,250m^2 general retail • Two 500m^2 sit-down restaurants • 430m^2 fast-food restaurant • Gas bar with a car-wash (10 fueling positions)	2021
Eastboro Phase 1B, 2A & 2B	• 116 single detached dwellings • 66 semi-detached dwellings • 58 freehold townhomes • 400 multiple attached units (approximately)	Unknown

4.3 Demand Rationalization

The purpose of this section is to rationalize future travel demands within the study area to account for potential capacity limitations in the transportation network and its ability to effectively accommodate the additional demand generated by a new development.

4.3.1 Description of Capacity Issues

The TIA for Spring Valley Trails Phase 3 development prepared by IBI Group (August 2017) concluded that the intersection of Renaud Road & Joshua Street / Percifor Way was exceeding its theoretical capacity as an all-way stop-controlled intersection under 2017 traffic conditions. The report recommended that traffic signals be implemented at the intersection to address the capacity issues.

All other intersections within the study area were shown to operate at overall acceptable levels of Service (i.e. LOS ‘D’ or better) in both the Spring Valley Trails Phase 3 TIA and the 2983 Navan Road TIA.

4.3.2 Adjustment to Development Generated Demands

Given the limited planned improvements pedestrian and cycling infrastructure in the vicinity of the proposed development and the uncertainty with regards to the planned Brian Coburn Extension, it is not expected that their respective mode shares will increase significantly within the horizon year of this study. As such, no adjustments have been made to the mode share targets presented previously in **Table 7**.

Existing traffic patterns indicate that approximately half of the traffic generated by the existing phases of the Spring Valley Trails subdivision travel to/from the west via Renaud Road. In recognition of the existing capacity issues at the intersection of Renaud Road & Joshua Street / Percifor Way, just 22% of site-generated traffic has been assigned to this intersection.

4.3.3 Adjustment to Background Network Demands

No adjustments have been made to background network demands. As discussed previously, the preferred alignment of the Brian Coburn Boulevard Extension has not yet been determined and therefore its impact on background network demands is uncertain.

4.4 Traffic Volume Summary

4.4.1 Future Background Traffic Volumes

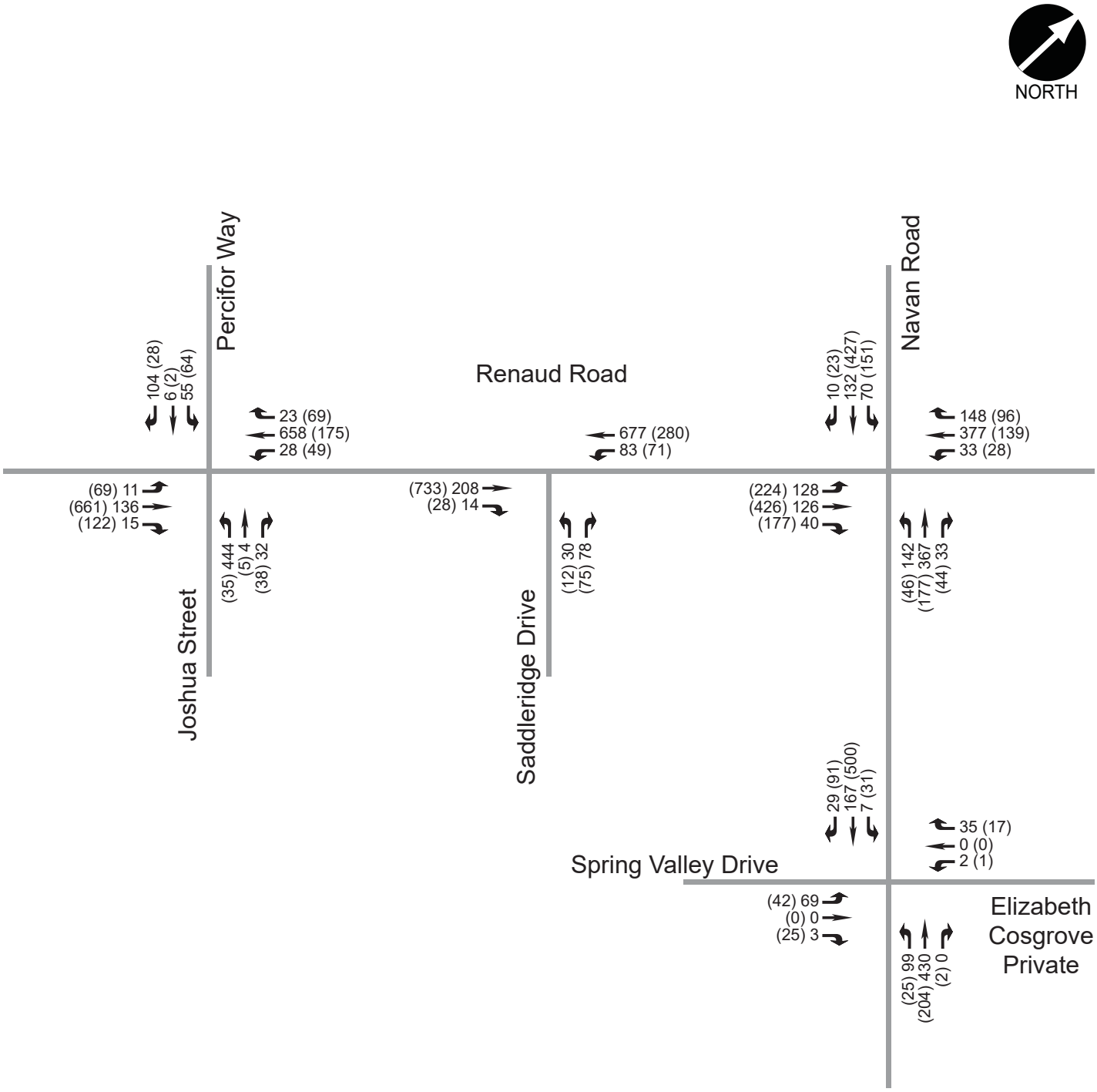
Future background traffic volumes have been established by applying a linear background growth rate to existing (2019) traffic counts, as described in previous sections of this report, and superimposing the total adjacent development traffic volumes derived from ongoing development applications within the study area (i.e. 2983 Navan Road and Eastboro Phase 1B, 2A & 2B).

Exhibit 7 and **Exhibit 8** present the future background traffic volumes anticipated for the 2023 build-out year, as well as the 2028 study horizon, respectively.

4.4.2 Future Total Traffic Volumes

Future total volumes have been derived by combining the site-generated traffic with the future background volumes from **Exhibit 7** and **Exhibit 8**.

Exhibit 9 and **Exhibit 10** present the future total traffic volumes anticipated for 2023 and 2028 analysis years, respectively.



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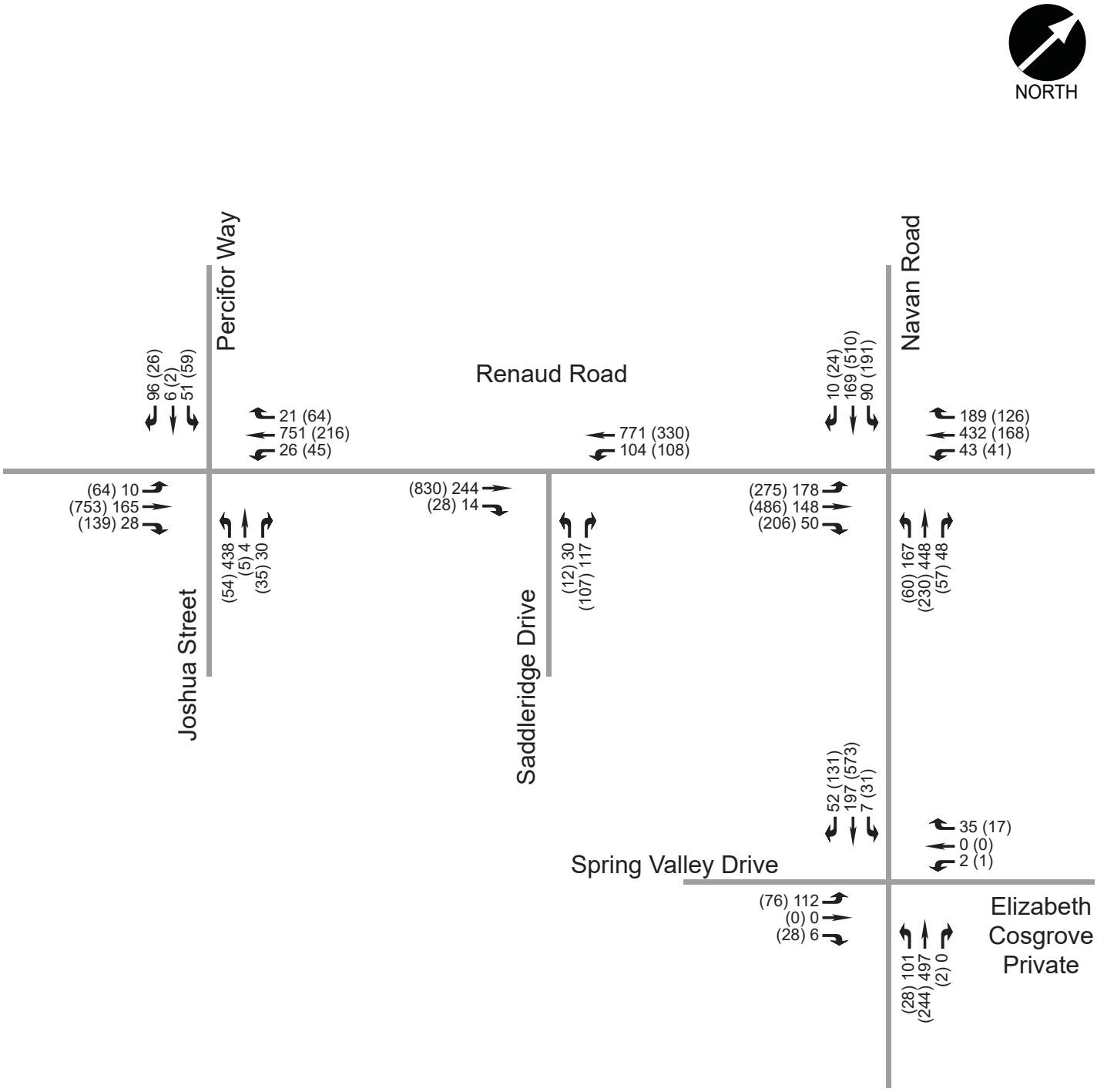
Spring Valley Trails Phase 5 & 6
Transportation Impact Assessment

Exhibit 7:
Future (2023)
Background Traffic

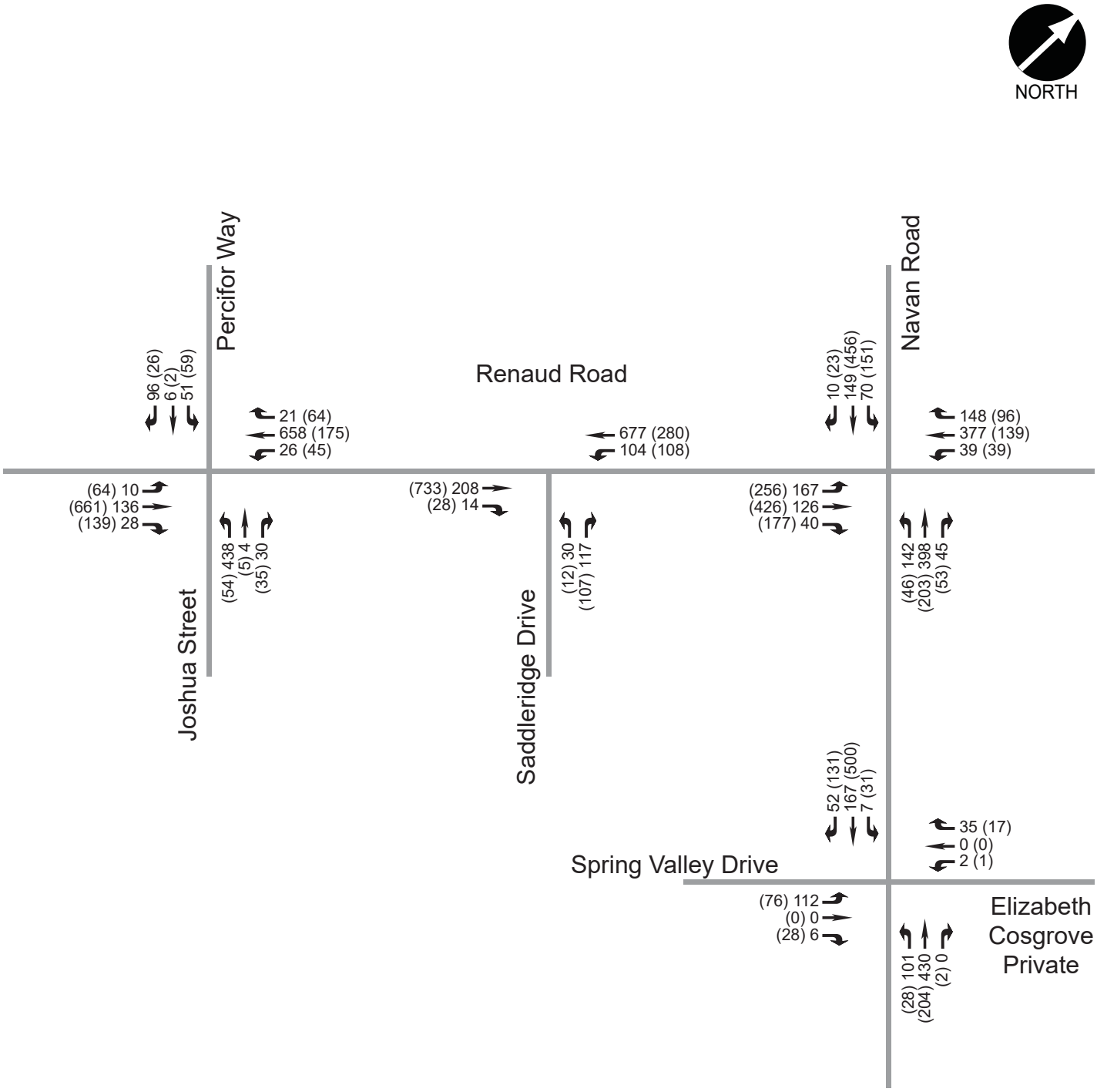
PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.



Spring Valley Trails Phases 5 & 6
Transportation Impact Assessment

Exhibit 10:
Future (2028)
Total Traffic

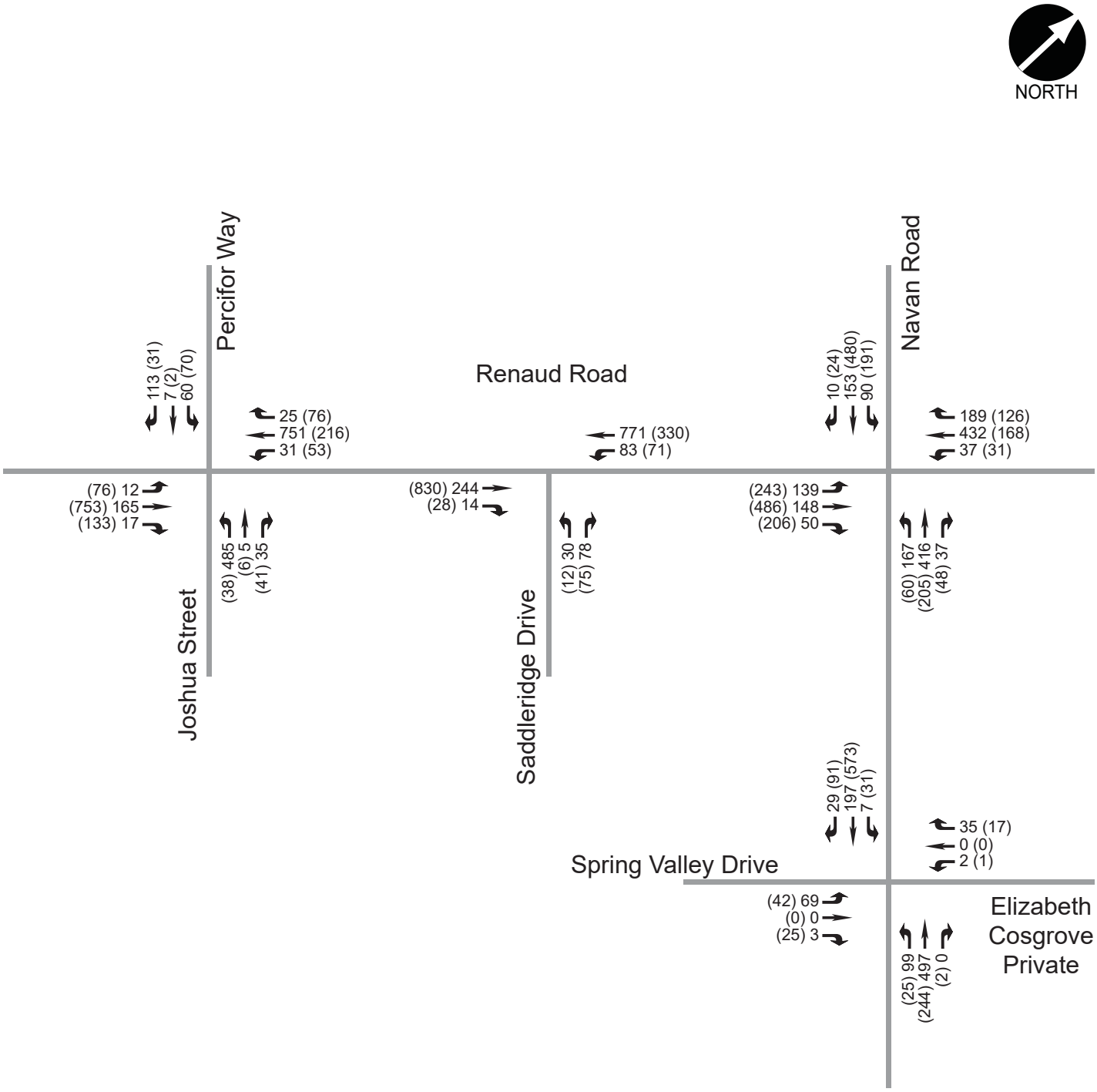
PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.



Spring Valley Trails Phases 5 & 6
Transportation Impact Assessment

Exhibit 9:
Future (2023)
Total Traffic

PROJECT No. 123888
DATE: February 2020
SCALE: N.T.S.


NORTH
Percifor Way
Renaud Road
Navan Road
Joshua Street
Saddleridge Drive
Spring Valley Drive
Elizabeth Cosgrove Private
113 (31)
7 (2)
60 (70)
25 (76)
751 (216)
31 (53)
771 (330)
83 (71)
10 (24)
153 (480)
90 (191)
189 (126)
432 (168)
37 (31)
(76) 12
(753) 165
(133) 17
(38) 485
(6) 5
(41) 35
(830) 244
(28) 14
(12) 30
(75) 78
(243) 139
(486) 148
(206) 50
(60) 167
(205) 416
(48) 37
29 (91)
197 (573)
7 (31)
35 (17)
0 (0)
2 (1)
(42) 69
(0) 0
(25) 3
(25) 99
(244) 497
(2) 0
LEGEND
Permitted Movements
Weekday AM (PM) Peak Hour Vehicular Volume
xxx (xxx)
xxx (xxx)
xxx (xxx)

5 Analysis

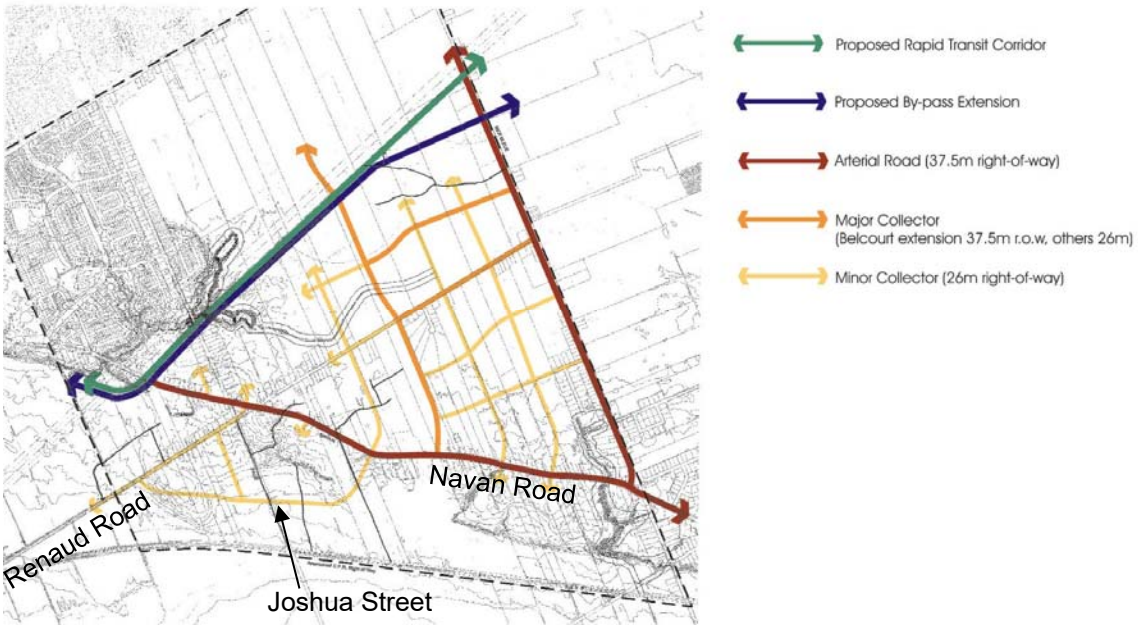
5.1 Development Design

5.1.1 Design for Sustainable Modes

It is anticipated that there will be no changes to transit service within the vicinity of the proposed development until such time that the future extension of Joshua Street and its connection with Navan Road is implemented. In the interim, the proposed development will not meet transit service coverage standards with walking distances expected to range from 750m to 1,100 with respect to existing transit stops. The alignment of Joshua Street through the proposed development has, however, been designed with a long term lens to maintain consistency with the East Urban Community Phase 1 Community Design Plan (CDP), as illustrated in **Figure 5**, and support transit service in the future.

Upon its connection with Navan Road, the extension of Joshua Street will provide an opportunity to significantly increase transit coverage throughout most of the development to meet the City's 400m walking distance threshold. The southern extremity of the proposed development may slightly exceed the 400m threshold, however transit coverage is still expected to be reasonably close to this target, with walking distances of approximately 500m or less.

Figure 5 - East Urban Community Phase 1 CDP Road Network



Source: East Urban Community Phase 1 Community Design Plan, Figure 16

Pedestrian facilities within the proposed development will consist of concrete sidewalks on both sides of Joshua Street and on one side of some of the local roads, as well as some strategic mid-block pedestrian pathways.

The TDM-Supportive Development Design and Infrastructure Checklist is provided in **Appendix G**. This checklist identifies anticipated measures that are being considered in association with the proposed development to offset the vehicular impact on the adjacent road network.

5.1.2 Circulation and Access

Not Applicable: The Circulation and Access element is exempt from this TIA, as defined in the study scope. This element is not required for Draft Plan of Subdivision applications.

5.1.3 New Street Networks

The road network within the proposed development is organized in a modified grid pattern with relatively short road segments and strategic mid-block pathway connections to create a more porous, walkable community. The overall road network design will promote driver behaviour that is consistent with the roadway classifications.

5.2 Parking

Not Applicable: The Parking Supply and Spillover Parking elements are exempt from this TIA, as previously defined in the Scoping section. These elements are not required for a Draft Plan of Subdivision application.

5.3 Boundary Streets

The proposed development is accessed by two boundary streets: Navan Road and Renaud Road. Neither road currently has a Complete Streets design, therefore segment Multi-Modal Level of Service (MMLOS) has been provided below.

5.3.1 Mobility

The MMLOS targets for each road vary based on a variety of factors such as the Official Plan designation / policy area the road is in, its road classification, cycling network classification, transit network classification and whether the road is on a truck route.

Segment-based MMLOS results for Navan Road and Renaud Road are provided in **Table 11** below.

Details of the MMLOS analysis are provided in **Appendix H**.

Table 11 - Segment MMLOS

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
SEGMENTS				
Renaud Road – Joshua Street / Percifor Way to Saddleridge Drive	E (Target: C)	F (Target: B)	D (Target: D)	B (Target: N/A[1])
Renaud Road – Saddleridge Drive to Navan Road	E (Target: C)	F (Target: B)	D (Target: D)	B (Target: N/A[1])
Navan Road – Renaud Road to Spring Valley Drive	F (Target: C)	F (Target: C)	D (Target: D)	C (Target: D)

Notes:

[1] Collector roads in the General Urban Area that are not on a truck route do not have a TkLOS target.

The results of the Segment MMLOS indicate that none of the boundary street segments meet their respective Pedestrian Level of Service (PLOS) or Bicycle Level of Service (BLOS) targets.

In order to meet these targets, the following modifications have been identified that could improve conditions along each boundary street:

- **Renaud Road** – Replacing the existing substandard sidewalks with 2.0m wide sidewalks and 2.0m wide boulevards (PLOS: C), as well as a physically separated bikeway (BLOS: A) on both sides of the roadway would be required to meet the PLOS and BLOS targets. A section of on-road bike lanes approximately 260 metres in length presently exists on both sides of Renaud Road. These cycling facilities, however, are isolated and do not cover the entire length of Renaud through the study area. As such, the BLOS is dictated by the worst performing section within the segment (i.e. the section without bike lanes), resulting in a BLOS of 'F'.
- **Navan Road** – Implementing 2.0m wide sidewalks with 2.0m wide boulevards (PLOS: C), as well as, a physically separated bikeway (BLOS: A) on both sides of the roadway would be required in order to meet the PLOS and BLOS targets.

It should be noted that these deficiencies in the segment MMLOS along the boundary streets represent existing conditions and will not be exacerbated by the proposed development. The remediation measures described above would improve mobility and comfort for all transportation modes and should be considered by the City but are not required to accommodate the proposed development.

5.3.2 Road Safety

A summary of all reported collisions within the study period over the past five years was presented in the Section 3.2.4. The City requires a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. Based on this criterion, the following locations warrant further analysis:

- Navan Road & Renaud Road
- Renaud Road & Joshua Street/ Percifor Way
- Navan Road between Renaud Road and Mer Bleue Road

Navan Road & Renaud Road

Overall, there were five angle collisions, six rear-end collisions and three single motor vehicle collisions between 2014 and 2018. The majority of rear end collisions occurred during either the weekday morning or afternoon peak periods, with no other significant collision patterns observed for the other collision types. In addition, a pedestrian collision involving a westbound left-turning vehicle was reported during the weekday morning peak hour under wet conditions.

Renaud Road & Joshua Street/ Percifor Way

Overall, there was one angle collision, five rear-end collisions and one single motor vehicle collision at this intersection between 2014 and 2018. All rear-end collisions involved eastbound and westbound vehicles. The single motor vehicle collision was a pedestrian collision involving a northbound vehicle that occurred under nighttime conditions.

Navan Road between Renaud Road and Mer Bleue Road

The collision data indicates that the majority of collisions along this segment of Navan Road are single motor vehicle collisions. Four of these collisions involved drivers running off the road or into the ditch, one involved a collision with a wild animal, and one involved a collision with an unattended vehicle. It is expected that as development progresses in the area and Navan Road becomes urbanized that these types of collisions will become less frequent. One pedestrian collision was recorded along this segment of Navan Road between 2014 and 2018 which involved

an eastbound vehicle colliding with a pedestrian. This collision occurred in the morning under wet conditions.

Overall, the results of the collision analysis indicate that there are no significant collisions patterns at any of the three locations analysed. As such, no mitigation measures are recommended for any of these locations.

5.4 Access Intersections

5.4.1 Location and Design of Access

The proposed development will utilize three existing access intersections:

- **Renaud Road & Joshua Street / Percifor Way** – A four-legged, unsignalized intersection with all-way stop control, located approximately 780m west of the Navan Road & Renaud Road intersection.
- **Renaud Road & Saddleridge Drive** – A three-legged intersection with stop control on Saddleridge Drive and free-flow along Renaud Road. This intersection is located approximately 275m west of the Navan & Renaud intersection.
- **Navan Road & Spring Valley Drive/ Elizabeth Cosgrove Private** – A four-legged intersection with stop control on the northbound and southbound approaches and free-flow along Navan Road. The intersection is approximately 250m east of the Navan Road & Renaud Road intersection.

The intersection configuration of these intersections is illustrated in **Exhibit 3** in the Scoping section of this report.

5.4.2 Intersection Control

5.4.2.1 Traffic Signal Warrants

Based on the projected traffic volumes presented in this study, the Joshua/ Percifor Way & Renaud intersection is expected to warrant traffic signals under Future (2028) Total Traffic conditions. Under Future (2028) Background Traffic conditions, the intersection is on the verge of triggering traffic signals. Sensitivity analysis indicates that an additional five vehicles on one of the side street movements would be sufficient to trigger the warrant. As this additional analysis is within the margin of error for traffic count data, this indicates the need for traffic signals is primarily a consequence of background traffic and not the proposed development.

The results of the traffic signal warrants are provided in **Appendix I**.

5.4.2.2 Roundabout Analysis

As per the City's Roundabout Implementation Policy, intersections that satisfy any of the following criteria should be screened utilizing the Roundabout Initial Feasibility Screening Tool:

- At any new City intersection
- Where traffic signals are warranted
- At intersections where capacity or safety problems are being experienced

As discussed previously, traffic signals are warranted at the intersection of Renaud Road & Joshua Street / Percifor Way, based on the Future (2028) Total Traffic volume projections. The Roundabout Feasibility Screening Tool was, therefore, utilized to assess the feasibility of implementing a roundabout at this intersection.

The results of the Roundabout Feasibility Screening Tool indicate that a roundabout may be problematic due to potential property constraints at this location. The results of the Roundabout Feasibility Screening Tool are provided in **Appendix I**.

5.4.3 Intersection Design (MMLOS)

There is currently no methodology for evaluating Multi-Modal Level of Service (MMLOS) at unsignalized intersections. All three site access intersections are currently unsignalized, therefore no MMLOS analysis is provided for these intersections under existing conditions. The intersection of Renaud & Joshua / Percifor Way may require signalization, as indicated by the intersection capacity analysis presented in subsequent sections of this report. MMLOS analysis was, therefore, limited to the intersection of Renaud & Joshua / Percifor Way under future conditions.

Table 12 - Intersection MMLOS - Future Conditions

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
INTERSECTIONS				
Renaud & Joshua/ Percifor Way	E (Target: C)	F (Target: B)	C (Target: D)	E (Target: E)

5.4.3.1 Summary of Potential Improvements

Based on the MMLOS results outlined in **Table 22**, the following measures have been identified that could improve conditions for each travel mode at the intersection of Renaud & Joshua/ Percifor Way:

Pedestrians

The PLOS at intersections is based on several factors including the number of traffic lanes that pedestrians must cross, corner radii and whether the crossing allows for permissive or protective right or left turns, among others. The City of Ottawa minimum target for PLOS is 'C'.

In order to achieve a PLOS of 'C', the north-south crossing would require a pedestrian leading interval, a median, and zebra stripe high-visibility crosswalk markings. These additional measures would be required to offset the negative impact the number of lanes on this approach have to the PLOS.

Cyclists

The BLOS at intersections is dependent on several factors: the number of lanes that the cyclist is required to cross to make a left-turn, the presence of a dedicated right-turn lane on the approach and the operating speed of each approach. The City target for BLOS is 'C'.

In order to achieve a BLOS of 'C', pocket bike lanes would be required on both the southbound and eastbound approach and two-stage left-turn bike boxes would be required on all approaches. A 'protected intersection' design would also achieve the BLOS target.

Transit

Intersection TLOS is based on the average signal delay experienced by transit vehicles on each approach. The City Target TLOS is 'D'.

The results of the analysis indicate that the average signal delay at the intersection complies with the TLOS target.

Truck

The Truck LOS (TKLOS) is based on the right-turn radii, as well as the number of receiving lanes for vehicles making a right-turn from the traffic lane being analyzed. The City of Ottawa target for TKLOS is 'E'.

The results of the analysis indicate that the intersection will meet its TkLOS targets, provided the effective right-turn turning radius on all approaches is greater than or equal to 10m. As this junction is an arterial-collector intersection, this minimum radius is expected to be met.

The recommended measures listed above are intended only as suggestions to the City on how the MMLOS within the study area could be improved and do not identify measures to be implemented as a direct consequence of this development. The remediation measures described above would improve mobility and comfort for all transportation modes but are not required to accommodate the proposed development.

5.5 Transportation Demand Management (TDM)

The City of Ottawa is committed to implementing Transportation Demand Management (TDM) measures on a City-wide basis in an effort to reduce automobile dependence, particularly during the weekday peak travel periods.

5.5.1 Context for TDM

As described in the Forecasting section of this report, the mode share targets used to estimate future development traffic were based on the 2011 TRANS Origin-Destination (O-D) Survey peak period mode shares for the Orleans Traffic Assessment Zone (TAZ).

The proposed development aligns with the objectives of the Building Better and Smarter Suburbs (BBSS) policy document, which promotes sustainable and compact growth. More than 95% of dwelling units are either street townhomes or condominiums, an appropriate level of density given the suburban context of this development. It should be noted as well that this development is not located within close proximity to either a Transit-Oriented Development (TOD) zone or Design Priority Area (DPA).

5.5.2 Need and Opportunity

To promote sustainable transportation for local trips, the internal road network of the proposed development has been configured with short street segments and frequent intersections to provide direct connections to the internal collector roads which will be capable of supporting transit service. Sidewalks and appropriate pedestrian connections will be provided throughout the subdivision to facilitate access to local amenities, recreational pathways and the adjacent road and transit network.

5.5.3 TDM Program

The proposed development conforms to the City's TDM principles by providing convenient and direct connections to adjacent pedestrian, cycling and transit facilities where available.

The City of Ottawa's TDM Measures Checklist was completed for the proposed development and is provided in **Appendix G**.

5.6 Neighbourhood Traffic Management

5.6.1 Adjacent Neighbourhoods

The proposed development will rely on the following collector and local roads for access to the regional road network: Renaud Road, Joshua Street, Saddleridge Drive and Spring Valley Drive. As collector roads, the liveability threshold for Renaud Road, Joshua Street and Saddleridge Drive is 300 vehicles per hour, as prescribed in the Transportation Impact Assessment Guidelines. Although technically a classified as a local road in the TMP, Spring Valley Drive effectively functions a collector, therefore the traffic volumes projections along this road are also compared against the liveability threshold for a collector road as well.

Under existing conditions, traffic volumes on Renaud Road are well in excess of the liveability threshold for a collector road. It is anticipated that once Brian Coburn Boulevard is widened to a four-lane cross-section and connected directly to the Blackburn Hamlet Bypass, as per the TMP's 2031 'Affordable Network', that this will offer a more direct, parallel for regional commuter trips. This is expected to result in a significant diversion of commuter trips to Brian Coburn Boulevard that will help to mitigate the potential for neighbourhood traffic management issues along Renaud Road.

Based on traffic count data, Joshua Street is presently exceeding its liveability threshold approaching Renaud Road. It is not uncommon for traffic volumes on a segment of road providing direct access to the broader transportation network to exceed their targeted thresholds, as these segments experience the cumulative traffic impact of local roads within the subdivision. With the dispersion of traffic throughout the Spring Valley subdivision, volumes decrease significantly to well within their liveability thresholds along the remainder of Joshua Street, therefore traffic management measures are not required.

As mentioned previously, Spring Valley Drive effectively operates as a collector road. The roadway presently consists of an 11-metre wide pavement with a 26-metre right-of-way and 2.0-metre concrete sidewalks on both sides. All of these cross-section features are typically associated with collector roads, and are indicative of a road that can comfortably and safely accommodate 300 vehicles per hour. A comparison of the 2028 total two-way traffic volumes against the collector road liveability threshold indicates that this threshold is not likely to be exceeded during the weekday morning and afternoon peak hours within the timeframe of the study.

Two-way traffic volumes along Saddleridge Drive are anticipated to remain well within the collector road threshold beyond the 2028 study horizon year, based on the traffic volumes projections derived for this study.

Traffic management and traffic calming measures have previously been implemented on Renaud Road and on Joshua Street between Renaud Road and Lucinda Crescent / Keith Crescent, as described in the Scoping section of this TIA. Based on the neighbourhood traffic management review presented above, no additional traffic calming measures are required to accommodate site-generated traffic volumes.

5.7 Transit

5.7.1 Route Capacity

The estimated Future (2028) Total transit passenger demand within the study area was provided in Section 4.1.2.5. The results have been summarized in **Table 13**.

Table 13 - 2028 Development Generated Transit Demand

PERIOD	PEAK PERIOD DEMAND	
	IN	OUT
AM	16	30
PM	29	24

As indicated in **Table 13** above, the proposed development is expected to contribute approximately 46 and 53 two-way transit trips during the weekday morning and afternoon peak hours, respectively. This represents a moderate increase in transit demand along existing transit routes. Given that a typical OC Transpo bus can accommodate 100 passengers and that there are multiple transit routes that serve the study area during weekday peak hours, it is expected that sufficient capacity will be provided within the study area to accommodate the transit ridership associated with the proposed development.

5.7.1 Transit Priority Measures

The Transportation Master Plan 2031 'Affordable Network' and 'Network Concept' do not identify the need for any transit priority measures within the study area.

5.8 Review of Network Concept

As discussed in Section 3.3.3 Network Concept Screenline, the following screenlines are applicable to this study: SL45 – Bilberry Creek, SL46 – Frank Kenny and SL47 - Innes. A summary comparison of the City 2031 Network Concept demand and capacity has been provided in **Table 14**.

Table 14 – 2031 Network Concept

SCREENLINE	AM 2031 PREFERRED INBOUND		
	DEMAND	CAPACITY	V/C RATIO
SL45 – Bilberry Creek	7,681	11,600	0.66
SL46 – Frank Kenny	3,880	9,800	0.40
SL47 - Innes	4,278	12,200	0.35

Note - Table results from Road Network Development Report: Final Report (December 2013)

As shown above, significant excess capacity is projected across all three nearby screenlines and as a result, network capacity deficiencies are not expected with the addition of site-generated traffic.

5.9 Intersection Design

The following sections summarize the methodology and results of the Multi-Modal Level of Service (MMLOS) analysis conducted within the study area.

5.9.1 Intersection Control

The results of the intersection control warrants discussed below are provided in **Appendix H**.

5.9.1.1 Traffic Signal Warrants

Traffic signal warrants for site access intersections were discussed previously in Section 5.4. All other study area intersections are signalized, therefore no other traffic signal warrants were completed.

5.9.1.2 Roundabout Analysis

Based on the intersection capacity analysis for the intersection of Renaud & Navan presented in subsequent sections of this report, it is not necessary to screen the site for a roundabout. The City has already indicated that this location is monitored on a yearly basis and will be upgraded to a roundabout once capacity issues are identified. The current configuration is expected to operate at an acceptable level of service (i.e. LOS 'D') within the timeframe of this study, therefore no roundabout scenarios were analysed for the intersection of Navan & Renaud as part of this TIA.

Roundabout analysis for site access intersections was discussed previously in Section 5.4.

5.9.2 Intersection Analysis Criteria (Automobile)

The following section outlines the City of Ottawa's methodology for determining motor vehicle Level of Service (LOS) at signalized and unsignalized intersections.

5.9.2.1 Signalized Intersections

In qualitative terms, the Level of Service (LOS) defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS are given letter designations from 'A' to 'F'. LOS 'A' represents the best operating conditions and LOS 'E' represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS 'F' indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are as follows:

Table 15 - LOS Criteria for Signalized Intersections

LOS	VOLUME TO CAPACITY RATIO (v/c)
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The Level of Service calculation is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. The analysis existing conditions utilized a Peak Hour Factor (PHF) of 0.90, while future conditions considers optimized signal timing plans and use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

5.9.2.2 Unsignalized Intersections

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 16**.

Table 16 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic scenarios, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service 'E' represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service 'D' is considered to represent an acceptable operating condition. Level of Service 'E' is considered an acceptable operating condition for planning purposes for intersections located within Ottawa's Urban Core the downtown and its vicinity). Level of Service 'F' indicates that the movement is operating beyond its design capacity.

5.9.3 Intersection Capacity Analysis

Following the established intersection capacity analysis criteria described above, the existing and future conditions are analysed using the weekday peak hour traffic volumes derived in this study.

The following section presents the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the weekday morning and afternoon peak hour periods.

The Synchro output files have been provided in **Appendix J**.

5.9.3.1 Existing Traffic

An intersection capacity analysis has been undertaken using the Existing (2019) Traffic volumes presented previously in **Exhibit 4**.

The results of the intersection capacity analysis are summarized in **Table 17** below.

Table 17 - Intersection Capacity Analysis: Existing (2019) Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Joshua/ Percifor Way & Renaud	Unsignalized [1]	**F (199.4s)**	**WBTR (199.4s)**	**F (101.9s)**	**EBTR (101.9s)**
	> Signalized	D (0.86)	WBTR (0.87)	B (0.67)	EBTR (0.76)
Saddleridge & Renaud	Unsignalized [2]	C (22.9s)	NBL (22.9s)	C (23.8s)	NBL (23.8s)
Navan & Renaud	Signalized	B (0.65)	WBTR (0.78)	A (0.56)	SBTR (0.71)
Navan & Spring Valley/ Elizabeth Cosgrove Private	Unsignalized [2]	D (26.0s)	EBTRL (26.0s)	C (17.9s)	EBTRL (17.9s)

Notes:

[1] AWSC – All-way Stop Controlled Intersection

[2] TWSC – Two-way Stop Controlled Intersection

The results of the analysis indicate that the study area intersections are operating at acceptable Levels of Service (i.e. LOS 'D' or better) under existing traffic conditions during both the weekday morning and afternoon peak hours, with the exception of Joshua/ Percifor Way & Renaud. This intersection is presently operating at a LOS 'F' as a result of heavy northbound left-turn and westbound through movements during the morning peak hour, as well as a heavy eastbound through movement during the afternoon peak hour. The introduction of traffic signals significantly improves weekday morning and afternoon peak hour Levels of Service to 'D' and 'B', respectively, therefore this modification is carried forward for all future analysis years.

5.9.3.2 Future (2023) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2023) Background Traffic volumes presented previously in **Exhibit 7**.

The results of the intersection capacity analysis are summarized in **Table 18** below.

Table 18 - Intersection Capacity Analysis: 2023 Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Joshua/ Percifor Way & Renaud	Signalized	D (0.83)	WBTR (0.84)	B (0.67)	EBTR (0.76)
Saddleridge & Renaud	Unsignalized [1]	C (22.6s)	NBL (22.6s)	C (24.5s)	NBL (24.5s)
Navan & Renaud	Signalized	B (0.67)	WBTR (0.77)	B (0.62)	SBTR (0.75)
Navan & Spring Valley/ Elizabeth Cosgrove Private	Unsignalized [1]	C (24.9s)	EBTRL (24.9s)	C (18.3s)	EBTRL (18.3s)

Notes:

[1] TWSC – Two-way Stop Controlled Intersection

The results of the intersection capacity analysis presented in **Table 18** above indicate with the recommended signalization of the Joshua/ Percifor Way & Renaud intersection carried forward from the Existing analysis year, all study area intersections are expected to operate at acceptable levels of service (i.e. LOS 'D' or better) under Future (2023) Background Traffic conditions.

5.9.3.3 Future (2028) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2028) Background Traffic volumes presented previously in **Exhibit 8**.

The results of the intersection capacity analysis are summarized in **Table 19** below.

Table 19 - Intersection Capacity Analysis: 2028 Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Joshua/ Percifor Way & Renaud	Signalized	D (0.88)	WBTR (0.89)	C (0.71)	EBTR (0.79)
Saddleridge & Renaud	Unsignalized [1]	D (26.8s)	NBL (26.8s)	D (29.3s)	NBL (29.3s)
Navan & Renaud	Signalized	C (0.78)	WBTR (0.87)	B (0.70)	SBTR (0.78)
Navan & Spring Valley/ Elizabeth Cosgrove Private	Unsignalized [1]	D (30.1s)	EBTRL (30.1s)	C (21.4s)	EBTRL (21.4s)

Notes:

[1] TWSC – Two-way Stop Controlled Intersection

The results of the intersection capacity analysis presented in **Table 19** above indicate that all four study are intersections are expected to operate at acceptable levels of service (i.e. LOS 'D' or better) under Future (2028) Background Traffic conditions.

Despite being operationally required under Existing conditions, the traffic signal warrants at the intersection of Joshua/ Percifor Way & Renaud are not met until the horizon year of the study. As discussed previously, traffic signals are warranted at Joshua/ Percifor Way & Renaud under Future (2028) Total Traffic conditions and are on the verge of being warranted under Future (2028) Background Traffic conditions, with a nominal increase of 5 vehicles on any of the sidestreet approaches sufficient to trigger the warrant.

5.9.3.4 Future (2023) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2023) Total Traffic volumes presented previously in **Exhibit 9**.

The results of the intersection capacity analysis are summarized in **Table 20** below.

Table 20 - Intersection Capacity Analysis: 2023 Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Joshua/ Percifor Way & Renaud	Signalized	D (0.85)	WBTR (0.86)	B (0.68)	EBTR (0.77)
Saddleridge & Renaud	Unsignalized [1]	C (24.2s)	NBL (24.2s)	D (27.8s)	NBL (27.8s)
Navan & Renaud	Signalized	C (0.72)	WBTR (0.78)	B (0.66)	SBTR (0.76)
Navan & Spring Valley/ Elizabeth Cosgrove Private	Unsignalized [1]	D (31.6s)	EBTRL (31.6s)	C (22.3s)	EBTRL (22.3s)

Notes:

[1] TWSC – Two-way Stop Controlled Intersection

Based on the intersection capacity analysis shown in **Table 20** above, all study area intersections are anticipated to operate at an acceptable levels of service (i.e. LOS 'D' or better) under Future (2023) Total Traffic conditions.

5.9.3.5 Future (2028) Total Traffic

An intersection capacity analysis has been undertaken using the Future (2023) Total Traffic volumes presented previously in **Exhibit 10**.

The results of the intersection capacity analysis are summarized in **Table 21** below.

Table 21 - Intersection Capacity Analysis: 2028 Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Joshua/ Percifor Way & Renaud	Signalized	D (0.89)	WBTR (0.90)	C (0.73)	EBTR (0.81)
Saddleridge & Renaud	Unsignalized [1]	D (29.0s)	NBL (29.0s)	D (34.0s)	NBL (34.0s)
Navan & Renaud	Signalized	D (0.83)	WBTR (0.90)	C (0.74)	SBTR (0.80)
Navan & Spring Valley/ Elizabeth Cosgrove Private	Unsignalized [1]	**E (41.1s)**	**EBTRL (41.1s)**	D (27.4s)	EBTRL (27.4s)

Notes:
[1] TWSC – Two-way Stop Controlled Intersection

The results of the intersection capacity analysis presented in **Table 21** above indicate that the intersection of Navan & Spring Valley/ Elizabeth Cosgrove Private is expected to operate slightly above acceptable conditions (i.e. LOS 'E') under Future (2028) Total Traffic conditions during the weekday morning peak hour. Sensitivity analysis conducted on the critical northbound through and eastbound left-turn movements indicates that reductions of just 30 vehicles and 10 vehicles, respectively, would allow the intersection to operate at LOS 'D'. This is considered within a reasonable range of fluctuation, therefore no changes to traffic control are recommended based on these intersection capacity analysis results.

As previously mentioned, despite being operationally required under Existing conditions, the traffic signal warrants at the intersection of Joshua/ Percifor Way & Renaud are not met until the horizon year of the study. Traffic signals are effectively warranted at Joshua/ Percifor Way & Renaud under Future (2028) Background Traffic conditions.

All other study area intersections are expected to operate at acceptable levels of service (i.e. LOS 'D' or better) at the 2028 study horizon year under total traffic conditions.

5.9.4 Intersection Design (MMLOS)

Analysis of existing and future conditions for each mode has been conducted based on the methodology prescribed in the City of Ottawa Multi-Modal Level of Service Guidelines. The Level of Service for each mode has been calculated for each intersection where signals exist or are anticipated. MMLOS analysis for site access intersections was discussed previously in Section 5.4.

The intersection MMLOS results of the intersection of Navan & Renaud under existing and future conditions is summarized in **Table 22** below.

Detailed intersection MMLOS analysis results for future conditions are provided **Appendix H**.

Table 22 - Intersection MMLOS – Existing & Future Conditions

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
INTERSECTIONS				
Navan & Renaud	E (Target: C)	F (Target: B)	D (Target: D)	F (Target: E)

Pedestrians

The PLOS at intersections is based on several factors including the number of traffic lanes that pedestrians must cross, corner radii, and whether the crossing allows for permissive or protective right or left turns, among others. The City of Ottawa minimum target for PLOS is 'C'.

The intersection is shown to operate with a PLOS 'E', exceeding the City's target due to pedestrian delays experienced at each approach. Increasing minimum pedestrian walk time or decreasing the cycle length may help reduce the pedestrian delay, however this may result in negative impacts to vehicle Level of Service.

Ultimately, when the intersection of Navan & Renaud is converted to a roundabout, it is anticipated that pedestrian convenience, comfort and safety will be significantly improved, with delay times more in line with the City's targets.

Cyclists

The BLOS at intersections is dependent on several factors: the number of lanes that the cyclist is required to cross to make a left-turn, the presence of a dedicated right-turn lane on the approach and the operating speed of each approach. The City target for BLOS is 'B'.

In order to achieve a BLOS of 'C' or better, two-stage left-turn bike boxes would be required on all four approaches and restrictions regarding right-turns on red phases would be required to be implemented.

The City's preliminary design for the roundabout configuration at this intersection indicates that cycling facilities such as multi-use pathways and cross-rides are planned to be fully-integrated into the intersection design, which will provide cyclists a safer alternative for making left turn movements.

Transit

TLOS is based on the average signal delay experienced by transit vehicles at each intersection. The City Target TLOS is 'D'.

The results of the analysis indicate that the average signal delay at the intersection complies with the TLOS target. It should be noted that delays were only considered on approaches or movements with existing transit service.

Trucks

The Truck LOS (TKLOS) is based on the right-turn radii, as well as the number of receiving lanes for vehicles making a right-turn from the traffic lane being analysed. The City of Ottawa target for TKLOS is 'E'.

The results of the analysis indicate that the intersection will operate with a TkLOS 'F' as a result of the effective turning radii of less than 10m, which would impact southbound right-turn traffic. Due to the skewed configuration of this intersection that results in a sharp southbound right-turn, the majority of larger vehicles such as trucks and OC Transpo buses bypass the intersection altogether and opt to utilize Pagé Road instead.

Given that Renaud is not a truck route, however, it is expected that this substandard TkLOS is acceptable in this context.

The introduction of a roundabout at this intersection is expected to result in its realignment such that the approaches generally intersect at right angles, which would help to better accommodate heavy vehicles on all right-turning movements.

The recommended measures listed above are intended only as suggestions to the City on how MMLOS within the study area could be improved and do not identify measures to be implemented as a direct consequence of this development. The remediation measures described above would improve mobility and comfort for all transportation modes but are not required to accommodate the proposed development.

5.10 Geometric Review

The following section provides a review of all geometric requirements for the study area intersections.

5.10.1 Sight Distance and Corner Clearances

All three site access intersections are existing and are provided along segments of Renaud and Navan with no significant horizontal or vertical constraints. Sight distances and corner clearances are therefore not expected to be a concern at either location.

5.10.2 Auxiliary Lane Analysis

Auxiliary turning lane requirements for all intersections within the study area are described as below. The minimum storage requirements do not include deceleration or taper.

5.10.2.1 Auxiliary Left-Turn Lane Requirements (Unsignalized Intersections)

Left-turn lane warrants were completed under Future (2028) Total Traffic conditions for the following intersections:

- Renaud Road & Saddleridge Drive
- Navan Road & Spring Valley Drive/ Elizabeth Cosgrove Private

The operating speeds on Renaud and Navan were assumed to be 60 km/h and 70km/h, respectively, representing 10 km/h above the posted speed limits for each road.

The results of the left-turn lane warrant analysis are summarised below in **Table 23**. Relevant extracts from the MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads have been provided in **Appendix K**.

Table 23 - Auxiliary Left-Turn Storage Analysis at Unsignalized Intersections

	APPROACH	VOLUME ADVANCING (V_A)	VOLUME OPPOSING (V_O)	% LEFT TURN (V_A)	EXISTING PARALLEL LANE LENGTH (M)	STORAGE DEFICIENCY (M)
AM Peak Hour						
Renaud & Saddleridge	WB	875	258	12%	80	Existing Storage Adequate
Navan & Spring Valley/ Elizabeth Cosgrove Private	NB	598	256	17%	-	25m
PM Peak Hour						
Renaud & Saddleridge	WB	439	859	25%	80	Existing Storage Adequate
Navan & Spring Valley/ Elizabeth Cosgrove Private	NB	275	735	10%	-	15m

As per the left-turn lane warrant analyses presented above, the westbound approach at the intersection of Renaud & Saddleridge requires at least 40m of storage to accommodate Future (2028) Total Traffic. The existing westbound left-turn at the intersection of Renaud & Saddleridge has 80m of parallel lane, therefore sufficient storage exists to accommodate background traffic demand as well as demand generated by the proposed development.

Based on future traffic volume projections, a minimum storage length of 25m is warranted for the northbound left-turn movement under Future (2028) Background and Total Traffic conditions at the intersection of Navan & Spring Valley/ Elizabeth Cosgrove Private. Observations of existing traffic volumes indicate that the high left-turning volume during the weekday morning peak hour may be attributed to cut-through traffic as a means of avoiding delays at the Navan/ Renaud intersection. Future improvements to the Navan/ Renaud intersection should resolve this issue. Furthermore, as the proposed development is expected to contribute nominal volumes to the northbound left-turn movement, an auxiliary lane is not recommended.

5.10.2.2 Auxiliary Left-Turn Requirements (Signalized Intersections)

A review of auxiliary left-turn lane storage requirements was completed at all signalized intersections within the study area under Future (2028) Total Traffic conditions. The review compared the projected 95th percentile queue lengths from the Synchro analysis operational results, and the standard queue length calculation based on the following equation:

$$Storage\ Length = \frac{NL}{C} \times 1.5$$

Where:
N = number of vehicles per hour
L = Length occupied by a vehicle in the queue = 7 m
C = number of traffic signal cycles per hour = 3600s / cycle length

In accordance with Appendix C of the TIA Guidelines, a 45%/55% distribution of traffic between lanes was assumed for double left-turn lanes.

The results of the auxiliary left-turn lane analysis are summarized in **Table 24**.

Table 24 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (M)	CALCULATED QUEUE LENGTH (M)	EXISTING PARALLEL LANE LENGTH (M)	STORAGE DEFICIENCY (M)
Joshua/ Percifor Way & Renaud	NB	#150	165	25	- [1]
	SB	20	25	25	Existing Storage Adequate
	EB	10	25	55	Existing Storage Adequate
	WB	10	20	55	Existing Storage Adequate
Navan & Renaud	NB	45	65	65	Existing Storage Adequate
	SB	50	75	20	- [1]
	EB	#75	105	105	Existing Storage Adequate
	WB	20	20	30	Existing Storage Adequate

Notes:

Recommended storage lengths do not consider deceleration and taper lengths. Values rounded to nearest 5m.

- Synchro extrapolated queue lengths at congested intersections. From Synchro 10 User Guide, "In practice, 95th percentile queue lengths will rarely be exceeded and the queues shown with the # footnote are acceptable in the design of storage bays."

[1] - Queue length analysis indicates that the queuing may occasionally exceed existing parallel lane lengths. It is recommended that signal optimization be conducted to mitigate any potential for queuing spillback.

As indicated in **Table 24** above, it is possible that queue lengths at the intersection of Joshua/ Percifor Way & Renaud will occasionally exceed the 25m of parallel lane on the northbound approach during the weekday morning peak hour. Synchro analysis indicates that signal optimization to allocate more green time to the critical movement will help mitigate queue spillback within the Spring Valley subdivision, while maintaining acceptable levels of service. It should be noted that the potential for queue spillback on the northbound left-turn movement is an existing issue that is not being exacerbated by the inclusion of site-generated traffic and does not pose a risk to traffic operations along Renaud Road. Further, the widening of Brian Coburn Boulevard to four lanes should help to alleviate congestion along Renaud Road and, as a consequence, the potential for queuing on the northbound approach. As such, no geometric modifications are required on the northbound approach.

The results of the analysis indicate that existing left-turn parallel lanes at the intersection of Navan & Renaud are shown to have sufficient storage to accommodate projected queue lengths from both the Synchro analysis and the queue length calculation, with the exception of the southbound left-turn lane. The proposed development, however, is not expected to contribute traffic volumes to the southbound left-turn movement, therefore any potential operational issues will not be exacerbated by site-generated traffic. It is recommended that traffic operations on the southbound approach be considered as part of the City's annual monitoring plan for this intersection to help determine the appropriate timing for the conversion of this intersection to a roundabout configuration.

Based on the above analysis, no geometric modifications are required to accommodate site-generated traffic at either of the signalized study area intersections.

5.10.2.3 Auxiliary Right-Turn Lane Requirements (Unsignalized Intersections)

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes be considered "when the volume of decelerating or accelerating vehicles compared with through vehicles causes undue hazard." Consideration for auxiliary right-turn lanes is typically given when the right-turning traffic exceeds 10% of the through volume and is at least 60 vehicles per hour.

Queue length results from Synchro indicate that the southbound right-turn parallel lane at the intersection of Navan & Spring Valley/ Elizabeth Cosgrove Private has sufficient storage to accommodate total traffic volumes projections at the 2028 study horizon year.

Based on the above criteria, no additional right-turn lanes are required at any of the study area intersections.

5.10.2.4 Auxiliary Right-Turn Lane Requirements (Signalized Intersections)

Similarly, for signalized intersections, Section 9.14 of TAC suggests that auxiliary right-turn lanes should be considered when more than 10% of vehicles on an approach are turning right and when the peak hour demand exceeds 60 vehicles. The purpose of this guideline is to mitigate operational impacts to through-traffic, particularly on high-speed or high-volume arterial roadways, and may not be applicable in all circumstances.

The results of the auxiliary right-turn lane analysis are summarized in **Table 25** below under Future (2028) Total Traffic conditions:

Table 25 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	RIGHT TURN VOLUME	APPROACH VEHICLES TURNING RIGHT (%)	95TH %ILE QUEUE LENGTH (M)	EXISTING PARALLEL LANE LENGTH (M)	STORAGE DEFICIENCY (M)
Joshua/ Percifor Way & Renaud	NB	35	6%	7.6	-	-
	SB	96	63%	9.7	-	- [1]
	EB	139	15%	4.5	-	15
	WB	64	20%	3.0	-	- [2]
Navan & Renaud	NB	57	16%	5.1	15	Existing Storage Adequate
	SB	24	3%		-	-
	EB	206	21%	25	45	Existing Storage Adequate
	WB	189	29%	14.7	-	15

Notes:
[1] - Nominal southbound through volumes of less than 10 vehicles expected during weekday AM & PM Peak Hours within study horizon
[2] - Marginally exceeds 60 vehicle threshold during weekday PM Peak Hour only

Based on the results of **Table 25** above and confirmed through intersection capacity analyses, it is recommended that an eastbound right-turn lane with at least 15m of storage be considered in

the signalized design of the Joshua/ Percifor Way & Renaud intersection. It should be noted, however, that the criteria for consideration of a right-turn lane is met under existing conditions and is therefore not triggered as a direct consequence of site-generated traffic.

Although the westbound approach technically meets the criteria for consideration of a right-turn lane at the Joshua/ Percifor Way & Renaud intersection, it should be noted that this is an existing condition which only marginally exceeds the 60 vehicle threshold during the weekday afternoon peak hour, and falls significantly short of the target with just 21 right-turning vehicles during the weekday morning peak hour. Further, 95th percentile queues in Synchro modelled with the existing shared through/ right configuration on the westbound approach are projected to be in the order of 20 metres, which is considered to be well within acceptable limits. Under the existing all-way stop configuration, the addition of auxiliary lanes is not recommended and shall only be considered upon signalization of the intersection.

As indicated by the results of the right-turn criteria and confirmed through intersection capacity analysis, the introduction of a westbound right-turn lane with at least 15 metres of storage should be considered at the intersection of Navan & Renaud if it is to remain signalized. The proposed development is not expected to contribute traffic volumes to this movement based on the distribution of site-generated traffic, therefore a right-turn lane is triggered with and without the inclusion of site-generated traffic volumes. It is recommended that traffic operations on the westbound approach be monitored as part of the City's annual review to determine the appropriate timing for the conversion of this intersection to a roundabout configuration.

5.11 Summary of Recommended Improvements

Based on the intersection capacity analyses, Multi-Modal Level of Service analyses and auxiliary lane analyses results presented above, off-site improvements to the adjacent road network have been recommended in order to accommodate multi-modal demands of both background and site-generated traffic.

5.11.1 Joshua/ Percifor Way & Renaud

The results of the intersection capacity analysis indicate that the existing all-way stop configuration of Joshua/ Percifor Way & Renaud is presently operating at a LOS 'F' during the weekday morning and afternoon peak hours. Traffic signals are operationally required at the Renaud & Joshua/ Percifor Way intersection under Existing conditions and expected to be warranted under Future (2028) Total Traffic conditions. Sensitivity analysis indicates that traffic signals are on the verge of being warranted under Future (2028) Background Traffic conditions, and require a nominal increase of just 5 vehicles on any of the sidestreet movement to trigger the warrant. With traffic signals in place, the intersection is anticipated to operate at an acceptable level of service (i.e. LOS 'D' or better) during the weekday morning and afternoon peak hours beyond the 2028 study horizon year.

As per the results of the queue length analyses, it is possible that queue lengths will occasionally exceed the northbound left-turn parallel lane at the intersection of Joshua/ Percifor Way & Renaud during the weekday morning peak hour under future signalized conditions. Synchro analysis indicates that signal optimization will help to manage queuing within the Spring Valley subdivision, while maintaining overall acceptable intersection levels of service. It should be noted that the potential for queue spillback on the northbound left-turn movement is attributed to background traffic and will not be significantly exacerbated by the proposed development traffic and does not pose a risk to traffic operations along Renaud Road. Ultimately, it is expected that many commuter trips will shift to a more direct parallel route using Brian Coburn Boulevard, which will help to mitigate queuing issues. As such, no modifications to the northbound left-turn auxiliary lane are required at the Joshua/ Percifor Way & Renaud intersection.

Based on auxiliary lane analysis, it is recommended that an eastbound right-turn lane with at least 15m of storage be considered in the signalized design of the Joshua/ Percifor Way & Renaud intersection. It should be noted, however, that the eastbound approach meets the criteria for consideration of a right-turn lane under Existing conditions and is therefore not triggered as a direct consequence of site-generated traffic.

5.11.2 Saddleridge & Renaud

The results of the intersection capacity analysis indicate that the Saddleridge & Renaud intersection is expected to operate at an acceptable level of service (i.e. LOS 'D') as a stop-controlled intersection (northbound approach only) with existing auxiliary lanes on the northbound and westbound approaches.

Based on the auxiliary lane analyses conducted at this intersection, no modifications to any auxiliary lanes will be required within the timeframe horizon year of this study.

5.11.3 Navan & Renaud

The results of the intersection capacity analysis indicate that the Navan & Renaud intersection is expected to operate at an acceptable level of service (i.e. LOS 'D' or better) as a signalized intersection under Future (2028) Total Traffic conditions.

Deficiencies were identified through multi-modal analysis for pedestrians, cyclists and trucks that are expected to be mitigated through the future conversion of this signalized intersection to a roundabout. This configuration is not required within the timeframe of this study, and according City staff, will be implemented once annual monitoring of the intersection indicates that it is approaching its theoretical capacity (i.e. LOS 'E').

As indicated by the results of the right-turn criteria and confirmed through intersection capacity analysis, the introduction of a westbound right-turn lane with at least 15 metres of storage should be considered at the intersection of Navan & Renaud if it is to remain signalized. The proposed will not contribute traffic to this movement.

The southbound left-turn may occasionally experience spillback beyond its short, 20m parallel lane section. It should be noted, however, that this is not a consequence of site-generated traffic and can be attributed to both existing and projected background traffic volumes. It is recommended that traffic operations on the southbound approach be considered in the City's monitoring of this intersection to help determine the appropriate timing for the conversion of this signalized intersection to a roundabout.

5.11.4 Navan & Spring Valley/ Elizabeth Cosgrove Private

By 2028, the intersection of Navan & Spring Valley/ Elizabeth Cosgrove Private is expected to operate slightly above acceptable conditions (i.e. LOS 'E') under total traffic conditions as a two-way stop-controlled intersection. Sensitivity analysis conducted on the critical northbound through and eastbound left-turn movements indicates that reductions of just 30 vehicles and 10 vehicles, respectively, would improve the Level of Service to 'D'. This is considered within a reasonable range of fluctuation, therefore no changes to traffic control are recommended based on these intersection capacity analysis results.

Observations of existing traffic volumes indicate that the high left-turning volume during the weekday morning peak hour may be attributed to cut-through traffic as a means of avoiding delays at the Navan/ Renaud intersection. Future improvements to the Navan/ Renaud intersection should resolve this issue. Furthermore, as the proposed development is expected to contribute nominal volumes to the northbound left-turn movement, an auxiliary lane is not recommended.

6 Conclusion

The proposed Spring Valley Phases 5 & 6 development is expected to generate up to 325 and 371 two-way person-trips during the weekday morning and afternoon peak hours, respectively. These person-trips were subdivided into *local* trips and *regional* trips and assigned separate mode share targets and trip distributions, consistent with Orleans Traffic Assessment Zone (TAZ) in the 2011 O-D Survey. The resulting two-way vehicular trip generation is, therefore, 172 and 196 vehicles per hour during the weekday morning and afternoon peak hour, respectively.

The Draft Plan was developed with a long term lens, provisioning for the future extension of Joshua Street and its connection to Navan Road, while maintaining consistency with the conceptual alignment presented in the East Urban Community Phase 1 Community Design Plan (CDP).

Based on intersection capacity analysis completed for the intersection of Joshua/ Percifor Way & Renaud, traffic signals are operationally required under Existing conditions and warranted under Future (2028) Total Traffic conditions. Sensitivity analysis, however, indicates that traffic signals are on the verge of being warranted under Future (2028) Background Traffic conditions, requiring a nominal increase of just 5 vehicles on any of the sidestreet movements to trigger the warrant. As such, the traffic signal warrants are primarily triggered by background traffic volumes.

As indicated by analysis conducted for this study, the intersection of Saddleridge & Renaud is expected to operate at an acceptable level of service (i.e. LOS ‘D’ or better) during weekday peak hours under with its existing configuration as a stop-controlled intersection.

The results of the intersection capacity analysis indicate that the intersection of Navan & Renaud is expected to operate at acceptable levels of service (i.e. LOS ‘D’ or better) during the weekday morning and afternoon peak hours. Auxiliary lane analysis indicates that queues associated with background traffic volume projections on the southbound left-turn may spillback beyond its 20m of parallel lane. The proposed development, however, is not expected to contribute traffic volumes to the southbound left-turn movement, therefore any potential operational issues will not be exacerbated by site-generated traffic. The City is currently monitoring the Navan & Renaud intersection on an annual basis for traffic operational issues, and is planning to introduce a roundabout at this location once it approaches its theoretical capacity. It is recommended that traffic operations on the southbound approach be considered as part of the City’s annual monitoring plan for this intersection to help determine the appropriate timing for the conversion of this intersection to a roundabout configuration.

Within the timeframe of this study, the Navan & Spring Valley/ Elizabeth Cosgrove Private intersection is expected to operate slightly above acceptable capacity (i.e. LOS ‘E’) during the weekday afternoon peak hour with two-way stop control. Sensitivity analysis conducted at the study horizon year indicates that reductions of just 30 vehicles and 10 vehicles, respectively, would improve the Level of Service to ‘D’. Observations of existing traffic volumes indicate that the high left-turning volume during the weekday morning peak hour may be attributed to cut-through traffic as a means of avoiding delays at the Navan/ Renaud intersection. Future improvements to the Navan/ Renaud intersection should resolve this issue. Furthermore, as the proposed development is expected to contribute nominal volumes to the northbound left-turn movement, an auxiliary lane is not recommended.

Based on the right-turn lane criteria and confirmed through intersection capacity analysis, auxiliary right-turns with at least 15m of storage should be considered on the eastbound approach at the intersection of Joshua/ Percifor Way & Renaud and on the westbound approach at the intersection of Navan & Renaud, with each configured as a signalized intersection. It should be noted, however, that these right-turn lanes are required to support existing and background traffic volume projections only and neither are triggered as a direct result of the proposed development.

Multi-Modal Level of Service (MMLOS) analysis was also conducted for all existing boundary streets and all existing and future proposed signalized intersections to determine the roadway and intersection design elements required for these facilities to achieve their MMLOS targets as best as possible. The future configuration of this intersection as a roundabout is expected to help improve the user experience for all travel modes by addressing deficiencies identified in the multi-modal analysis, however it is not required to safely accommodate the proposed development.

The analysis conducted as part of this study indicates that no off-site geometric improvements are triggered as a direct result of the proposed development, and as such an RMA will not be required. It is expected that the City will promptly address the existing capacity limitations in the study area to accommodate ongoing growth.

Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network with the recommended actions and modifications in place.

Appendix A – City Circulation Comments

Step 1 & 2 Submission (Screening & Scoping) – Circulation Comments & Response

Report Submitted: December 18, 2019
Comments Received: December 20, 2019
Transportation Project Manager: Josiane Gervais

1) As a small note, when undertaking forecasting, there are numerous smaller developments within the study area (in addition to the two major ones you identified with Scoping). Please ensure the background growth rate selected is conservative to account for the numerous smaller developments within the area.

   - IBI Response: Acknowledged. The discussion on background traffic growth rates will acknowledge the numerous smaller developments in the study area and a conservative background growth rate will be selected to account for the traffic generated by these small developments, as well as, other developments outside the context area of the study.

Step 3 Submission (Forecasting) – Circulation Comments & Response

Report Submitted: December 20, 2019
Comments Received: January 17, 2020
Transportation Project Manager: Josiane Gervais

Transportation Engineering Services

1) Consider reassigning some of the local trips eastbound down Renaud Road.

   - IBI Response: Local site-generated traffic in the order of 25% has been assigned to/from Renaud Road, east of Navan Road to account for potential usage of this corridor for trips that remain within the Orleans Traffic Assessment Zone (TAZ).

Traffic Signal Operations

Future total traffic volumes may necessitate modifications at the intersection of Navan & Renaud.

- IBI Response: Based on the intersection capacity analysis included in the Analysis component of the TIA, the intersection of Navan & Renaud is expected to operate at an acceptable level of service (i.e. LOS 'D') at the study horizon year during the weekday morning and afternoon peak hours. As a result, no intersection modifications were investigated for the proposed development as part of this TIA.

Development Review – Transportation

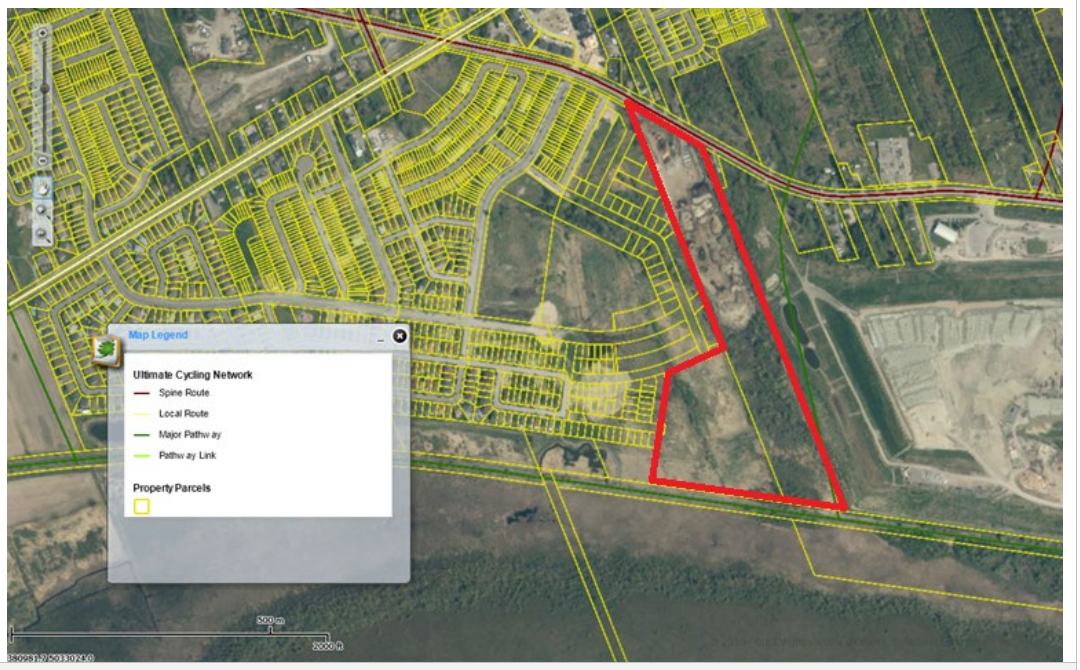
2) Please note that a future roundabout is planned at the intersection of Navan Rd & Renaud Rd, however the timing of improvements is not defined at this time.

   - IBI Response: Acknowledged. Supplemental information provided by City staff indicates that the intersection will be monitored on an annual basis for capacity issues and that a roundabout will only be implemented when the intersection approaches its theoretical capacity (i.e. LOS 'E') during either the weekday morning or afternoon peak hour traffic conditions. Based on the analysis completed for this TIA, this intersection is expected to operate at an acceptable level of service (LOS 'D') beyond 2028 study horizon. As such, the analysis of a roundabout at this intersection is considered to be outside of the TIA scope.

Appendix B – Screening Form

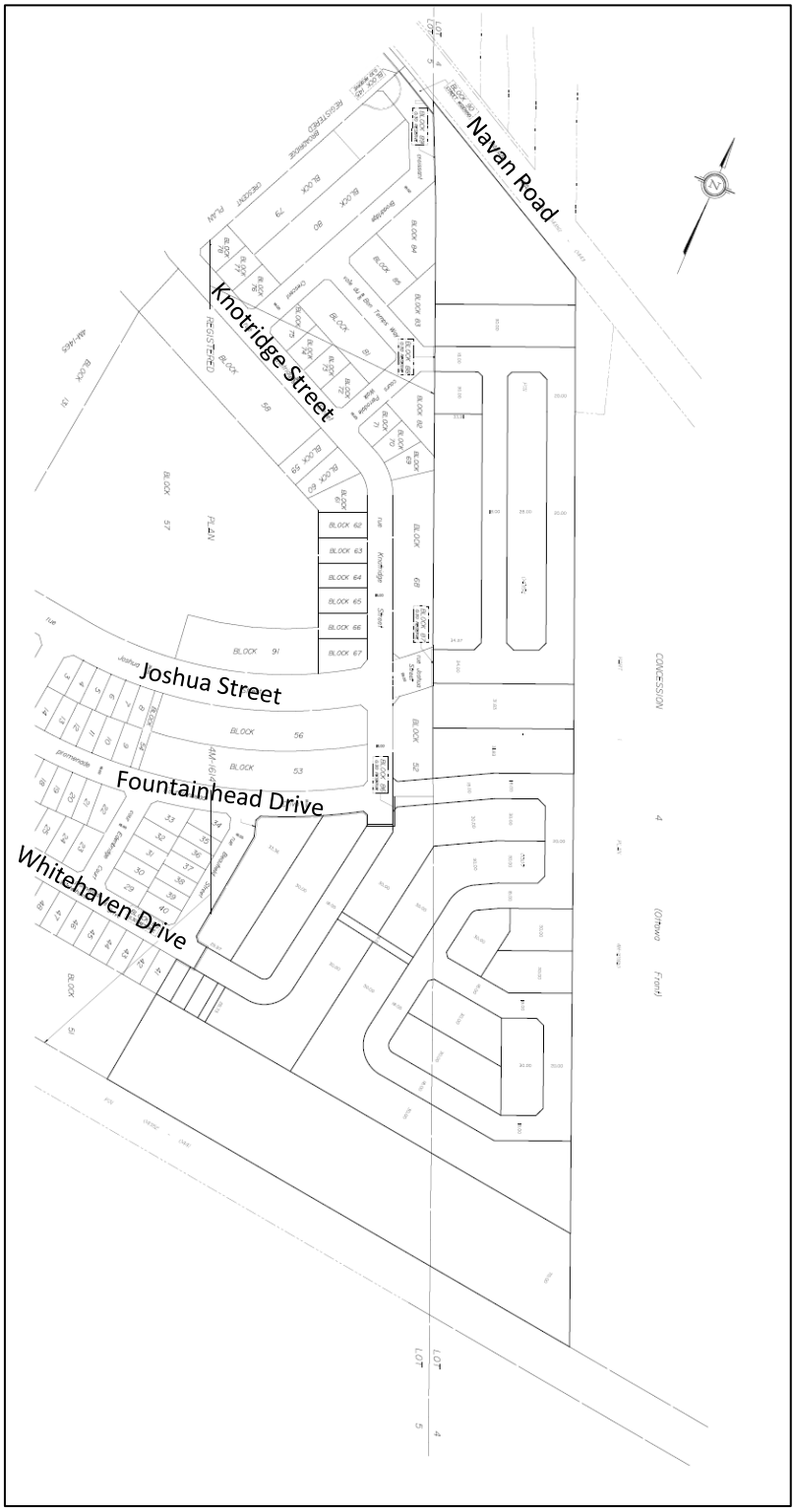
City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	3252 Navan Road
Description of Location	Orleans – South of Navan Road and east of Renaud Road 
Land Use Classification	Single-Detached, Townhomes and Condominiums
Development Size (units)	11 Single-Detached Homes 262 Townhomes 48 Condominiums
Development Size (m^2)	N/A
Number of Accesses and Locations	Three (3) existing access intersections: Renaud Road & Joshua Street / Percifor Way, Renaud Road & Saddleridge Drive and Navan Road & Spring Valley Drive. Several internal connections will provide access between Phase 5 and 6 and the remainder of the Spring Valley Trails subdivision.
Phase of Development	Phase 5 & 6
Buildout Year	2023

If available, please attach a sketch of the development or site plan to this form.

Proposed Development:



2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units ✓
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

Based on the results above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		✓

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

Based on the above, the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		✓
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		✓
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		✓
Is the proposed driveway within auxiliary lanes of an intersection?		✓
Does the proposed driveway make use of an existing median break that serves an existing site?		✓
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		✓
Does the development include a drive-thru facility?		✓

Based on the results above, the Safety Trigger is NOT satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?		✓

CONCLUSION: As one or more of the above triggers has been satisfied, a TIA will be required.

Appendix C – Traffic Data

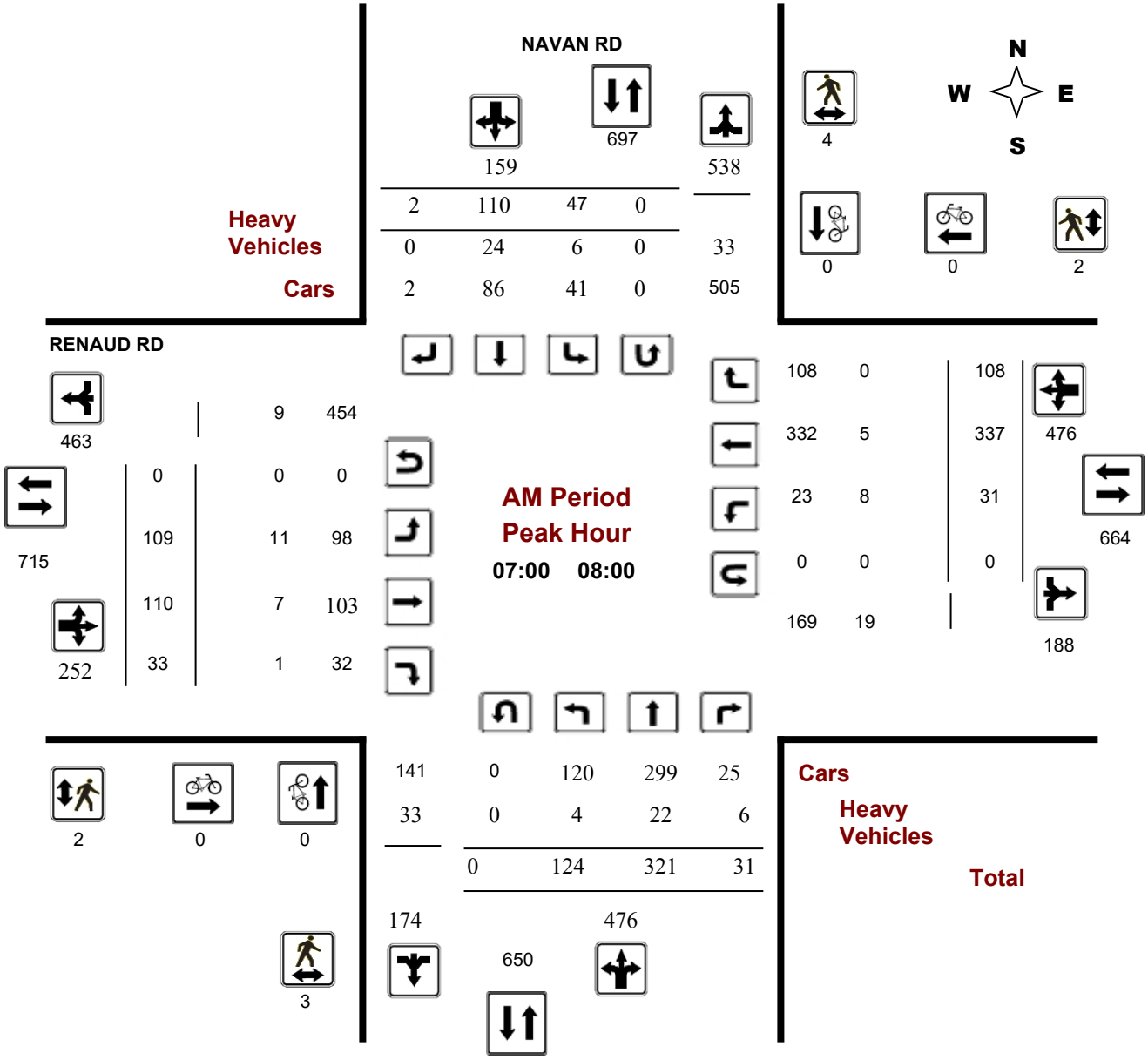
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

Start Time: 07:00 **Device:** Miovision



Comments

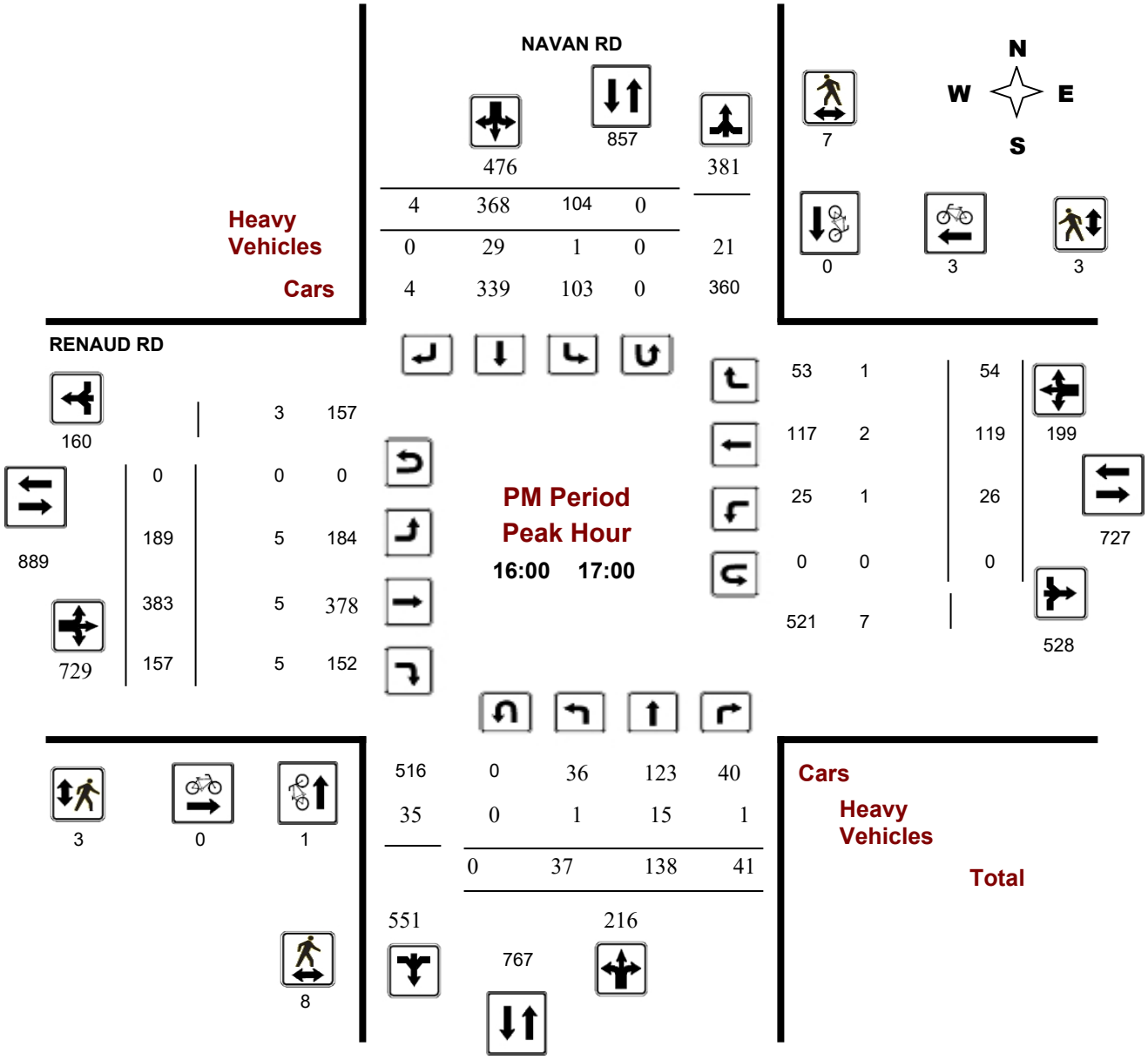
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

Start Time: 07:00 **Device:** Miovision



Comments

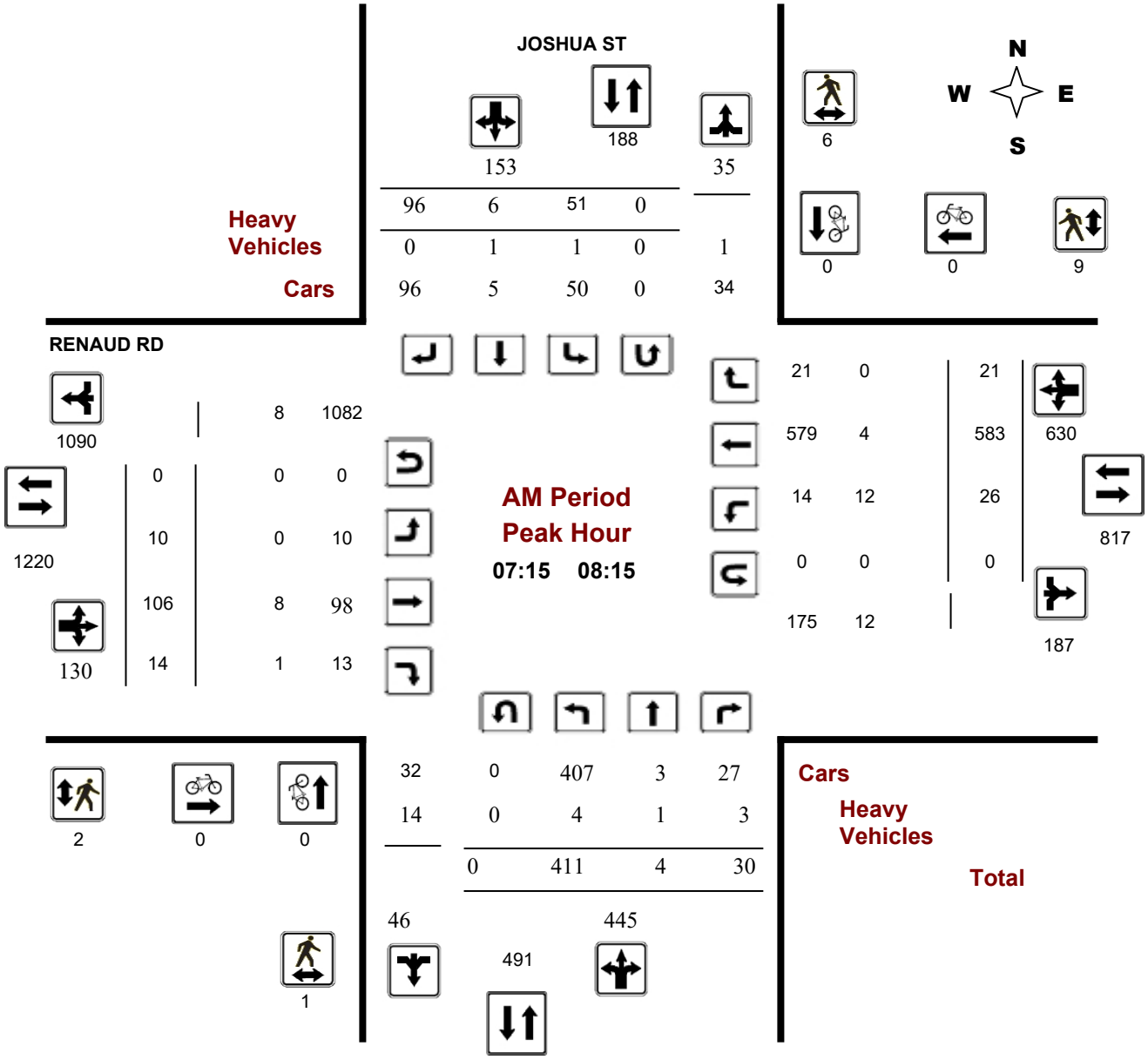
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOSHUA ST @ RENAUD RD

Survey Date: Tuesday, September 10, 2019 **WO No:** 39189

Start Time: 07:00 **Device:** Miovision



Comments

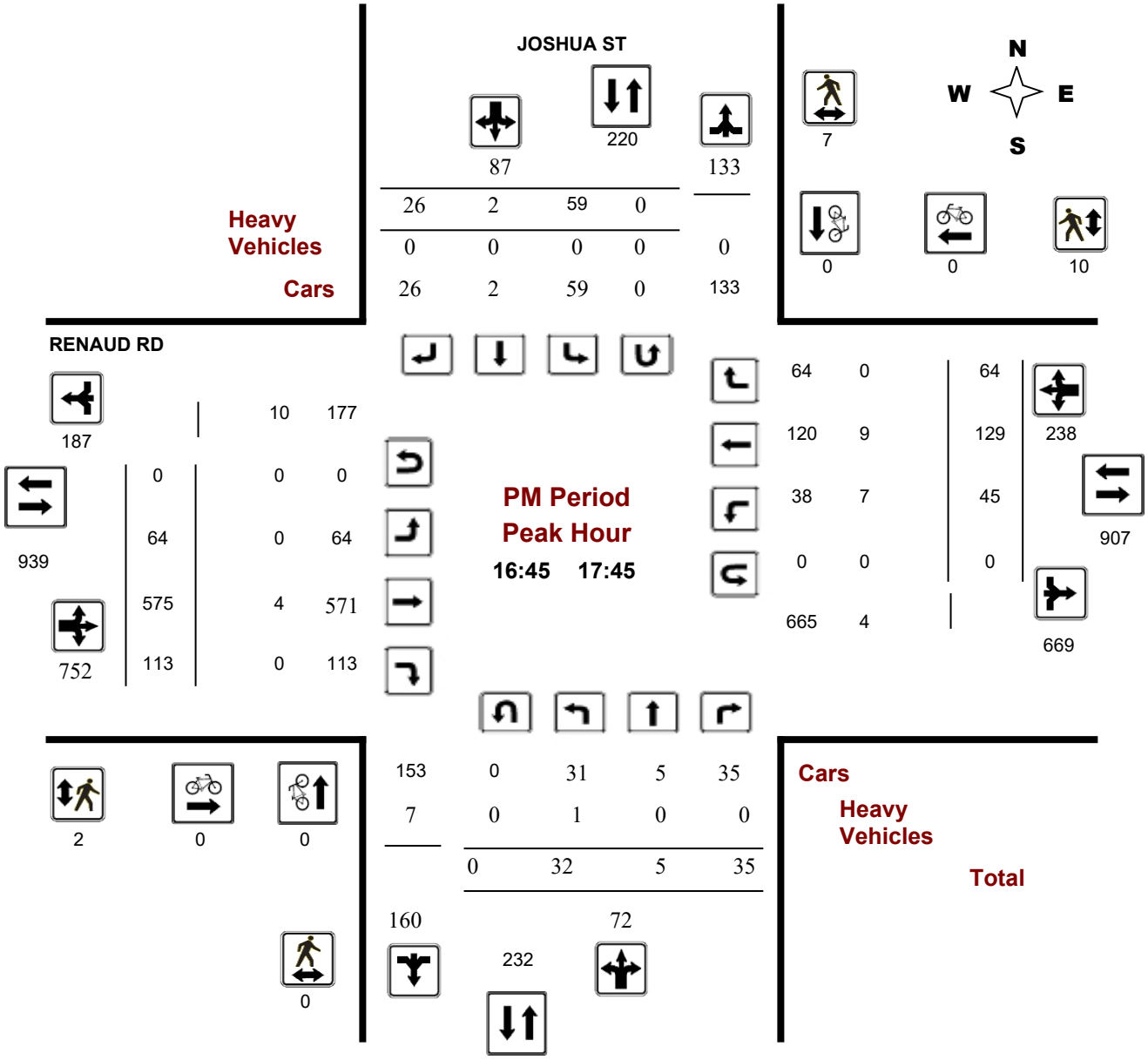
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOSHUA ST @ RENAUD RD

Survey Date: Tuesday, September 10, 2019 **WO No:** 39189

Start Time: 07:00 **Device:** Miovision



Comments

Survey Date: Thursday June 15 2017
Weather: Dry

NB (South Leg) Street Name: Spring Valley Dr
SB (North Leg) Street Name:

EB (West Leg) Street Name: Navan Rd
WB (East Leg) Street Name: Navan Rd

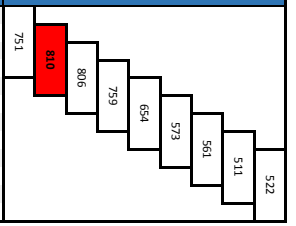
Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

The AM Peak Hour is from 6:45 AM to 7:45 AM

AADT Factor: 0.9

Turning Movement Count - 15 Minute Vehicle Summary Report (AM Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STREET TOTAL	Navan Rd Eastbound					Navan Rd Westbound					E/W STREET TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
6:30 6:45	5		6		**11**					**0**	**11**		28	2		**30**	2	119			**121**	**151**	**162**	
6:45 7:00	7		1		**8**					**0**	**8**		27	1		**28**	5	123			**128**	**156**	**164**	
7:00 7:15	9		0		**9**					**0**	**9**		22	8		**30**	10	162			**172**	**202**	**211**	
7:15 7:30	12		1		**13**					**0**	**13**		23	5		**28**	38	135			**173**	**201**	**214**	
7:30 7:45	10		1		**11**					**0**	**11**		26	1		**27**	44	139			**183**	**210**	**221**	
7:45 8:00	7		4		**11**					**0**	**11**		22	2		**24**	17	108			**125**	**149**	**160**	
8:00 8:15	12		2		**14**					**0**	**14**		31	8		**39**	15	96			**111**	**150**	**164**	
8:15 8:30	13		0		**13**					**0**	**13**		20	2		**22**	4	70			**74**	**96**	**109**	
8:30 8:45	10		5		**15**					**0**	**15**		39	6		**45**	6	74			**80**	**125**	**140**	
8:45 9:00	11		2		**13**					**0**	**13**		40	10		**50**	3	82			**85**	**135**	**148**	
9:00 9:15	7		3		**10**					**0**	**10**		33	9		**42**	4	58			**62**	**104**	**114**	
9:15 9:30	9		1		**10**					**0**	**10**		42	11		**53**	2	55			**57**	**110**	**120**	
TOTAL:	38	0	3	0	41	0	0	0	0	0	41	0	98	15	0	113	97	559	0	0	656	769	810	

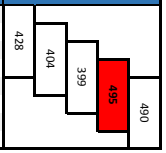


Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

The Mid-day Peak Hour is from 12:15 PM to 1:15 PM

Turning Movement Count - 15 Minute Vehicle Summary Report (Mid-Day Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STREET TOTAL	Navan Rd Eastbound					Navan Rd Westbound					E/W STREET TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
11:30 11:45	13		3		**16**					**0**	**16**		38	9		**47**	2	53			**55**	**102**	**118**	
11:45 12:00	2		3		**5**					**0**	**5**		38	7		**45**	1	41			**42**	**87**	**92**	
12:00 12:15	7		5		**12**					**0**	**12**		60	3		**63**	2	44			**46**	**109**	**121**	
12:15 12:30	6		2		**8**					**0**	**8**		40	10		**50**	3	36			**39**	**89**	**97**	
12:30 12:45	7		1		**8**					**0**	**8**		40	7		**47**	3	36			**39**	**86**	**94**	
12:45 13:00	3		2		**5**					**0**	**5**		30	5		**35**	3	44			**47**	**82**	**87**	
13:00 13:15	14		11		**25**					**0**	**25**		87	13		**100**	5	87			**92**	**192**	**217**	
13:15 13:30	6		2		**8**					**0**	**8**		40	6		**46**	1	37			**38**	**84**	**92**	
TOTAL:	30	0	16	0	46	0	0	0	0	0	46	0	197	35	0	232	14	203	0	0	217	449	495	

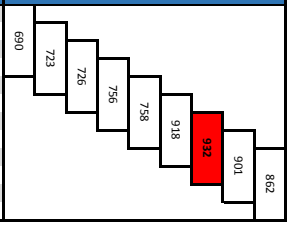


Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

The PM Peak Hour is from 4:30 PM to 5:30 PM

Turning Movement Count - 15 Minute Vehicle Summary Report (PM Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STR TOTAL	Navan Rd Eastbound					Navan Rd Westbound					E/W STR TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
15:00 15:15	12		4		**16**					**0**	**16**		77	9		**86**	3	55			**58**	**144**	**160**	
15:15 15:30	10		2		**12**					**0**	**12**		94	14		**108**	2	43			**45**	**153**	**165**	
15:30 15:45	6		3		**9**					**0**	**9**		105	12		**117**	3	41			**44**	**161**	**170**	
15:45 16:00	13		1		**14**					**0**	**14**		131	9		**140**	0	41			**41**	**181**	**195**	
16:00 16:15	8		4		**12**					**0**	**12**		137	7		**144**	3	34			**37**	**181**	**193**	
16:15 16:30	9		5		**14**					**0**	**14**		110	7		**117**	1	36			**37**	**154**	**168**	
16:30 16:45	3		7		**10**					**0**	**10**		123	12		**135**	4	51			**55**	**190**	**200**	
16:45 17:00	4		4		**8**					**0**	**8**		128	12		**140**	4	45			**49**	**189**	**197**	
17:00 17:15	11		9		**20**					**0**	**20**		210	13		**223**	5	105			**110**	**333**	**353**	
17:15 17:30	11		5		**16**					**0**	**16**		103	11		**114**	7	45			**52**	**166**	**182**	
17:30 17:45	10		2		**12**					**0**	**12**		100	11		**111**	2	44			**46**	**157**	**169**	
17:45 18:00	12		0		**12**					**0**	**12**		87	11		**98**	2	46			**48**	**146**	**158**	
TOTAL:	29	0	25	0	54	0	0	0	0	0	54	0	564	48	0	612	20	246	0	0	266	878	932	



Survey Date: Thursday June 15 2017
Weather: Dry

NB (South Leg) Street Name: Spring Valley Dr
SB (North Leg) Street Name: 0
EB (West Leg) Street Name: Navan Rd
WB (East Leg) Street Name: Navan Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Heavy Vehicle Report (AM Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STREET Total	Navan Rd Eastbound					Navan Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
6:30 6:45					**0**					**0**	**0**		2			**2**		10			**10**	**12**	**12**
6:45 7:00					**0**					**0**	**0**		4			**4**		5			**5**	**9**	**9**
7:00 7:15	1				**1**					**0**	**1**		3	3		**6**		10			**10**	**16**	**17**
7:15 7:30					**0**					**0**	**0**		3	1		**4**		6			**6**	**10**	**10**
7:30 7:45	3				**3**					**0**	**3**		7	1		**8**	2	5			**7**	**15**	**18**
7:45 8:00	1		1		**2**					**0**	**2**		4			**4**		4			**4**	**8**	**10**
8:00 8:15					**0**					**0**	**0**		8			**8**		4			**4**	**12**	**12**
8:15 8:30	2				**2**					**0**	**2**		4			**4**	1				**1**	**5**	**7**
8:30 8:45					**0**					**0**	**0**		12	1		**13**		13			**13**	**26**	**26**
8:45 9:00	1				**1**					**0**	**1**		12	2		**14**		9			**9**	**23**	**24**
9:00 9:15	1				**1**					**0**	**1**		6			**6**	1	5			**6**	**12**	**13**
9:15 9:30	1				**1**					**0**	**1**		7	1		**8**		8			**8**	**16**	**17**
TOTAL:	10	0	1	0	**11**	0	0	0	0	**0**	**11**	0	72	9	0	**81**	4	79	0	0	**83**	**164**	**175**

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Heavy Vehicle Report (Mid-Day Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STREET Total	Navan Rd Eastbound					Navan Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
11:30 11:45			3		**3**					**0**	**3**		7			**7**	1	7			**8**	**15**	**18**
11:45 12:00	2				**2**					**0**	**2**		9	1		**10**	1	7			**8**	**18**	**20**
12:00 12:15	1				**1**					**0**	**1**		2	3		**5**		6			**6**	**11**	**12**
12:15 12:30			2		**2**					**0**	**2**		6	1		**7**	1	7			**8**	**15**	**17**
12:30 12:45	1		1		**2**					**0**	**2**		7			**7**		8			**8**	**15**	**17**
12:45 13:00	1				**1**					**0**	**1**		9			**9**	1	4			**5**	**14**	**15**
13:00 13:15	2				**2**					**0**	**2**		5			**5**	1	8			**9**	**14**	**16**
13:15 13:30					**0**					**0**	**0**		5			**5**		6			**6**	**11**	**11**
TOTAL:	7	0	6	0	**13**	0	0	0	0	**0**	**13**	0	50	5	0	55	5	53	0	0	**58**	**113**	**126**

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Heavy Vehicle Report (PM Peak)

Time Period	Spring Valley Dr Northbound					0 Southbound					N/S STREET TOTAL	Navan Rd Eastbound					Navan Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
15:00 15:15					**0**					**0**	**0**		6	1		**7**	1	8			**9**	**16**	**16**
15:15 15:30					**0**					**0**	**0**		7			**7**	1	6			**7**	**14**	**14**
15:30 15:45	1				**1**					**0**	**1**		12			**12**	1	2			**3**	**15**	**16**
15:45 16:00			1		**1**					**0**	**1**		10			**10**	1	5			**6**	**16**	**17**
16:00 16:15			2		**2**					**0**	**2**		9			**9**	1	7			**8**	**17**	**19**
16:15 16:30	3				**3**					**0**	**3**		8			**8**		8			**8**	**16**	**19**
16:30 16:45	1				**1**					**0**	**1**		10			**10**		6			**6**	**16**	**17**
16:45 17:00					**0**					**0**	**0**		6			**6**		8			**8**	**14**	**14**
17:00 17:15			1		**1**					**0**	**1**		10			**10**		1			**1**	**11**	**12**
17:15 17:30					**0**					**0**	**0**		1			**1**		4			**4**	**5**	**5**
17:30 17:45					**0**					**0**	**0**		4			**4**		6			**6**	**10**	**10**
17:45 18:00					**0**					**0**	**0**		8			**8**		2			**2**	**10**	**10**
TOTAL:	5	0	4	0	**9**	0	0	0	0	**0**	**9**	0	91	1	0	**92**	5	63	0	0	**68**	**160**	**169**

Survey Date: Thursday June 15 2017
Weather: Dry

NB (South Leg) Street Name: Spring Valley Dr
SB (North Leg) Street Name: 0

Navan Rd
Navan Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Cyclist Volume Report (AM Peak)

Time Period	Spring Valley Dr Northbound	0 Southbound	N/S STREET Total	Navan Rd Eastbound	Navan Rd Westbound	E/W STREET TOTAL	Grand TOTAL
6:30 6:45			0			0	0
6:45 7:00			0			0	0
7:00 7:15			0			0	0
7:15 7:30			0			0	0
7:30 7:45			0			0	0
7:45 8:00			0			0	0
8:00 8:15			0			0	0
8:15 8:30			0			0	0
8:30 8:45			0		1	1	1
8:45 9:00			0			0	0
9:00 9:15			0			0	0
9:15 9:30			0			0	0
TOTAL:	0	0	0	0	1	1	1

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Cyclist Volume Report (Mid-Day Peak)

Time Period	Spring Valley Dr Northbound	0 Southbound	N/S STREET Total	Navan Rd Eastbound	Navan Rd Westbound	E/W STREET TOTAL	Grand TOTAL
11:30 11:45			0			0	0
11:45 12:00			0			0	0
12:00 12:15	1		1			0	1
12:15 12:30			0			0	0
12:30 12:45			0			0	0
12:45 13:00			0			0	0
13:00 13:15			0			0	0
13:15 13:30			0			0	0
TOTAL:	1	0	1	0	0	0	1

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Cyclist Volume Report (PM Peak)

Time Period	Spring Valley Dr Northbound	0 Southbound	N/S STREET Total	Navan Rd Eastbound	Navan Rd Westbound	E/W STREET TOTAL	Grand TOTAL
15:00 15:15			0			0	0
15:15 15:30			0			0	0
15:30 15:45		1	1			0	1
15:45 16:00			0			0	0
16:00 16:15			0		1	1	1
16:15 16:30			0			0	0
16:30 16:45			0			0	0
16:45 17:00			0			0	0
17:00 17:15			0			0	0
17:15 17:30			0			0	0
17:30 17:45			0			0	0
17:45 18:00			0			0	0
TOTAL:	0	1	1	0	1	1	2

Survey Date: Thursday June 15 2017
Weather: Dry

NB (South Leg) Street Name: Spring Valley Dr
SB (North Leg) Street Name: 0

EB (West Leg) Street Name: Navan Rd
WB (East Leg) Street Name: Navan Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Pedestrian Volume Report (AM Peak)

Time Period	Spring Valley Dr	0	N/S STREET TOTAL	Navan Rd	Navan Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
6:30 6:45			0			0	0
6:45 7:00			0			0	0
7:00 7:15			0			0	0
7:15 7:30			0			0	0
7:30 7:45	1		1			0	1
7:45 8:00			0			0	0
8:00 8:15	1		1			0	1
8:15 8:30	1		1			0	1
8:30 8:45			0			0	0
8:45 9:00			0		3	3	3
9:00 9:15			0			0	0
9:15 9:30	1		1			0	1
TOTAL:	4	0	4	0	3	3	7

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Pedestrian Volume Report (Mid-Day Peak)

Time Period	Spring Valley Dr	0	N/S STREET TOTAL	Navan Rd	Navan Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
11:30 11:45			0			0	0
11:45 12:00			0			0	0
12:00 12:15	1		1			0	1
12:15 12:30			0			0	0
12:30 12:45			0			0	0
12:45 13:00			0			0	0
13:00 13:15	1		1			0	1
13:15 13:30			0			0	0
TOTAL:	2	0	2	0	0	0	2

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Pedestrian Volume Report (PM Peak)

Time Period	Spring Valley Dr	0	N/S STREET TOTAL	Navan Rd	Navan Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
15:00 15:15			0	1		1	1
15:15 15:30			0			0	0
15:30 15:45			0			0	0
15:45 16:00			0			0	0
16:00 16:15			0			0	0
16:15 16:30			0			0	0
16:30 16:45			0			0	0
16:45 17:00			0			0	0
17:00 17:15			0			0	0
17:15 17:30			0			0	0
17:30 17:45			0			0	0
17:45 18:00			0			0	0
TOTAL:	0	0	0	1	0	1	1

Survey Date: Wednesday June 25 2017

Weather: Wet

NB (South Leg) Street Name: Saddleridge Dr

SB (North Leg) Street Name:

EB (West Leg) Street Name: Renaud Rd

WB (East Leg) Street Name: Renaud Rd

Start Time (AM Peak): 6:30

End Time (AM Peak): 9:30

The AM Peak Hour is from 7:00 AM to 8:00 AM

AADT Factor: 0.9

Turning Movement Count - 15 Minute Vehicle Summary Report (AM Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STREET TOTAL	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STREET TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
6:30 6:45	11	0	6	0	**17**	0	0	0	0	**0**	**17**	0	11	0	0	**11**	3	101	0	0	**104**	**115**	**132**	812
6:45 7:00	7	0	9	0	**16**	0	0	0	0	**0**	**16**	0	27	1	0	**28**	6	115	0	0	**121**	**149**	**165**	972
7:00 7:15	10	0	10	0	**20**	0	0	0	0	**0**	**20**	0	29	0	0	**29**	8	188	0	0	**196**	**225**	**245**	1068
7:15 7:30	1	0	14	0	**15**	0	0	0	0	**0**	**15**	0	35	1	0	**36**	13	206	0	0	**219**	**255**	**270**	1062
7:30 7:45	7	0	19	0	**26**	0	0	0	0	**0**	**26**	0	53	7	0	**60**	33	173	0	0	**206**	**266**	**292**	1007
7:45 8:00	6	0	21	0	**27**	0	0	0	0	**0**	**27**	0	50	3	0	**53**	29	152	0	0	**181**	**234**	**261**	897
8:00 8:15	5	0	12	0	**17**	0	0	0	0	**0**	**17**	0	40	2	0	**42**	22	158	0	0	**180**	**222**	**239**	793
8:15 8:30	4	0	30	0	**34**	0	1	0	0	**1**	**35**	0	24	1	0	**25**	8	147	0	0	**155**	**180**	**215**	670
8:30 8:45	7	0	19	0	**26**	0	0	0	0	**0**	**26**	0	35	0	0	**35**	12	109	0	0	**121**	**156**	**182**	557
8:45 9:00	9	0	14	0	**23**	0	0	0	0	**0**	**23**	0	37	1	0	**38**	7	89	0	0	**96**	**134**	**157**	
9:00 9:15	5	0	19	0	**24**	0	0	0	0	**0**	**24**	0	31	1	0	**32**	5	55	0	0	**60**	**92**	**116**	
9:15 9:30	2	0	16	0	**18**	0	0	0	0	**0**	**18**	0	34	2	0	**36**	5	43	0	0	**48**	**84**	**102**	
TOTAL:	24	0	64	0	88	0	0	0	0	0	88	0	167	11	0	178	83	719	0	0	802	980	1068	
% H. Vehs:	0%	0%	16%	0%	11%	0%	0%	0%	0%	0%	11%	0%	13%	0%	0%	12%	6%	3%	0%	0%	4%	5%	6%	

Start Time (MD Peak): 11:30

End Time (MD Peak): 13:30

The Mid-day Peak Hour is from 12:15 PM to 1:15 PM

Turning Movement Count - 15 Minute Vehicle Summary Report (Mid-Day Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STREET TOTAL	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STREET TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
11:30 11:45	2	0	3	0	**5**	0	0	0	0	**0**	**5**	0	34	2	0	**36**	5	35	0	0	**40**	**76**	**81**	359
11:45 12:00	6	0	13	0	**19**	0	0	0	0	**0**	**19**	0	40	1	0	**41**	3	33	0	0	**36**	**77**	**96**	379
12:00 12:15	4	0	9	0	**13**	0	0	0	0	**0**	**13**	0	33	4	0	**37**	15	35	0	0	**50**	**87**	**100**	376
12:15 12:30	2	0	7	0	**9**	0	0	0	0	**0**	**9**	0	35	1	0	**36**	11	26	0	0	**37**	**73**	**82**	399
12:30 12:45	3	0	10	0	**13**	0	0	0	0	**0**	**13**	0	35	1	0	**36**	10	42	0	0	**52**	**88**	**101**	388
12:45 13:00	2	0	19	0	**21**	0	0	0	0	**0**	**21**	0	33	5	0	**38**	6	28	0	0	**34**	**72**	**93**	
13:00 13:15	3	0	21	0	**24**	0	0	0	0	**0**	**24**	0	41	2	0	**43**	17	39	0	0	**56**	**99**	**123**	
13:15 13:30	3	0	0	0	**3**	0	0	0	0	**0**	**3**	0	29	3	0	**32**	11	25	0	0	**36**	**68**	**71**	
TOTAL:	10	0	57	0	67	0	0	0	0	0	67	0	144	9	0	153	44	135	0	0	179	332	399	
% H. Vehs:	10%	0%	2%	0%	3%	0%	0%	0%	0%	0%	3%	0%	6%	11%	0%	6%	5%	6%	0%	0%	6%	6%	5%	

Start Time (PM Peak): 15:00

End Time (PM Peak): 18:00

The PM Peak Hour is from 4:15 PM to 5:15 PM

Turning Movement Count - 15 Minute Vehicle Summary Report (PM Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STR TOTAL	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STR TOTAL	Grand TOTAL	1 Hour Traffic Volumes (All Scenarios)
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL			
15:00 15:15	0	0	14	0	**14**	0	0	0	0	**0**	**14**	0	82	2	0	**84**	10	58	0	0	**68**	**152**	**166**	764
15:15 15:30	1	0	17	0	**18**	0	0	0	0	**0**	**18**	0	97	4	0	**101**	13	42	0	0	**55**	**156**	**174**	823
15:30 15:45	4	0	16	0	**20**	0	0	0	0	**0**	**20**	0	113	12	0	**125**	8	49	0	0	**57**	**182**	**202**	877
15:45 16:00	3	0	19	0	**22**	0	0	0	0	**0**	**22**	0	138	7	0	**145**	9	46	0	0	**55**	**200**	**222**	881
16:00 16:15	0	0	20	0	**20**	0	0	0	0	**0**	**20**	0	148	12	0	**160**	15	30	0	0	**45**	**205**	**225**	852
16:15 16:30	2	0	15	0	**17**	0	0	0	0	**0**	**17**	0	133	5	0	**138**	18	55	0	0	**73**	**211**	**228**	921
16:30 16:45	1	0	13	0	**14**	0	0	0	0	**0**	**14**	0	121	6	0	**127**	14	51	0	0	**65**	**192**	**206**	899
16:45 17:00	2	0	12	0	**14**	0	0	0	0	**0**	**14**	0	115	4	0	**119**	16	44	0	0	**60**	**179**	**193**	887
17:00 17:15	5	0	29	0	**34**	0	0	0	0	**0**	**34**	0	142	5	0	**147**	23	90	0	0	**113**	**260**	**294**	887
17:15 17:30	4	0	19	0	**23**	0	0	0	0	**0**	**23**	0	120	9	0	**129**	16	38	0	0	**54**	**183**	**206**	
17:30 17:45	2	0	7	0	**9**	0	0	0	0	**0**	**9**	0	120	7	0	**127**	20	38	0	0	**58**	**185**	**194**	
17:45 18:00	5	0	19	0	**24**	0	0	0	0	**0**	**24**	0	93	11	0	**104**	18	47	0	0	**65**	**169**	**193**	
TOTAL:	10	0	69	0	79	0	0	0	0	0	79	0	511	20	0	531	71	240	0	0	311	842	921	
% H. Vehs:	0%	0%	13%	0%	11%	0%	0%	0%	0%	0%	11%	0%	2%	0%	0%	2%	1%	4%	0%	0%	3%	2%	3%	

Survey Date: Wednesday June 25 2017
Weather: Wet

NB (South Leg) Street Name: Saddleridge Dr
SB (North Leg) Street Name:

EB (West Leg) Street Name: Renaud Rd
WB (East Leg) Street Name: Renaud Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Heavy Vehicle Report (AM Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STREET Total	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
6:30 6:45					**0**					**0**	**0**					**0**		2			**2**	**2**	**2**
6:45 7:00			2		**2**					**0**	**2**					**0**		4			**4**	**4**	**6**
7:00 7:15			1		**1**					**0**	**1**		5			**5**		3			**3**	**8**	**9**
7:15 7:30			3		**3**					**0**	**3**		8			**8**	1	10			**11**	**19**	**22**
7:30 7:45			3		**3**					**0**	**3**		7			**7**	3	5			**8**	**15**	**18**
7:45 8:00			3		**3**					**0**	**3**		1			**1**	1	7			**8**	**9**	**12**
8:00 8:15			1		**1**					**0**	**1**		2			**2**	1	7			**8**	**10**	**11**
8:15 8:30	1		7		**8**					**0**	**8**		2			**2**		7			**7**	**9**	**17**
8:30 8:45			3		**3**					**0**	**3**		5			**5**	2	7			**9**	**14**	**17**
8:45 9:00			2		**2**					**0**	**2**		3			**3**		3			**3**	**6**	**8**
9:00 9:15			1		**1**					**0**	**1**		7			**7**		2			**2**	**9**	**10**
9:15 9:30			1		**1**					**0**	**1**		2			**2**					**0**	**2**	**3**
TOTAL:	1	0	27	0	**28**	0	0	0	0	**0**	**28**	0	42	0	0	**42**	8	57	0	0	**65**	**107**	**135**

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Heavy Vehicle Report (Mid-Day Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STREET Total	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
11:30 11:45			2		**2**					**0**	**2**					**0**		4			**4**	**4**	**6**
11:45 12:00			2		**2**					**0**	**2**		2			**2**		1			**1**	**3**	**5**
12:00 12:15					**0**					**0**	**0**		3			**3**		3			**3**	**6**	**6**
12:15 12:30			1		**1**					**0**	**1**		3			**3**		1			**1**	**4**	**5**
12:30 12:45					**0**					**0**	**0**		2			**2**		3			**3**	**5**	**5**
12:45 13:00					**0**					**0**	**0**		3	1		**4**	1	3			**4**	**8**	**8**
13:00 13:15	1				**1**					**0**	**1**					**0**	1	1			**2**	**2**	**3**
13:15 13:30			4		**4**					**0**	**4**					**0**	1	3			**4**	**4**	**8**
TOTAL:	1	0	9	0	**10**	0	0	0	0	**0**	**10**	0	13	1	0	14	3	19	0	0	**22**	**36**	**46**

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Heavy Vehicle Report (PM Peak)

Time Period	Saddleridge Dr Northbound					Southbound					N/S STREET TOTAL	Renaud Rd Eastbound					Renaud Rd Westbound					E/W STREET TOTAL	Grand TOTAL
	LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
15:00 15:15					**0**					**0**	**0**		4			**4**		1			**1**	**5**	**5**
15:15 15:30	1		1		**2**					**0**	**2**		5			**5**	2	6			**8**	**13**	**15**
15:30 15:45			2		**2**					**0**	**2**		4			**4**	1	6			**7**	**11**	**13**
15:45 16:00			1		**1**					**0**	**1**		2			**2**	1	3			**4**	**6**	**7**
16:00 16:15			7		**7**					**0**	**7**		6			**6**	1	11			**12**	**18**	**25**
16:15 16:30			3		**3**					**0**	**3**		2			**2**		3			**3**	**5**	**8**
16:30 16:45			1		**1**					**0**	**1**		2			**2**	1	2			**3**	**5**	**6**
16:45 17:00			3		**3**					**0**	**3**		4			**4**		2			**2**	**6**	**9**
17:00 17:15			2		**2**					**0**	**2**					**0**		2			**2**	**2**	**4**
17:15 17:30			2		**2**					**0**	**2**		2			**2**		2			**2**	**4**	**6**
17:30 17:45					**0**					**0**	**0**					**0**		2			**2**	**2**	**2**
17:45 18:00			1		**1**					**0**	**1**					**0**		2			**2**	**2**	**3**
TOTAL:	1	0	23	0	**24**	0	0	0	0	**0**	**24**	0	31	0	0	**31**	6	42	0	0	**48**	**79**	**103**

Survey Date: Wednesday June 25 2017
Weather: Wet

NB (South Leg) Street Name: Saddleridge Dr
SB (North Leg) Street Name:

Renaud Rd
Renaud Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Cyclist Volume Report (AM Peak)

Time Period	Saddleridge Dr Northbound	Southbound	N/S STREET Total	Renaud Rd Eastbound	Renaud Rd Westbound	E/W STREET TOTAL	Grand TOTAL
6:30 6:45			0			0	0
6:45 7:00			0			0	0
7:00 7:15			0			0	0
7:15 7:30			0			0	0
7:30 7:45			0			0	0
7:45 8:00			0			0	0
8:00 8:15			0			0	0
8:15 8:30			0			0	0
8:30 8:45			0			0	0
8:45 9:00			0			0	0
9:00 9:15			0			0	0
9:15 9:30			0			0	0
TOTAL:	0	0	0	0	0	0	0

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Cyclist Volume Report (Mid-Day Peak)

Time Period	Saddleridge Dr Northbound	Southbound	N/S STREET Total	Renaud Rd Eastbound	Renaud Rd Westbound	E/W STREET TOTAL	Grand TOTAL
11:30 11:45			0			0	0
11:45 12:00		2	2			0	2
12:00 12:15			0			0	0
12:15 12:30			0			0	0
12:30 12:45			0			0	0
12:45 13:00	2		2			0	2
13:00 13:15			0			0	0
13:15 13:30	1		1			0	1
TOTAL:	3	2	5	0	0	0	5

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Cyclist Volume Report (PM Peak)

Time Period	Saddleridge Dr Northbound	Southbound	N/S STREET Total	Renaud Rd Eastbound	Renaud Rd Westbound	E/W STREET TOTAL	Grand TOTAL
15:00 15:15			0			0	0
15:15 15:30			0			0	0
15:30 15:45			0			0	0
15:45 16:00			0			0	0
16:00 16:15			0			0	0
16:15 16:30			0			0	0
16:30 16:45			0			0	0
16:45 17:00			0			0	0
17:00 17:15			0			0	0
17:15 17:30			0			0	0
17:30 17:45			0			0	0
17:45 18:00			0			0	0
TOTAL:	0	0	0	0	0	0	0

Survey Date: Wednesday June 25 2017
Weather: Wet

NB (South Leg) Street Name: Saddleridge Dr
SB (North Leg) Street Name:

EB (West Leg) Street Name: Renaud Rd
WB (East Leg) Street Name: Renaud Rd

Start Time (AM Peak): 6:30
End Time (AM Peak): 9:30

Turning Movement Count - 15 Minute Pedestrian Volume Report (AM Peak)

Time Period	Saddleridge Dr		N/S STREET TOTAL	Renaud Rd	Renaud Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
6:30 6:45	2		**2**			**0**	**2**
6:45 7:00	15		**15**	2	1	**3**	**18**
7:00 7:15			**0**	1	1	**2**	**2**
7:15 7:30	1		**1**		1	**1**	**2**
7:30 7:45	1		**1**			**0**	**1**
7:45 8:00			**0**			**0**	**0**
8:00 8:15			**0**			**0**	**0**
8:15 8:30			**0**		1	**1**	**1**
8:30 8:45			**0**	2		**2**	**2**
8:45 9:00	1		**1**			**0**	**1**
9:00 9:15			**0**			**0**	**0**
9:15 9:30			**0**			**0**	**0**
TOTAL:	20	0	**20**	5	4	**9**	**29**

Start Time (MD Peak): 11:30
End Time (MD Peak): 13:30

Turning Movement Count - 15 Minute Pedestrian Volume Report (Mid-Day Peak)

Time Period	Saddleridge Dr		N/S STREET TOTAL	Renaud Rd	Renaud Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
11:30 11:45			**0**			**0**	**0**
11:45 12:00			**0**			**0**	**0**
12:00 12:15			**0**			**0**	**0**
12:15 12:30			**0**			**0**	**0**
12:30 12:45	1		**1**			**0**	**1**
12:45 13:00			**0**			**0**	**0**
13:00 13:15	1		**1**			**0**	**1**
13:15 13:30			**0**			**0**	**0**
TOTAL:	2	0	**2**	0	0	**0**	**2**

Start Time (PM Peak): 15:00
End Time (PM Peak): 18:00

Turning Movement Count - 15 Minute Pedestrian Volume Report (PM Peak)

Time Period	Saddleridge Dr		N/S STREET TOTAL	Renaud Rd	Renaud Rd	E/W STREET TOTAL	Grand TOTAL
	NB Approach (East or West Crossing)	SB Approach (East or West Crossing)		EB Approach (North or South Crossing)	WB Approach (North or South Crossing)		
15:00 15:15			**0**			**0**	**0**
15:15 15:30			**0**			**0**	**0**
15:30 15:45	1		**1**			**0**	**1**
15:45 16:00			**0**			**0**	**0**
16:00 16:15			**0**	1		**1**	**1**
16:15 16:30			**0**			**0**	**0**
16:30 16:45			**0**			**0**	**0**
16:45 17:00			**0**		1	**1**	**1**
17:00 17:15			**0**			**0**	**0**
17:15 17:30			**0**			**0**	**0**
17:30 17:45			**0**			**0**	**0**
17:45 18:00			**0**			**0**	**0**
TOTAL:	1	0	**1**	1	1	**2**	**3**

Appendix D – OC Transpo Routes

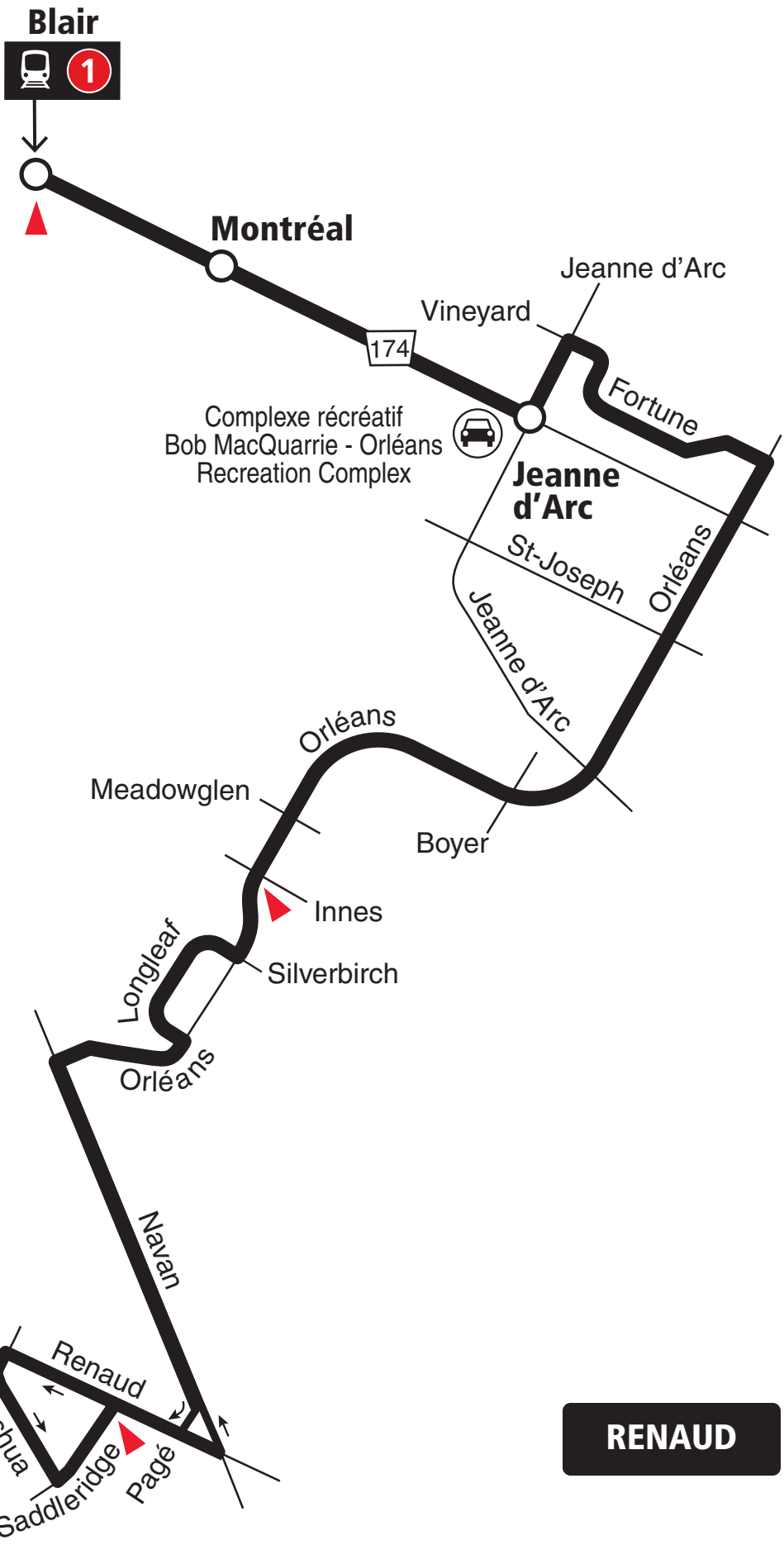
34 RENAUD / BLAIR

Local

7 days a week / 7 jours par semaine

All day service
Service toute la journée

BLAIR



RENAUD

Station
Park & Ride / Parc-o-bus
Timepoint / Heures de passage

2019.07

1

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**
Security / Sécurité **613-741-2478**

OC Transpo
INFO 613-741-4390
octranspo.com

225 Connexion

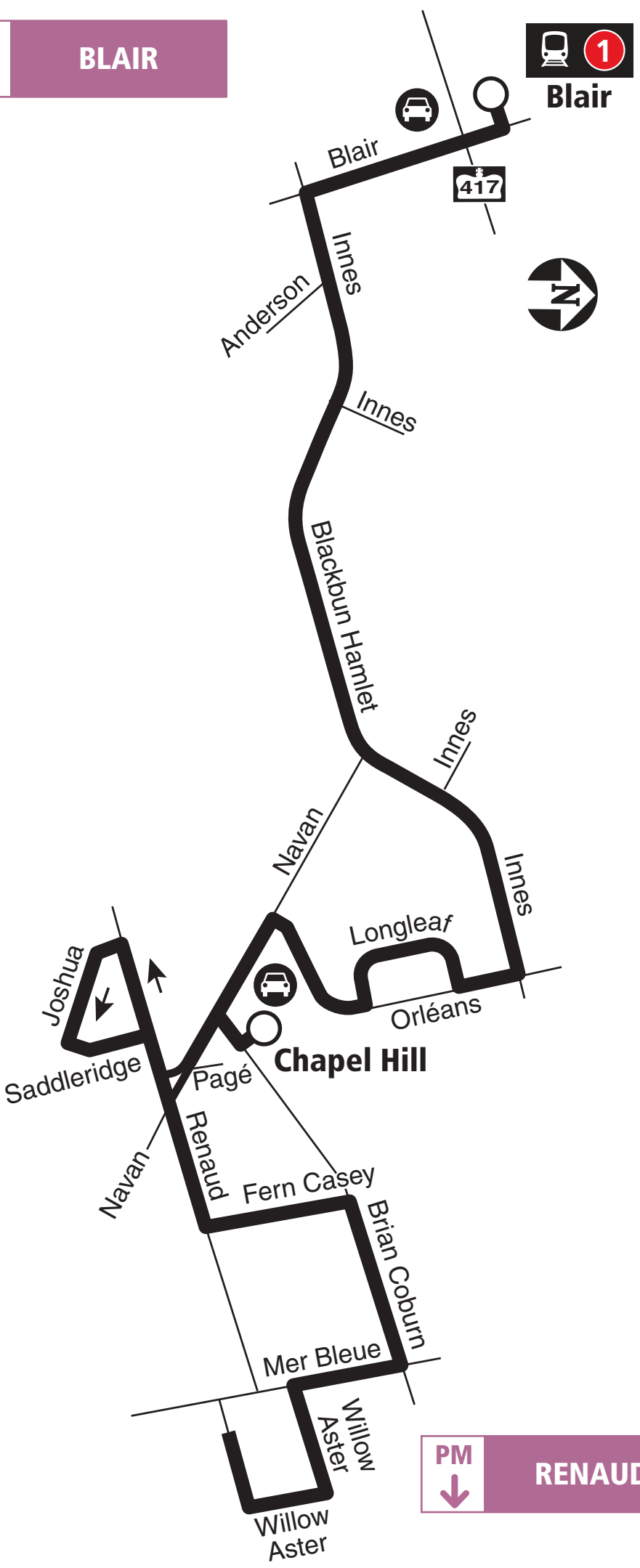
BLAIR
RENAUD

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement

AM ↑ **BLAIR**



PM ↓ **RENAUD**

○ Transitway Station / Station du Transitway

Park & Ride / Parc-o-bus

2019.09

1

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité..... **613-741-2478**

OC Transpo

INFO 613-741-4390
octranspo.com

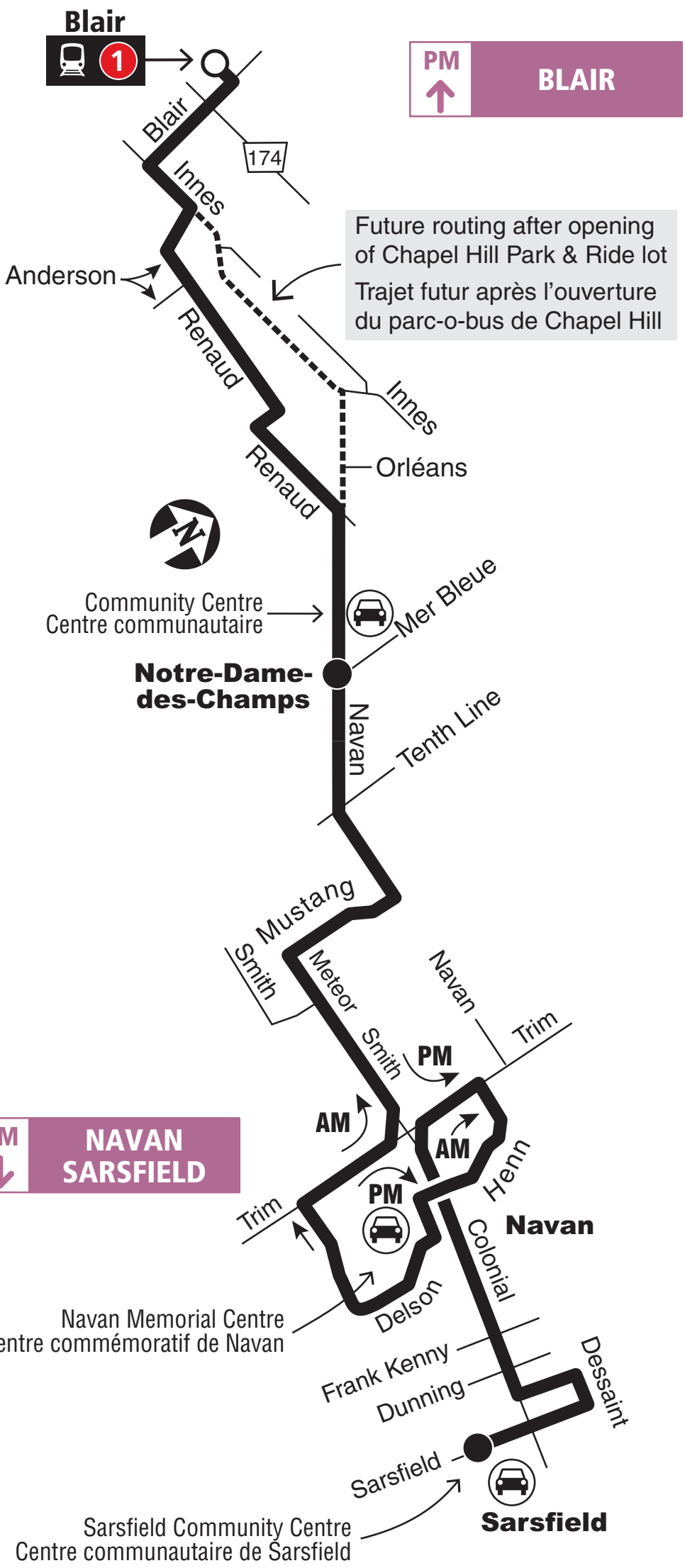
228 Connexion

NAVAN SARSFIELD
BLAIR

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement



Station

Park & Ride / Parc-o-bus

2019.07

1

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité..... **613-741-2478**

OC Transpo

INFO 613-741-4390
octranspo.com

Appendix E – Collision Data

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: JOSHUA ST @ RENAUD RD

Traffic Control: Stop sign

Total Collisions: 7

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-May-14, Wed,17:29	Clear	Rear end	Non-fatal injury	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Jun-11, Wed,16:25	Rain	Rear end	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-May-28, Sat,11:25	Clear	Angle	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2016-Nov-26, Sat,03:00	Rain	Rear end	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
2018-Mar-17, Sat,12:40	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Apr-19, Thu,08:15	Snow	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Oct-30, Tue,06:17	Clear	SMV other	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Pedestrian	1

Location: NAVAN RD @ SPRING VALLEY DR

Traffic Control: Stop sign

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Oct-30, Thu,08:40	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Delivery van	Other motor vehicle	
					West	Turning left	Automobile, station wagon	Other motor vehicle	

Location: NAVAN RD btwn ORLEANS BLVD & PAGE RD

Traffic Control: No control

Total Collisions: 8

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Feb-17, Wed,18:40	Snow	Rear end	P.D. only	Ice	West	Going ahead	Pick-up truck	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
2016-Dec-05, Mon,18:40	Snow	Rear end	P.D. only	Packed snow	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2017-May-31, Wed,09:29	Clear	Angle	P.D. only	Loose sand or gravel	North	Changing lanes	Delivery van	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Mar-19, Mon,06:38	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	

					West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Slowing or stopping	Pick-up truck	Other motor vehicle	
2018-Mar-10, Sat,18:50	Clear	SMV other	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Pedestrian	1
2018-Jun-06, Wed,17:18	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Going ahead	Unknown	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Dec-19, Wed,07:55	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Oct-09, Tue,22:52	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Location: NAVAN RD btwn RENAUD RD & MER BLEUE RD

Traffic Control: No control

Total Collisions: 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-07, Mon,11:39	Clear	SMV other	P.D. only	Dry	East	Going ahead	Motorcycle	Ran off road	
2014-Aug-29, Fri,15:48	Clear	SMV other	P.D. only	Dry	East	Going ahead	Passenger van	Animal - wild	
2015-Apr-13, Mon,10:00	Clear	Other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Debris falling off vehicle	

					North	Going ahead	Unknown	Other	
2015-Sep-03, Thu,08:13	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Aug-12, Wed,17:40	Clear	SMV other	P.D. only	Dry	East	Turning left	Automobile, station wagon	Ditch	
2017-Jan-12, Thu,07:31	Rain	SMV other	Non-fatal injury	Wet	East	Going ahead	Automobile, station wagon	Pedestrian	1
2017-Nov-27, Mon,07:20	Clear	SMV unattended vehicle	P.D. only	Dry	West	Going ahead	Bus (other)	Unattended vehicle	
2018-Jun-16, Sat,12:34	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Ran off road	
2018-Sep-18, Tue,16:28	Clear	SMV other	P.D. only	Dry	West	Going ahead	Motorcycle	Ditch	

Location: RENAUD RD @ NAVAN RD

Traffic Control: Traffic signal **Total Collisions:** 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-10, Mon,22:19	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Pick-up truck	Skidding/sliding	
2014-Apr-28, Mon,05:42	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
2014-Apr-22, Tue,16:50	Clear	Rear end	P.D. only	Dry	North	Going ahead	Passenger van	Other motor vehicle	

					North	Turning right	Passenger van	Other motor vehicle
2015-Feb-04, Wed,10:37	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Skidding/sliding
2015-Mar-04, Wed,07:29	Clear	Rear end	P.D. only	Slush	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2015-Apr-14, Tue,12:35	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
2016-Jan-05, Tue,18:41	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2015-Oct-05, Mon,17:25	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Pick-up truck	Other motor vehicle
2016-Jan-07, Thu,16:17	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Pick-up truck	Other motor vehicle
2017-Oct-19, Thu,13:03	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Unknown	Other motor vehicle

2017-Oct-24, Tue,07:24	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Pick-up truck	Pedestrian	1
2018-Dec-10, Mon,10:05	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-31, Fri,09:20	Clear	Angle	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jul-17, Tue,21:43	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD @ SADDLERIDGE DR

Traffic Control: Stop sign **Total Collisions:** 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Oct-26, Mon,16:26	Clear	Rear end	P.D. only	Dry	East	Going ahead	Passenger van	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2017-Jun-15, Thu,07:20	Clear	Other	P.D. only	Dry	West	Reversing	Automobile, station wagon	Other motor vehicle	
					East	Making "U" turn	Pick-up truck	Other motor vehicle	
2018-Feb-07, Wed,17:22	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	

2018-Oct-20, Sat,07:53	Clear	Angle	P.D. only	Wet	North	Turning left	Automobile, station wagon	Other motor vehicle	
					West	Turning left	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD btwn Continuation of RENAUD RD & Continuation of RENAUD RD

Traffic Control: No control **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-28, Mon,15:49	Rain	SMV other	Non-fatal injury	Wet	South	Going ahead	Automobile, station wagon	Ran off road	
2018-Dec-28, Fri,09:10	Freezing Rain	SMV other	P.D. only	Ice	North	Going ahead	Automobile, station wagon	Skidding/sliding	

Location: RENAUD RD btwn Continuation of RENAUD RD & PERCIFOR WAY

Traffic Control: No control **Total Collisions:** 10

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-27, Mon,10:04	Snow	Rear end	P.D. only	Loose snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2014-May-12, Mon,17:53	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Jul-11, Fri,18:28	Clear	SMV other	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Ran off road	
2016-Mar-24, Thu,15:27	Freezing Rain	SMV other	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Skidding/sliding	

2016-Sep-29, Thu,08:04	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild
2016-Dec-12, Mon,06:41	Snow	SMV other	P.D. only	Packed snow	East	Going ahead	Pick-up truck	Ran off road
2016-Dec-05, Mon,09:52	Snow	SMV other	Non-fatal injury	Loose snow	West	Going ahead	Automobile, station wagon	Ditch
2017-Dec-23, Sat,14:29	Snow	SMV other	P.D. only	Loose snow	South	Turning left	Automobile, station wagon	Ran off road
2018-Mar-14, Wed,09:40	Snow	SMV other	P.D. only	Slush	West	Going ahead	Automobile, station wagon	Skidding/sliding
2018-Jul-02, Mon,00:53	Clear	SMV other	P.D. only	Dry	East	Going ahead	Motorcycle	Animal - wild

Location: RENAUD RD btwn IDA ST & Continuation of RENAUD RD

Traffic Control: No control **Total Collisions:** 10

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-03, Thu,03:25	Clear	SMV unattended vehicle	P.D. only	Dry	Unknown	Unknown	Unknown	Unattended vehicle	
2014-Aug-14, Thu,14:26	Rain	Approaching	Non-fatal injury	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Passenger van	Other motor vehicle	
2015-Dec-08, Tue,17:24	Clear	SMV other	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Animal - wild	
2015-Oct-28, Wed,18:19	Rain	SMV other	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Animal - wild	

2016-Mar-31, Thu,11:24	Rain	SMV other	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other
2017-Oct-09, Mon,22:01	Fog, mist, smoke, dust	Rear end	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Dec-25, Mon,10:42	Snow	Approaching	P.D. only	Loose snow	East	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Dec-27, Wed,23:30	Clear	SMV other	P.D. only	Ice	East	Going ahead	Automobile, station wagon	Animal - wild
2018-Dec-29, Sat,06:00	Clear	SMV other	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Animal - wild
2018-Nov-16, Fri,15:30	Snow	Rear end	P.D. only	Ice	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle

Location: RENAUD RD btwn MAURICE ST & IDA ST

Traffic Control: No control **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jan-14, Wed,08:35	Clear	SMV unattended vehicle	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Unattended vehicle	
2015-Mar-09, Mon,09:11	Clear	Sideswipe	P.D. only	Wet	West	Changing lanes	Pick-up truck	Other motor vehicle	
					West	Overtaking	Pick-up truck	Other motor vehicle	

Location: RENAUD RD btwn NAVAN RD & WHITE ST

Traffic Control: No control

Total Collisions: 8

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-May-30, Fri,08:00	Clear	SMV other	P.D. only	Dry	West	Going ahead	Pick-up truck	Animal - wild	
2014-Nov-12, Wed,05:49	Clear	Rear end	P.D. only	Wet	East	Stopped	Automobile, station wagon	Skidding/sliding	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Feb-18, Wed,10:31	Clear	Angle	Non-fatal injury	Wet	South	Turning left	Pick-up truck	Other motor vehicle	
					East	Going ahead	Delivery van	Other motor vehicle	
2015-Jun-23, Tue,14:20	Clear	Other	P.D. only	Dry	East	Reversing	Delivery van	Other motor vehicle	
					West	Stopped	Passenger van	Other motor vehicle	
2015-Apr-16, Thu,10:34	Clear	SMV unattended vehicle	P.D. only	Dry	South	Reversing	Truck-other	Unattended vehicle	
2016-Jun-14, Tue,18:59	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2016-Jul-07, Thu,06:17	Rain	SMV other	P.D. only	Wet	East	Going ahead	Pick-up truck	Animal - wild	
2018-Mar-14, Wed,06:25	Snow	Angle	P.D. only	Slush	South	Reversing	Farm tractor	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD btwn PERCIFOR WAY & SADDLERIDGE DR

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-25, Wed,08:45	Snow	Rear end	P.D. only	Loose snow	West	Unknown	Unknown	Other motor vehicle	
					West	Slowing or stopping	Tow truck	Other motor vehicle	

Location: RENAUD RD btwn WEIR RD & MAURICE ST

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Jan-27, Fri,01:00	Snow	SMV other	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Snowbank/drift	

Appendix F – Trip Generation Data

Table 3.12: Person Trip Generation Rates – (all households with residents not older than 55 years of age)

Person Trip Generation Rates
All Households with persons 55 years of age or less
AM and PM Peak Hours

Dwelling Unit Types \ Geographic Areas		Core Area Person Trip Rate	Core Area %▽	Urban Area (Inside the greenbelt) Person Trip Rate	Urban Area %▽	Suburban (Outside the greenbelt) Person Trip Rate	Suburban %▽	Rural Person Trip Rate	Rural %▽	All Areas Person Trip Rate
Single detached:	AM	0.85	- 7%	0.99	+ 9%	0.94	+ 3%	0.78	- 14%	0.91
	PM	0.74	- 3%	0.75	- 1%	0.79	+ 4%	0.71	- 7%	0.76
Semi-detached:	AM	0.79	- 10%	0.97	10%	0.89	+ 1%	0.64	- 27%	0.88
	PM	0.74	- 1%	0.68	- 9%	0.82	+ 9%	0.60	- 20%	0.75
Row Townhouse:	AM	0.71	- 3%	0.78	+ 7%	0.67	- 8%	0.74	+ 1%	0.73
	PM	0.62	- 3%	0.60	- 6%	0.69	+ 8%	0.56	- 13%	0.64
Apartment:	AM	0.48	- 4%	0.51	+ 2%	0.53	+ 6%	0.36	- 28%	0.50
	PM	0.45	0%	0.42	- 7%	0.52	+ 16%	0.52	+ 16%	0.45
All Types:	AM	0.62	- 23%	0.82	+ 2%	0.86	+ 8%	0.76	- 5%	0.80
	PM	0.57	- 16%	0.63	- 7%	0.75	+ 10%	0.69	+ 1%	0.68

Note: 5 % (+ or -) represents the percentage delta change in trip rate when compared against the average trip rate across all geographic areas

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)

Reported Mode Shares
All Households with persons 55 years of age or less
AM and PM Peak Hours

Dwelling Unit Types \ Geographic Areas		Core Area Vehicle Trips	Core Area Transit Share	Core Area Non-Motorised	Urban Area (Inside the greenbelt) Vehicle Trips	Urban Area Transit Share	Urban Area Non-Motorised	Suburban (Outside the greenbelt) Vehicle Trips	Suburban Transit Share	Suburban Non-Motorised	Rural * Vehicle Trips	Rural * Transit Share	Rural * Non-Motorised	All Areas Vehicle Trips	All Areas Transit Share	All Areas Non-Motorised
Single - Detached:	AM	35%	20%	33%	51%	26%	11%	55%	25%	9%	60%	27%	4%	54%	25%	10%
	PM	45%	11%	32%	58%	19%	13%	64%	19%	6%	73%	13%	2%	63%	17%	8%
Semi-Detached:	AM	38%	30%	26%	44%	35%	10%	52%	24%	12%	64%	27%	5%	49%	28%	12%
	PM	36%	20%	34%	51%	27%	13%	62%	17%	7%	77%	12%	1%	58%	20%	10%
Row / Townhouse:	AM	33%	22%	40%	45%	34%	10%	55%	27%	8%	73%	15%	3%	49%	30%	11%
	PM	39%	15%	42%	53%	28%	8%	61%	22%	6%	74%	15%	1%	57%	24%	9%
Apartment:	AM	27%	27%	43%	37%	41%	14%	44%	34%	13%	76%	8%	16%	36%	35%	23%
	PM	23%	29%	42%	40%	37%	14%	44%	33%	9%	48%	4%	17%	35%	33%	23%
All Types:	AM	32%	24%	38%	47%	31%	11%	54%	26%	9%	61%	26%	4%	51%	27%	11%
	PM	34%	21%	38%	53%	24%	12%	62%	20%	6%	73%	13%	2%	59%	20%	10%

Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.
* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.

Table 6.1: Vehicle Trip Generation Rates

Vehicle Trip Generation Rates AM and PM Peak Hours						
ITE Land Use Code	Dwelling Unit Type / Data Source		Vehicle Trip Generation Rate			
			2008 Count Data	ITE	OD Survey	Blended Rate
210	Single-detached dwellings	AM	0.66	0.75	0.56	0.66
		PM	0.89	1.01	0.53	0.81
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.40	0.70	0.46	0.52
		PM	0.64	0.72	0.46	0.61
231	Low-rise condominiums (1 or 2 floors)	AM	0.53	0.67	0.21	0.47
		PM	0.41	0.78	0.18	0.46
232	High-rise condominiums (3+ floors)	AM	0.53	0.34	0.21	0.36
		PM	0.41	0.38	0.18	0.32
233	Luxury condominiums	AM	0.53	0.56	0.21	0.43
		PM	0.41	0.55	0.18	0.38
221	Low-rise apartments (2 floors)	AM	0.19	0.46	0.21	0.29
		PM	0.21	0.58	0.18	0.32
223	Mid-rise apartments (3-10 floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.39	0.18	0.26
222	High-rise apartments (10+ floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.35	0.18	0.25

Table 6.2: Recommended Vehicle Trip Directional Splits

Comparison of Directional Splits (Inbound/Outbound) AM and PM Peak Hours								
ITE Land Use Code	Area Dwelling Unit Type / Data Source		2008 Count Data		ITE		Blended Rate	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
210	Single-detached dwellings	AM	33%	67%	25%	75%	29%	71%
		PM	60%	40%	63%	37%	62%	39%
224	Semi-detached dwellings, townhouses, rowhouses	AM	40%	60%	33%	67%	37%	64%
		PM	55%	45%	51%	49%	53%	47%
231	Low-rise condominiums (1 or 2 floors)	AM	36%	64%	25%	75%	31%	70%
		PM	54%	46%	58%	42%	56%	44%
232	High-rise condominiums (3+ floors)	AM	36%	64%	19%	81%	28%	73%
		PM	54%	46%	62%	38%	58%	42%
233	Luxury condominiums	AM	36%	64%	23%	77%	30%	71%
		PM	54%	46%	63%	37%	59%	42%
221	Low-rise apartments (2 floors)	AM	22%	78%	21%	79%	22%	79%
		PM	62%	38%	65%	35%	64%	37%
223	Mid-rise apartments (3-10 floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%
222	High-rise apartments (10+ floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Dwelling Unit Type / Geographic Area		Vehicle Trip Rate						
			Core		Urban (Inside the Greenbelt)		Suburban (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39
Note: The transit bonus was only applied to geographic areas and dwelling unit types where the reported transit mode shares were less than the transit mode share reported for residential development located within the 600m proximity to a rapid transit station. It is noted that condominium and apartment housing categories reported similar levels of transit mode shares independent of location to rapid transit stations.									

6.5 Future Data Collection

While the rates presented in were prepared by blending the vehicle trip rates from ITE, the OD Survey and the 2008 local trip generation studies, it is important to stress the importance and need for ongoing local trip generation surveys to monitor changes in travel behaviour. The 2008 trip generation studies undertaken to support this study provide insight into local travel patterns and a well organized ongoing annual data collection program aimed at trip generation surveys of key land uses or requirement for data collection by local developers will continue to provide recent and accurate local trip generation rates. For example the high-rise apartment category of dwelling units reported the lowest peak hour vehicle trip rates.

Orleans

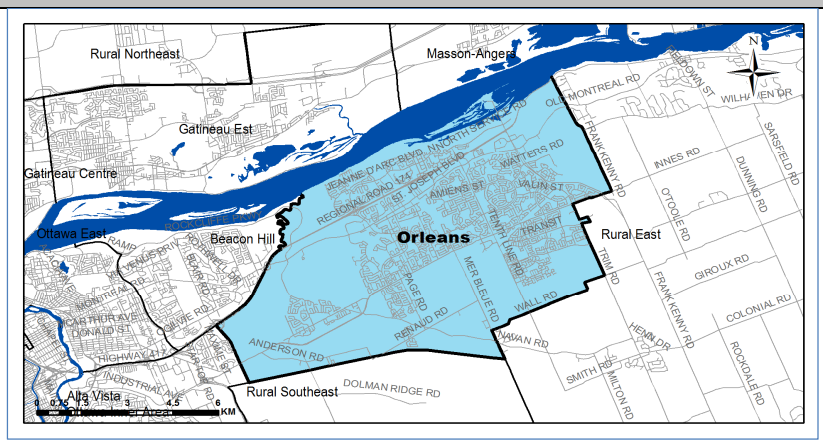
Demographic Characteristics

Population	117,440	Actively Travelled	95,100
Employed Population	57,400	Number of Vehicles	70,160
Households	42,950	Area (km^2)	88.6

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	27,630	24,540	52,170
Part Time Employed	2,040	3,200	5,240
Student	14,100	14,710	28,800
Retiree	8,240	9,820	18,060
Unemployed	890	790	1,670
Homemaker	110	2,990	3,090
Other	630	1,030	1,660
Total:	53,630	57,060	110,690

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	11,690	13,440	25,130
Licensed Drivers	41,780	42,490	84,270
Telecommuters	270	260	530
Trips made by residents	147,960	163,290	311,250

Selected Indicators	
Daily Trips per Person (age 5+)	2.81
Vehicles per Person	0.60
Number of Persons per Household	2.73
Daily Trips per Household	7.25
Vehicles per Household	1.63
Workers per Household	1.34
Population Density (Pop/km2)	1330

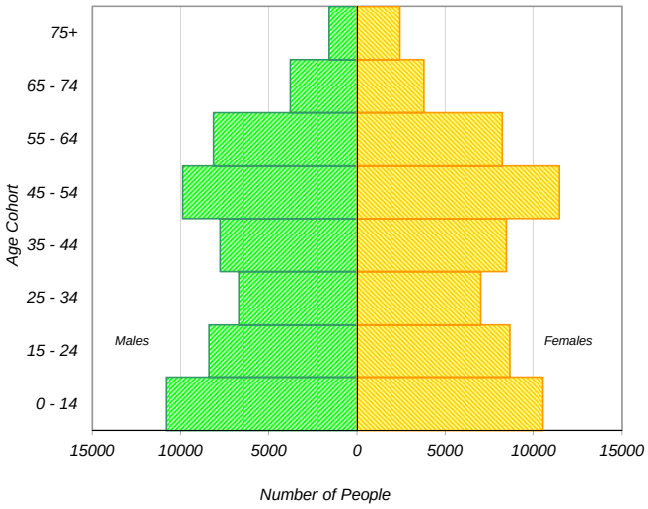


Household Size		
1 person	6,490	15%
2 persons	14,600	34%
3 persons	8,630	20%
4 persons	9,090	21%
5+ persons	4,130	10%
Total:	42,950	100%

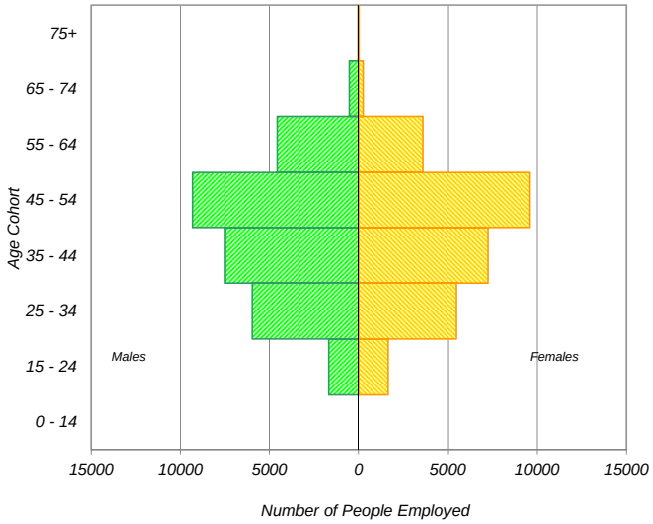
Households by Vehicle Availability		
0 vehicles	1,390	3%
1 vehicle	18,250	42%
2 vehicles	19,080	44%
3 vehicles	3,330	8%
4+ vehicles	890	2%
Total:	42,950	100%

Households by Dwelling Type		
Single-detached	25,970	60%
Semi-detached	3,250	8%
Townhouse	10,730	25%
Apartment/Condo	3,010	7%
Total:	42,950	100%

Population



Employed Population

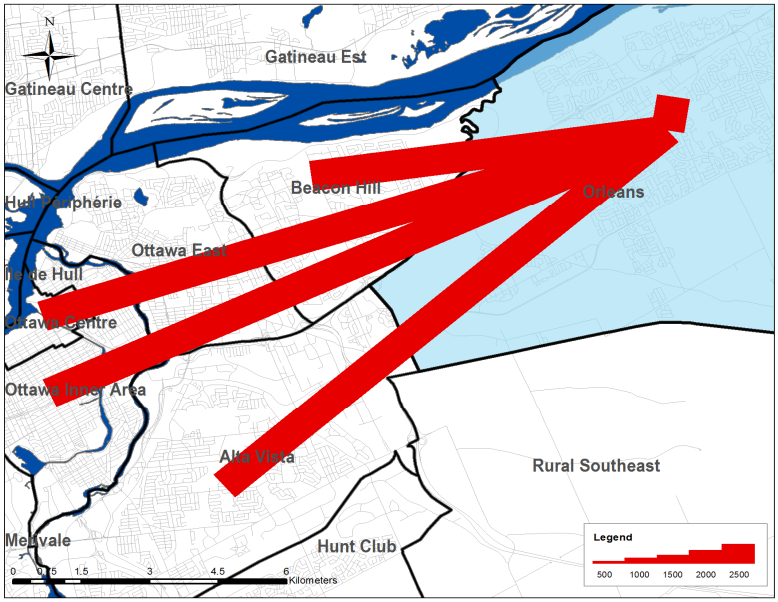


* In 2005 data was only collected for household members aged 11$^+$ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from Orleans

AM Peak Period



Summary of Trips to and from Orleans

AM Peak Period (6:30 - 8:59)	Destinations of Trips From District	% Total	Origins of Trips To District	% Total
Districts				
Ottawa Centre	7,330	11%	130	0%
Ottawa Inner Area	4,800	7%	630	2%
Ottawa East	2,840	4%	600	2%
Beacon Hill	4,180	6%	760	2%
Alta Vista	5,890	9%	1,050	3%
Hunt Club	950	1%	630	2%
Merivale	1,940	3%	460	1%
Ottawa West	1,460	2%	220	1%
Bayshore / Cedarview	1,210	2%	310	1%
Orléans	29,900	46%	29,900	78%
Rural East	1,000	2%	1,970	5%
Rural Southeast	70	0%	290	1%
South Gloucester / Leitrim	170	0%	50	0%
South Nepean	200	0%	330	1%
Rural Southwest	70	0%	70	0%
Kanata / Stittsvile	500	1%	290	1%
Rural West	70	0%	0	0%
Île de Hull	1,530	2%	80	0%
Hull Périphérie	460	1%	200	1%
Plateau	10	0%	80	0%
Aylmer	60	0%	90	0%
Rural Northwest	50	0%	40	0%
Pointe Gatineau	200	0%	70	0%
Gatineau Est	40	0%	60	0%
Rural Northeast	10	0%	20	0%
Buckingham / Masson-Angers	0	0%	30	0%
Ontario Sub-Total:	62,580	96%	37,690	98%
Québec Sub-Total:	2,360	4%	670	2%
Total:	64,940	100%	38,360	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	38,220	40%	7,250	8%	9,470	6%
School	9,890	10%	2,120	2%	15,080	10%
Shopping	7,210	8%	7,770	8%	23,480	16%
Leisure	8,640	9%	6,050	6%	15,650	10%
Medical	2,450	3%	1,950	2%	2,610	2%
Pick-up / drive passenger	6,060	6%	5,730	6%	12,910	9%
Return Home	18,630	20%	60,820	64%	65,050	43%
Other	3,880	4%	2,890	3%	6,970	5%
Total:	94,980	100%	94,580	100%	151,220	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	25,310	72%	3,910	46%	4,740	16%
School	5,870	17%	1,940	23%	13,930	47%
Shopping	240	1%	240	3%	840	3%
Leisure	470	1%	400	5%	1,190	4%
Medical	560	2%	310	4%	230	1%
Pick-up / drive passenger	1,780	5%	550	7%	4,540	15%
Return Home	210	1%	710	8%	2,160	7%
Other	630	2%	400	5%	2,280	8%
Total:	35,070	100%	8,460	100%	29,910	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	970	8%	370	1%	660	2%
School	420	3%	10	0%	30	0%
Shopping	1,090	9%	1,910	5%	4,480	13%
Leisure	2,110	17%	1,300	4%	3,470	10%
Medical	250	2%	520	1%	470	1%
Pick-up / drive passenger	1,220	10%	2,850	8%	3,080	9%
Return Home	5,530	46%	26,920	77%	20,320	60%
Other	470	4%	870	3%	1,190	4%
Total:	12,060	100%	34,750	100%	33,700	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	340,780		44%
AM Peak Period	73,440	22%	41%
PM Peak Period	80,510	24%	42%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	57,110	60%	57,360	61%	82,890	55%
Auto Passenger	14,260	15%	13,790	15%	30,320	20%
Transit	21,040	22%	20,690	22%	6,650	4%
Bicycle	400	0%	400	0%	1,600	1%
Walk	70	0%	30	0%	18,160	12%
Other	2,110	2%	2,320	2%	11,590	8%
Total:	94,990	100%	94,590	100%	151,210	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	19,140	55%	5,160	61%	11,450	38%
Auto Passenger	2,970	8%	1,080	13%	5,840	20%
Transit	12,140	35%	870	10%	2,170	7%
Bicycle	230	1%	0	0%	490	2%
Walk	30	0%	10	0%	4,780	16%
Other	550	2%	1,340	16%	5,170	17%
Total:	35,060	100%	8,460	100%	29,900	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	7,680	64%	19,440	56%	18,250	54%
Auto Passenger	2,580	21%	3,680	11%	7,810	23%
Transit	1,420	12%	11,050	32%	1,130	3%
Bicycle	0	0%	230	1%	380	1%
Walk	0	0%	20	0%	3,660	11%
Other	380	3%	320	1%	2,460	7%
Total:	12,060	100%	34,740	100%	33,690	100%

Avg Vehicle Occupancy	From District	To District	Within District
24 Hours	1.25	1.24	1.37
AM Peak Period	1.16	1.21	1.51
PM Peak Period	1.34	1.19	1.43

Transit Modal Split	From District	To District	Within District
24 Hours	23%	23%	6%
AM Peak Period	35%	12%	11%
PM Peak Period	12%	32%	4%

Appendix G – TDM Checklists

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☐
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☐
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☐
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☐
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☐
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☐
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☐
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☐
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☐
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☐
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☐
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix H – MMLOS Analysis

Multi-Modal Level of Service
Spring Valley Trails Phases 5 & 6
Scenario: Future Conditions

February 18, 2020

IBI

INTERSECTIONS		Navan Road & Renaud Road				Joshua/ Percifor Way & Renaud																Intersection 1			
		NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg	NORTH leg	SOUTH leg	EAST leg	WEST leg
Pedestrian	Lanes (do NOT include lanes protected by bulb-outs)	3	3	3	3	3	3	3	3																
	Median	No Median	No Median	No Median	No Median	No Median	No Median	No Median	No Median																
	Island Refuge																								
	Conflicting Left Turns (from street to right)	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive																
	Conflicting Right Turns (from street to left)	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control																
	RTOR? (from street to left)	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed																
	Ped Leading Interval? (on cross street)	No	No	No	No	No	No	No	No																
	Corner Radius	> 3m to 5m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 10m to 15m	> 10m to 15m	> 10m to 15m	> 10m to 15m																
	Right Turn Channel	No right turn channel	Conventional right turn channel without receiving lane	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel	No right turn channel																
	Crosswalk Type	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings	Standard transverse markings																
	LOS (PETSI)	72 C	72 C	68 C	68 C	70 C	70 C	70 C	70 C	#N/A #N/A	#N/A	#N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A	#N/A #N/A
	Cycle Length (sec)	128	128	128	128	120	120	120	120																
	Pedestrian Walk Time (solid white symbol) (sec)	12	12	7	7	7	7	7	7																
	LOS (Delay,seconds)	54.4 E	54.4 E	58.3 E	58.3 E	54.3 E	54.3 E	54.3 E	54.3 E	#DIV/0! #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Overall Level of Service	E				E				#N/A				#N/A				#N/A				#N/A			
Cyclist	Type of Bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Bike Pocket at Intersection	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic																
	Turning Speed (based on corner radius & angle)		Fast		Slow																				
	Right Turn Storage Length		≤ 50m		≤ 50m																				
	Dual Right Turn?		No		No																				
	Shared Through-Right?	Yes	No	Yes	No	Yes	Yes	Yes	Yes																
	Bike Box?	No	No	No	No	No	No	No	No																
	Number of Lanes Crossed for Left Turns	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed	1 Lane Crossed																
	Operating Speed on Approach	≥ 60km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h	≥ 60km/h																
	Dual Left Turn Lanes?	No	No	No	No	No	No	No	No																
	Level of Service	F	F	F	F	F	F	F	F																
		F				F				#VALUE!				#VALUE!				#VALUE!				#VALUE!			
Transit	Average Signal Delay		≤30 sec		≤30 sec			≤10 sec	≤20 sec																
	Level of Service				D			B	C																
		D				C																			
Truck	Turning Radius (Right Turn)	< 10m	> 15m	> 15m	> 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m																
	Number of Receiving Lanes	1	1	1	1	1	1	1	1																
		F	C	C	C	E	E	E	E																
		F				E				#VALUE!				#VALUE!				#VALUE!				#VALUE!			

SEGMENTS			Renaud Road - Joshua / Percifor to Saddleridge				Renaud Road - Saddleridge to Navan				Navan Road - Renaud to Spring Valley			#REF!	Section			#REF!	Section			#REF!	Section			#REF!	Section		
			1	2	3		1	2	3		1	2	3		1	2	3		1	2	3		1	2	3		1	2	3
Pedestrian	Sidewalk Width		1.8				1.8				No Sidewalk																		
	Boulevard Width		0.5 to 2				0.5 to 2				N/A																		
	AADT		> 3000				> 3000				N/A																		
	On-Street Parking		No				No				N/A																		
	Operating Speed		51 to 60 km/h				51 to 60 km/h				61 km/h or more																		
	Level of Service		E				E				F																		
			E				E				F				#VALUE!				#VALUE!				#VALUE!				#VALUE!		
Cyclist	Type of Bikeway		Mixed Traffic				Mixed Traffic				Mixed Traffic																		
	Number of Travel Lanes (per direction)		2 Travel Lanes Per Direction				2 Travel Lanes Per Direction				2 Travel Lanes Per Direction																		
	Raised Median?																												
	Bike Lane Width																												
	Operating Speed		60 km/h				60 km/h				60 km/h																		
	Bike Lane Blockages (Commercial Areas)																												
	Median Refuge																												
	Number of Travel Lanes on Sidestreet																												
	Sidestreet Operating Speed																												
	Level of Service		F				F				F																		
Transit	Facility Type		Mixed Traffic				Mixed Traffic				Mixed Traffic																		
	Friction		Limited parking/driveway friction				Limited parking/driveway friction				Limited parking/driveway friction																		
	Level of Service		D				D				D				#N/A				#N/A				#N/A				#N/A		
Truck	Curb Lane Width		>3.7				>3.7				≤3.5																		
	Number of Travel Lanes		2				2				2																		
			B				B				C																		
			B				B				C				#VALUE!				#VALUE!				#VALUE!				#VALUE!		

Appendix I – Intersection Control Warrants

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Renaud Road & Joshua Street / Percifor Way

What is the direction of the Main Road street? East-West

When was the data collected? Future (2028) Background Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

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

Hour Ending	Main Eastbound Approach			Minor Northbound Approach			Main Westbound Approach			Minor Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	10	165	14	411	4	30	26	751	21	51	6	96	
8:00	5	83	7	206	2	15	13	376	11	26	3	48	
9:00	5	83	7	206	2	15	13	376	11	26	3	48	
10:00	5	83	7	206	2	15	13	376	11	26	3	48	
15:00	64	753	113	32	5	35	45	216	64	59	2	26	
16:00	32	377	57	16	3	18	23	108	32	30	1	13	
17:00	32	377	57	16	3	18	23	108	32	30	1	13	
18:00	32	377	57	16	3	18	23	108	32	30	1	13	
Total	**185**	**2,295**	**318**	**1,108**	**23**	**163**	**178**	**2,418**	**213**	**275**	**20**	**305**	**0**

Justification 5: Collision Experience

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

* Include only collisions that are susceptable 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									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Renaud Road & Joshua Street / Percifor Way Count Date: Future (2028) Background Traffic

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	99	%	☐	☑
	B	Crossing Volume	79	%		
2. Delay to Cross Traffic	A	Main Road	83	%	☐	☑
	B	Crossing Road	87	%		
3. Combination	A	Justificaton 1	79	%	☐	☑
	B	Justification 2	83	%		
4. 4-Hr Volume			60	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Renaud Road & Joshua Street / Percifor Way

What is the direction of the Main Road street? East-West

When was the data collected? Future (2028) Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban **Population >= 10,000 AND Speed < 70 km/hr**

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

Hour Ending	Main Eastbound Approach			Minor Northbound Approach			Main Westbound Approach			Minor Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	10	165	28	438	4	30	26	751	21	51	6	96	
8:00	5	83	14	219	2	15	13	376	11	26	3	48	
9:00	5	83	14	219	2	15	13	376	11	26	3	48	
10:00	5	83	14	219	2	15	13	376	11	26	3	48	
15:00	64	753	139	54	5	35	45	216	64	59	2	26	
16:00	32	377	70	27	3	18	23	108	32	30	1	13	
17:00	32	377	70	27	3	18	23	108	32	30	1	13	
18:00	32	377	70	27	3	18	23	108	32	30	1	13	
Total	**185**	**2,295**	**418**	**1,230**	**23**	**163**	**178**	**2,418**	**213**	**275**	**20**	**305**	**0**

Justification 5: Collision Experience

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

* Include only collisions that are susceptable 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									
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate									
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									6,411

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	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds									
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	0%		0%		0%		0%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Renaud Road & Joshua Street / Percifor Way Count Date: Future (2028) Total Traffic

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100	%	☐	☑
	B	Crossing Volume	82	%		
2. Delay to Cross Traffic	A	Main Road	84	%	☐	☑
	B	Crossing Road	92	%		
3. Combination	A	Justificaton 1	82	%	☑	☐
	B	Justification 2	84	%		
4. 4-Hr Volume			61	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

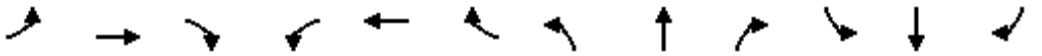
Appendix J – Intersection Capacity Analysis

Intersection	
Intersection Delay, s/veh	113.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	106	14	26	583	21	411	4	30	51	6	96
Future Vol, veh/h	10	106	14	26	583	21	411	4	30	51	6	96
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	8	7	46	1	0	1	25	10	2	17	0
Mvmt Flow	11	118	16	29	648	23	457	4	33	57	7	107
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	15.5	191.7	66.5	14.4
HCM LOS	C	F	F	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	12%	0%	88%	0%	97%	0%	6%
Vol Right, %	0%	88%	0%	12%	0%	3%	0%	94%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	411	34	10	120	26	604	51	102
LT Vol	411	0	10	0	26	0	51	0
Through Vol	0	4	0	106	0	583	0	6
RT Vol	0	30	0	14	0	21	0	96
Lane Flow Rate	457	38	11	133	29	671	57	113
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.989	0.074	0.027	0.308	0.069	1.367	0.137	0.246
Departure Headway (Hd)	8.669	7.937	9.562	9.095	8.653	7.332	9.868	8.921
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	420	454	377	397	412	497	365	406
Service Time	6.369	5.637	7.262	6.795	6.444	5.122	7.568	6.621
HCM Lane V/C Ratio	1.088	0.084	0.029	0.335	0.07	1.35	0.156	0.278
HCM Control Delay	71.1	11.3	12.5	15.8	12.1	199.4	14.1	14.5
HCM Lane LOS	F	B	B	C	B	F	B	B
HCM 95th-tile Q	12.1	0.2	0.1	1.3	0.2	30.4	0.5	1

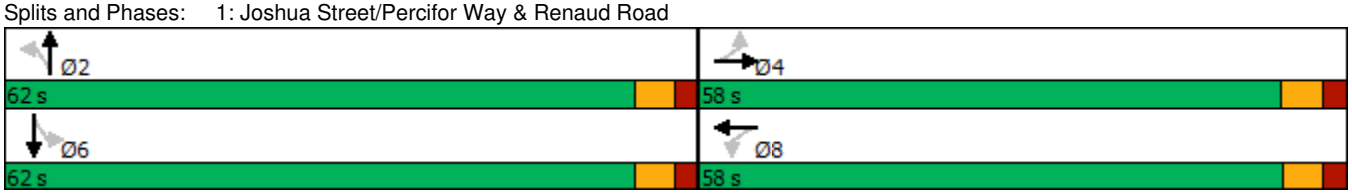


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	106	14	26	583	21	411	4	30	51	6	96
Future Volume (vph)	10	106	14	26	583	21	411	4	30	51	6	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00		0.99	0.96		0.97	0.98	
Frt		0.982			0.995			0.866			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1652	0	1184	1791	0	1712	1352	0	1695	1509	0
Flt Permitted	0.150			0.671			0.684			0.733		
Satd. Flow (perm)	273	1652	0	834	1791	0	1226	1352	0	1273	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			2			33			107	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	6		1	1		6	2		9	9		2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	8%	7%	46%	1%	0%	1%	25%	10%	2%	17%	0%
Adj. Flow (vph)	11	118	16	29	648	23	457	4	33	57	7	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	134	0	29	671	0	457	37	0	57	114	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	58.0	58.0		58.0	58.0		62.0	62.0		62.0	62.0	
Total Split (%)	48.3%	48.3%		48.3%	48.3%		51.7%	51.7%		51.7%	51.7%	
Maximum Green (s)	52.0	52.0		52.1	52.1		56.3	56.3		56.3	56.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	41.4	41.4		41.5	41.5		42.4	42.4		42.4	42.4	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.44	0.44		0.44	0.44	
v/c Ratio	0.09	0.19		0.08	0.87		0.85	0.06		0.10	0.16	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	22.4	19.0		19.8	40.1		41.4	6.8		17.8	4.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.4	19.0		19.8	40.1		41.4	6.8		17.8	4.7	
LOS	C	B		B	D		D	A		B	A	
Approach Delay		19.3			39.2			38.8			9.1	
Approach LOS		B			D			D			A	
Queue Length 50th (m)	1.3	15.2		3.3	118.1		79.5	0.4		6.5	0.8	
Queue Length 95th (m)	5.6	31.0		10.0	#208.1		#140.8	6.3		15.1	10.6	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	158	963		485	1043		771	862		801	989	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.14		0.06	0.64		0.59	0.04		0.07	0.12	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 96.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 33.7		Intersection LOS: C	
Intersection Capacity Utilization 74.1%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



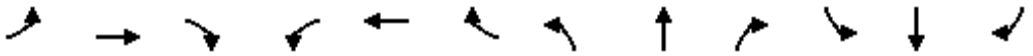
Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	173	14	83	600	30	78
Future Vol, veh/h	173	14	83	600	30	78
Conflicting Peds, #/hr	0	2	2	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	13	0	6	3	0	16
Mvmt Flow	192	16	92	667	33	87

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	210	0	1054	204
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	852	-
Critical Hdwy	-	-	4.16	-	6.4	6.36
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.444
Pot Cap-1 Maneuver	-	-	1337	-	252	802
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1334	-	234	799
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	392	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	234	799	-	-	1334	-
HCM Lane V/C Ratio	0.142	0.108	-	-	0.069	-
HCM Control Delay (s)	22.9	10.1	-	-	7.9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	0.4	-	-	0.2	-

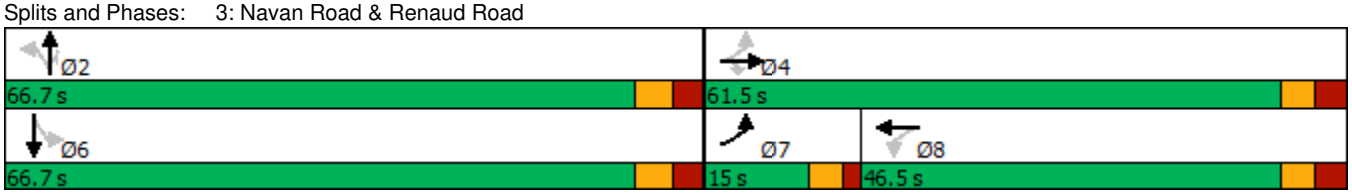


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	110	33	31	337	108	124	321	31	47	110	2
Future Volume (vph)	109	110	33	31	337	108	124	321	31	47	110	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	0.99	0.99		1.00		0.98	1.00	1.00	
Frt			0.850		0.964				0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1572	1717	1502	1372	1726	0	1679	1701	1300	1530	1493	0
Flt Permitted	0.233			0.679			0.677			0.374		
Satd. Flow (perm)	386	1717	1454	971	1726	0	1193	1701	1269	601	1493	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			37		13				72		1	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	4		3	3		4	2		2	2		2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	10%	6%	3%	26%	1%	0%	3%	7%	19%	13%	22%	0%
Adj. Flow (vph)	121	122	37	34	374	120	138	357	34	52	122	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	122	37	34	494	0	138	357	34	52	124	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	46.4	44.9	44.9	30.0	30.0		24.2	24.2	24.2	24.2	24.2	
Actuated g/C Ratio	0.56	0.54	0.54	0.36	0.36		0.29	0.29	0.29	0.29	0.29	
v/c Ratio	0.34	0.13	0.05	0.10	0.78		0.40	0.72	0.08	0.30	0.28	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	12.6	10.9	3.9	19.8	33.4		28.5	36.2	1.1	29.5	25.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	12.6	10.9	3.9	19.8	33.4		28.5	36.2	1.1	29.5	25.6	
LOS	B	B	A	B	C		C	D	A	C	C	
Approach Delay		10.7			32.5			32.0			26.7	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	8.4	8.9	0.0	3.5	66.6		17.6	51.1	0.0	6.4	15.2	
Queue Length 95th (m)	20.5	21.2	4.6	10.8	120.8		36.8	89.3	1.2	17.7	31.7	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	365	1185	1015	487	873		895	1277	970	451	1121	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.33	0.10	0.04	0.07	0.57		0.15	0.28	0.04	0.12	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 128.2			
Actuated Cycle Length: 82.8			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 27.6		Intersection LOS: C	
Intersection Capacity Utilization 75.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Navan Road & Renaud Road



Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	0	3	2	0	35	99	372	0	7	138	29
Future Vol, veh/h	69	0	3	2	0	35	99	372	0	7	138	29
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	11	0	0	0	0	0	2	5	0	0	17	33
Mvmt Flow	77	0	3	2	0	39	110	413	0	8	153	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	823	803	154	820	835	413	186	0	0	413	0	0
Stage 1	170	170	-	633	633	-	-	-	-	-	-	-
Stage 2	653	633	-	187	202	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	282	319	897	296	306	643	1388	-	-	1157	-	-
Stage 1	811	762	-	471	476	-	-	-	-	-	-	-
Stage 2	442	476	-	819	738	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	242	284	896	270	272	643	1387	-	-	1157	-	-
Mov Cap-2 Maneuver	242	284	-	270	272	-	-	-	-	-	-	-
Stage 1	727	755	-	422	427	-	-	-	-	-	-	-
Stage 2	372	427	-	809	731	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26	11.5	1.6	0.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1387	-	-	250	598	1157	-	-
HCM Lane V/C Ratio	0.079	-	-	0.32	0.069	0.007	-	-
HCM Control Delay (s)	7.8	0	-	26	11.5	8.1	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1.3	0.2	0	-	-

Intersection	
Intersection Delay, s/veh	65.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	575	113	45	129	64	32	5	35	59	2	26
Future Vol, veh/h	64	575	113	45	129	64	32	5	35	59	2	26
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	1	0	16	7	0	3	0	0	0	0	0
Mvmt Flow	71	639	126	50	143	71	36	6	39	66	2	29
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	94	11.5	10.8	11.3
HCM LOS	F	B	B	B

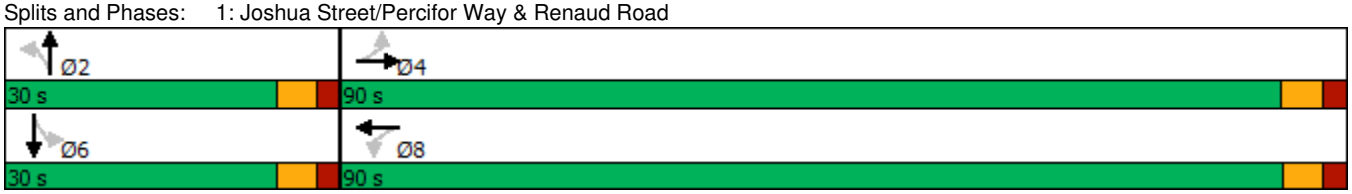
Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	12%	0%	84%	0%	67%	0%	7%
Vol Right, %	0%	88%	0%	16%	0%	33%	0%	93%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	32	40	64	688	45	193	59	28
LT Vol	32	0	64	0	45	0	59	0
Through Vol	0	5	0	575	0	129	0	2
RT Vol	0	35	0	113	0	64	0	26
Lane Flow Rate	36	44	71	764	50	214	66	31
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.076	0.08	0.118	1.143	0.092	0.342	0.138	0.056
Departure Headway (Hd)	8.128	6.934	5.986	5.383	6.923	6.023	8.013	6.834
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	443	520	602	680	521	600	450	527
Service Time	5.828	4.634	3.686	3.083	4.623	3.723	5.713	4.534
HCM Lane V/C Ratio	0.081	0.085	0.118	1.124	0.096	0.357	0.147	0.059
HCM Control Delay	11.5	10.2	9.5	101.9	10.3	11.8	12	9.9
HCM Lane LOS	B	B	A	F	B	B	B	A
HCM 95th-tile Q	0.2	0.3	0.4	23.9	0.3	1.5	0.5	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	575	113	45	129	64	32	5	35	59	2	26
Future Volume (vph)	64	575	113	45	129	64	32	5	35	59	2	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98				0.99		0.99	0.96		0.97	0.98	
Frt		0.975			0.950			0.870			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1760	0	1491	1630	0	1679	1513	0	1729	1527	0
Flt Permitted	0.624			0.256			0.737			0.728		
Satd. Flow (perm)	1118	1760	0	402	1630	0	1294	1513	0	1286	1527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			50			39			29	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	7					7	2		10	10		2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	1%	0%	16%	7%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	71	639	126	50	143	71	36	6	39	66	2	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	765	0	50	214	0	36	45	0	66	31	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	90.0	90.0		90.0	90.0		30.0	30.0		30.0	30.0	
Total Split (%)	75.0%	75.0%		75.0%	75.0%		25.0%	25.0%		25.0%	25.0%	
Maximum Green (s)	84.0	84.0		84.1	84.1		24.3	24.3		24.3	24.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	28.1	28.1		28.2	28.2		8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.57	0.57		0.57	0.57		0.17	0.17		0.17	0.17	
v/c Ratio	0.11	0.76		0.22	0.22		0.16	0.15		0.29	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	5.0	13.1		7.6	4.3		23.0	11.3		24.9	11.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.0	13.1		7.6	4.3		23.0	11.3		24.9	11.4	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		12.4			4.9			16.5			20.6	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.2	38.3		1.7	5.3		2.6	0.4		4.8	0.2	
Queue Length 95th (m)	6.9	84.5		6.7	14.1		11.2	8.3		17.8	6.6	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	1118	1760		402	1630		681	815		677	818	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.43		0.12	0.13		0.05	0.06		0.10	0.04	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 49.2			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 68.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



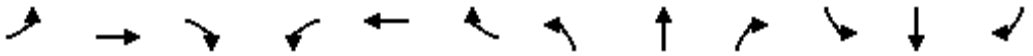
Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	641	28	71	226	12	75
Future Vol, veh/h	641	28	71	226	12	75
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	1	4	0	13
Mvmt Flow	712	31	79	251	13	83

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	743	0	1137	729
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	409	-
Critical Hdwy	-	-	4.11	-	6.4	6.33
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.417
Pot Cap-1 Maneuver	-	-	869	-	225	405
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	675	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	869	-	205	405
Mov Cap-2 Maneuver	-	-	-	-	205	-
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	614	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	205	405	-	-	869	-
HCM Lane V/C Ratio	0.065	0.206	-	-	0.091	-
HCM Control Delay (s)	23.8	16.2	-	-	9.6	-
HCM Lane LOS	C	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.8	-	-	0.3	-



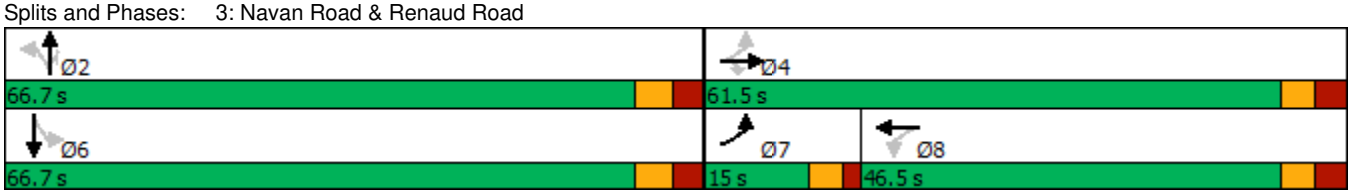
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	383	157	26	119	54	37	138	41	104	368	4
Future Volume (vph)	189	383	157	26	119	54	37	138	41	104	368	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.95	0.98	0.98		1.00		0.97	1.00	1.00	
Frt			0.850		0.953				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1802	1502	1662	1673	0	1679	1640	1517	1712	1684	0
Flt Permitted	0.465			0.514			0.386			0.660		
Satd. Flow (perm)	809	1802	1425	884	1673	0	680	1640	1477	1184	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			139		19				72		1	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	7		8	8		7	3		3	3		3
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Adj. Flow (vph)	210	426	174	29	132	60	41	153	46	116	409	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	426	174	29	192	0	41	153	46	116	413	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	30.0	28.4	28.4	13.3	13.3		22.1	22.1	22.1	22.1	22.1	
Actuated g/C Ratio	0.47	0.44	0.44	0.21	0.21		0.34	0.34	0.34	0.34	0.34	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.41	0.53	0.25	0.16	0.53		0.18	0.27	0.08	0.29	0.71	
Control Delay	14.9	17.6	5.3	25.8	27.9		16.7	16.5	2.1	17.3	25.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	14.9	17.6	5.3	25.8	27.9		16.7	16.5	2.1	17.3	25.7	
LOS	B	B	A	C	C		B	B	A	B	C	
Approach Delay		14.3			27.6			13.8			23.9	
Approach LOS		B			C			B			C	
Queue Length 50th (m)	13.9	34.0	2.2	2.8	17.9		3.2	12.4	0.0	9.5	40.0	
Queue Length 95th (m)	36.1	78.6	14.7	10.5	43.1		10.3	27.0	3.2	22.5	76.1	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	518	1557	1250	569	1085		618	1490	1349	1076	1530	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.41	0.27	0.14	0.05	0.18		0.07	0.10	0.03	0.11	0.27	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 64.1
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 77.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Navan Road & Renaud Road



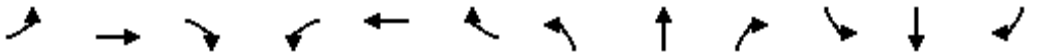
Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	0	25	1	0	17	25	157	2	31	429	91
Future Vol, veh/h	42	0	25	1	0	17	25	157	2	31	429	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	4	0	0	0	0	8	0	0	5	0
Mvmt Flow	47	0	28	1	0	19	28	174	2	34	477	101

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	786	777	477	841	877	175	578	0	0	176	0	0
Stage 1	545	545	-	231	231	-	-	-	-	-	-	-
Stage 2	241	232	-	610	646	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	309	330	584	287	289	874	1006	-	-	1412	-	-
Stage 1	521	522	-	776	717	-	-	-	-	-	-	-
Stage 2	760	716	-	485	470	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	287	308	584	259	270	874	1006	-	-	1412	-	-
Mov Cap-2 Maneuver	287	308	-	259	270	-	-	-	-	-	-	-
Stage 1	505	503	-	752	695	-	-	-	-	-	-	-
Stage 2	721	694	-	445	453	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	9.8	1.2	0.4
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1006	-	-	354	772	1412	-	-
HCM Lane V/C Ratio	0.028	-	-	0.21	0.026	0.024	-	-
HCM Control Delay (s)	8.7	0	-	17.9	9.8	7.6	0	-
HCM Lane LOS	A	A	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	0.1	0.1	-	-

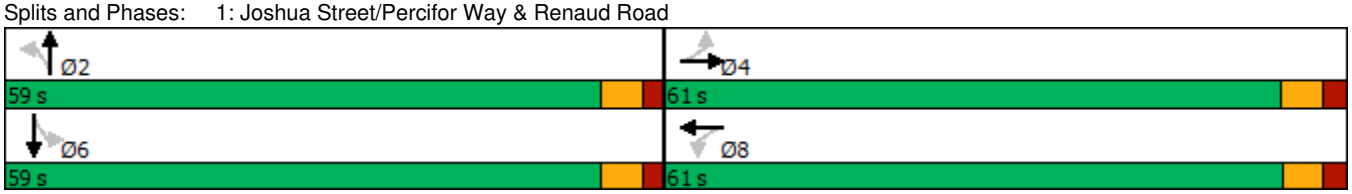


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	136	14	26	658	21	411	4	30	51	6	96
Future Volume (vph)	10	136	14	26	658	21	411	4	30	51	6	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00		0.99	0.96		0.97	0.98	
Frt		0.986			0.995			0.868			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1659	0	1184	1791	0	1712	1354	0	1695	1510	0
Flt Permitted	0.174			0.662			0.691			0.735		
Satd. Flow (perm)	317	1659	0	823	1791	0	1238	1354	0	1276	1510	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			2			30			96	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	6		1	1		6	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	8%	7%	46%	1%	0%	1%	25%	10%	2%	17%	0%
Adj. Flow (vph)	10	136	14	26	658	21	411	4	30	51	6	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	150	0	26	679	0	411	34	0	51	102	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	61.0	61.0		61.0	61.0		59.0	59.0		59.0	59.0	
Total Split (%)	50.8%	50.8%		50.8%	50.8%		49.2%	49.2%		49.2%	49.2%	
Maximum Green (s)	55.0	55.0		55.1	55.1		53.3	53.3		53.3	53.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	40.5	40.5		40.6	40.6		36.4	36.4		36.4	36.4	
Actuated g/C Ratio	0.45	0.45		0.45	0.45		0.41	0.41		0.41	0.41	
v/c Ratio	0.07	0.20		0.07	0.84		0.82	0.06		0.10	0.15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.7	16.8		17.2	33.8		40.0	8.0		19.1	5.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.7	16.8		17.2	33.8		40.0	8.0		19.1	5.4	
LOS	B	B		B	C		D	A		B	A	
Approach Delay		16.9			33.2			37.5			10.0	
Approach LOS		B			C			D			A	
Queue Length 50th (m)	0.9	14.3		2.4	98.6		61.1	0.4		5.3	0.6	
Queue Length 95th (m)	4.8	33.0		8.8	188.9		120.8	6.4		14.5	10.5	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	210	1104		547	1191		804	890		829	1015	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.14		0.05	0.57		0.51	0.04		0.06	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 89.8			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 30.3		Intersection LOS: C	
Intersection Capacity Utilization 78.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



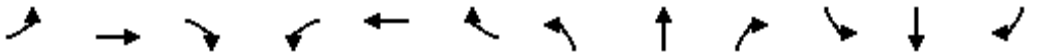
Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	208	14	83	677	30	78
Future Vol, veh/h	208	14	83	677	30	78
Conflicting Peds, #/hr	0	2	2	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	13	0	6	3	0	16
Mvmt Flow	208	14	83	677	30	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	224	0	1061	219
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	844	-
Critical Hdwy	-	-	4.16	-	6.4	6.36
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.444
Pot Cap-1 Maneuver	-	-	1321	-	250	787
Stage 1	-	-	-	-	824	-
Stage 2	-	-	-	-	425	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1318	-	234	784
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	398	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	234	784	-	-	1318	-
HCM Lane V/C Ratio	0.128	0.099	-	-	0.063	-
HCM Control Delay (s)	22.6	10.1	-	-	7.9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	0.3	-	-	0.2	-

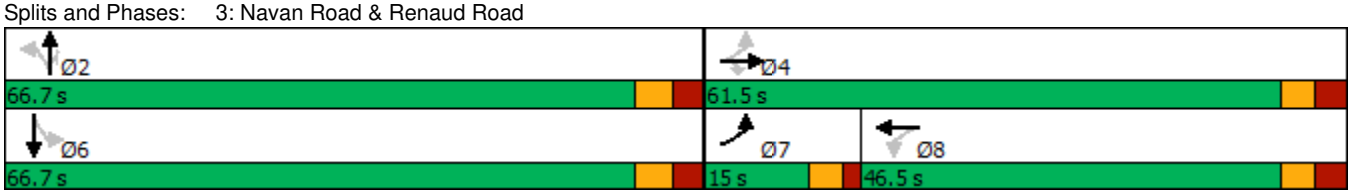


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	126	40	33	377	148	142	367	33	70	132	10
Future Volume (vph)	128	126	40	33	377	148	142	367	33	70	132	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	0.99	0.99		1.00		0.98	1.00	1.00	
Frt			0.850		0.958				0.850		0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1572	1717	1502	1372	1714	0	1679	1701	1300	1530	1492	0
Flt Permitted	0.229			0.676			0.666			0.341		
Satd. Flow (perm)	379	1717	1454	967	1714	0	1173	1701	1269	548	1492	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			40		16				72		4	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	4		3	3		4	2		2	2		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	6%	3%	26%	1%	0%	3%	7%	19%	13%	22%	0%
Adj. Flow (vph)	128	126	40	33	377	148	142	367	33	70	132	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	126	40	33	525	0	142	367	33	70	142	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	51.2	49.7	49.7	34.7	34.7		25.3	25.3	25.3	25.3	25.3	
Actuated g/C Ratio	0.58	0.56	0.56	0.39	0.39		0.29	0.29	0.29	0.29	0.29	
v/c Ratio	0.36	0.13	0.05	0.09	0.77		0.42	0.76	0.08	0.45	0.33	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	12.9	10.9	3.9	19.6	32.6		30.7	40.0	0.9	37.1	27.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	12.9	10.9	3.9	19.6	32.6		30.7	40.0	0.9	37.1	27.1	
LOS	B	B	A	B	C		C	D	A	D	C	
Approach Delay		10.8			31.8			35.2			30.4	
Approach LOS		B			C			D			C	
Queue Length 50th (m)	9.3	9.5	0.0	3.5	74.2		20.2	58.5	0.0	10.0	19.0	
Queue Length 95th (m)	22.0	22.3	4.9	10.7	#135.8		37.8	92.3	0.9	23.8	35.2	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	357	1093	940	448	802		814	1181	903	380	1037	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.36	0.12	0.04	0.07	0.65		0.17	0.31	0.04	0.18	0.14	

Intersection Summary			
Area Type:	Other		
Cycle Length: 128.2			
Actuated Cycle Length: 88.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 28.9		Intersection LOS: C	
Intersection Capacity Utilization 83.9%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Navan Road & Renaud Road



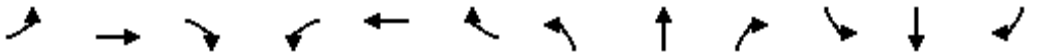
Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	0	3	2	0	35	99	430	0	7	167	29
Future Vol, veh/h	69	0	3	2	0	35	99	430	0	7	167	29
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	0	0	0	2	5	0	0	17	33
Mvmt Flow	69	0	3	2	0	35	99	430	0	7	167	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	828	810	168	825	839	430	197	0	0	430	0	0
Stage 1	182	182	-	628	628	-	-	-	-	-	-	-
Stage 2	646	628	-	197	211	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	280	316	881	294	304	629	1376	-	-	1140	-	-
Stage 1	799	753	-	474	479	-	-	-	-	-	-	-
Stage 2	446	479	-	809	731	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	244	284	880	270	273	629	1375	-	-	1140	-	-
Mov Cap-2 Maneuver	244	284	-	270	273	-	-	-	-	-	-	-
Stage 1	722	747	-	429	433	-	-	-	-	-	-	-
Stage 2	381	433	-	801	725	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.9	11.5	1.5	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1375	-	-	252	587	1140	-	-
HCM Lane V/C Ratio	0.072	-	-	0.286	0.063	0.006	-	-
HCM Control Delay (s)	7.8	0	-	24.9	11.5	8.2	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.1	0.2	0	-	-

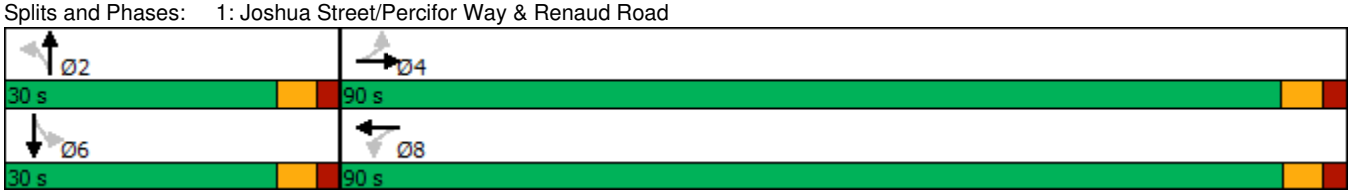


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	661	113	45	175	64	32	5	35	59	2	26
Future Volume (vph)	64	661	113	45	175	64	32	5	35	59	2	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98				0.99		0.99	0.96		0.97	0.98	
Frt		0.978			0.960			0.869			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1765	0	1491	1644	0	1679	1511	0	1729	1529	0
Flt Permitted	0.610			0.252			0.739			0.731		
Satd. Flow (perm)	1093	1765	0	395	1644	0	1298	1511	0	1291	1529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			37			35			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	7					7	2		10	10		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	16%	7%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	64	661	113	45	175	64	32	5	35	59	2	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	774	0	45	239	0	32	40	0	59	28	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	90.0	90.0		90.0	90.0		30.0	30.0		30.0	30.0	
Total Split (%)	75.0%	75.0%		75.0%	75.0%		25.0%	25.0%		25.0%	25.0%	
Maximum Green (s)	84.0	84.0		84.1	84.1		24.3	24.3		24.3	24.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	28.0	28.0		28.1	28.1		8.3	8.3		8.3	8.3	
Actuated g/C Ratio	0.57	0.57		0.58	0.58		0.17	0.17		0.17	0.17	
v/c Ratio	0.10	0.76		0.20	0.25		0.14	0.14		0.27	0.10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.9	13.0		7.1	4.7		22.9	11.5		24.6	11.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.9	13.0		7.1	4.7		22.9	11.5		24.6	11.8	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		12.4			5.1			16.5			20.4	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.0	38.4		1.5	6.6		2.3	0.4		4.3	0.2	
Queue Length 95th (m)	6.2	84.3		6.0	16.3		10.3	7.8		16.2	6.3	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	1093	1765		395	1644		688	818		684	823	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.44		0.11	0.15		0.05	0.05		0.09	0.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 48.8			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 73.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



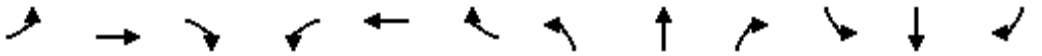
Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	733	28	71	280	12	75
Future Vol, veh/h	733	28	71	280	12	75
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	1	4	0	13
Mvmt Flow	733	28	71	280	12	75

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	761	0	1169	748
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	422	-
Critical Hdwy	-	-	4.11	-	6.4	6.33
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.417
Pot Cap-1 Maneuver	-	-	856	-	215	395
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	856	-	197	395
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	611	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	197	395	-	-	856	-
HCM Lane V/C Ratio	0.061	0.19	-	-	0.083	-
HCM Control Delay (s)	24.5	16.2	-	-	9.6	-
HCM Lane LOS	C	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.7	-	-	0.3	-



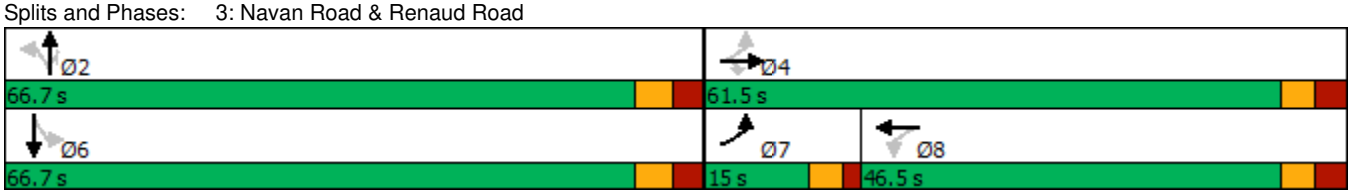
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	426	177	28	139	96	46	177	44	151	427	23
Future Volume (vph)	224	426	177	28	139	96	46	177	44	151	427	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	0.98	0.98		1.00		0.97	1.00	1.00	
Frt			0.850		0.939				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1802	1502	1662	1641	0	1679	1640	1517	1712	1676	0
Flt Permitted	0.420			0.514			0.342			0.646		
Satd. Flow (perm)	733	1802	1425	884	1641	0	603	1640	1477	1159	1676	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			141		28				72		3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	7		8	8		7	3		3	3		3
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Adj. Flow (vph)	224	426	177	28	139	96	46	177	44	151	427	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	224	426	177	28	235	0	46	177	44	151	450	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	32.2	30.7	30.7	15.3	15.3		24.7	24.7	24.7	24.7	24.7	
Actuated g/C Ratio	0.47	0.44	0.44	0.22	0.22		0.36	0.36	0.36	0.36	0.36	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.47	0.53	0.25	0.14	0.61		0.21	0.30	0.08	0.36	0.75	
Control Delay	16.8	18.5	5.5	26.1	30.0		18.6	17.6	1.9	19.4	28.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.8	18.5	5.5	26.1	30.0		18.6	17.6	1.9	19.4	28.0	
LOS	B	B	A	C	C		B	B	A	B	C	
Approach Delay		15.3			29.6			15.2			25.9	
Approach LOS		B			C			B			C	
Queue Length 50th (m)	16.5	37.4	2.5	2.9	23.4		3.9	15.5	0.0	13.5	47.6	
Queue Length 95th (m)	40.8	83.5	15.6	10.7	53.8		12.2	33.3	2.9	31.0	90.9	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	483	1465	1185	531	997		523	1424	1292	1006	1455	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.46	0.29	0.15	0.05	0.24		0.09	0.12	0.03	0.15	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 69.1
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 20.4 Intersection LOS: C
Intersection Capacity Utilization 83.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Navan Road & Renaud Road



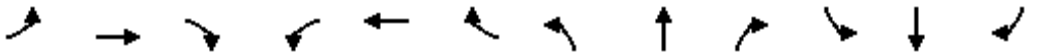
Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	0	25	1	0	17	25	204	2	31	500	91
Future Vol, veh/h	42	0	25	1	0	17	25	204	2	31	500	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	0	4	0	0	0	0	8	0	0	5	0
Mvmt Flow	42	0	25	1	0	17	25	204	2	31	500	91

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	826	818	500	875	908	205	591	0	0	206	0	0
Stage 1	562	562	-	255	255	-	-	-	-	-	-	-
Stage 2	264	256	-	620	653	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	290	313	567	272	277	841	995	-	-	1377	-	-
Stage 1	510	513	-	754	700	-	-	-	-	-	-	-
Stage 2	739	699	-	479	467	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	271	294	567	248	260	841	995	-	-	1377	-	-
Mov Cap-2 Maneuver	271	294	-	248	260	-	-	-	-	-	-	-
Stage 1	496	496	-	733	680	-	-	-	-	-	-	-
Stage 2	704	679	-	442	451	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.3	10	0.9	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	995	-	-	337	742	1377	-	-
HCM Lane V/C Ratio	0.025	-	-	0.199	0.024	0.023	-	-
HCM Control Delay (s)	8.7	0	-	18.3	10	7.7	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.1	0.1	-	-



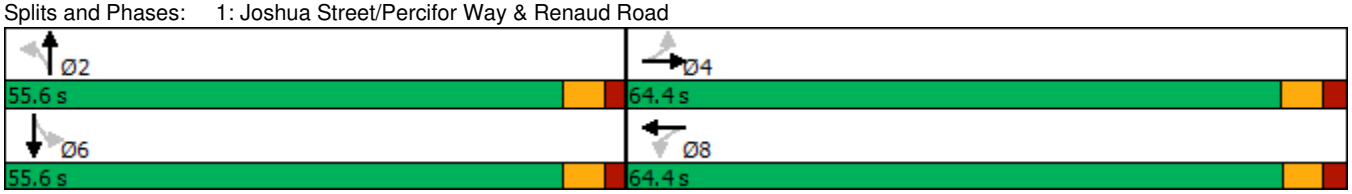
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	165	14	26	751	21	411	4	30	51	6	96
Future Volume (vph)	10	165	14	26	751	21	411	4	30	51	6	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00		0.99	0.96		0.97	0.98	
Frt		0.988			0.996			0.868			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1663	0	1184	1793	0	1712	1354	0	1695	1510	0
Flt Permitted	0.124			0.644			0.691			0.735		
Satd. Flow (perm)	226	1663	0	801	1793	0	1238	1354	0	1276	1510	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			2			30			96	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	6		1	1		6	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	8%	7%	46%	1%	0%	1%	25%	10%	2%	17%	0%
Adj. Flow (vph)	10	165	14	26	751	21	411	4	30	51	6	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	179	0	26	772	0	411	34	0	51	102	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	64.4	64.4		64.4	64.4		55.6	55.6		55.6	55.6	
Total Split (%)	53.7%	53.7%		53.7%	53.7%		46.3%	46.3%		46.3%	46.3%	
Maximum Green (s)	58.4	58.4		58.5	58.5		49.9	49.9		49.9	49.9	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	47.7	47.7		47.8	47.8		38.8	38.8		38.8	38.8	
Actuated g/C Ratio	0.48	0.48		0.48	0.48		0.39	0.39		0.39	0.39	
v/c Ratio	0.09	0.22		0.07	0.89		0.85	0.06		0.10	0.16	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.1	16.6		16.3	38.4		46.5	8.7		21.6	5.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.1	16.6		16.3	38.4		46.5	8.7		21.6	5.8	
LOS	B	B		B	D		D	A		C	A	
Approach Delay		16.7			37.7			43.6			11.1	
Approach LOS		B			D			D			B	
Queue Length 50th (m)	1.1	20.0		2.8	138.6		77.6	0.5		6.7	0.8	
Queue Length 95th (m)	4.7	37.1		8.3	#236.5		#136.0	6.7		15.3	11.1	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	142	1050		505	1133		666	743		687	857	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.17		0.05	0.68		0.62	0.05		0.07	0.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 99	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 34.3	Intersection LOS: C
Intersection Capacity Utilization 83.5%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



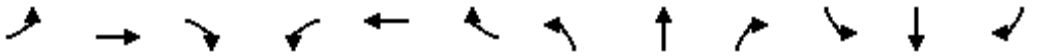
Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	244	14	83	771	30	78
Future Vol, veh/h	244	14	83	771	30	78
Conflicting Peds, #/hr	0	2	2	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	13	0	6	3	0	16
Mvmt Flow	244	14	83	771	30	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	260	0	1191	255
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	938	-
Critical Hdwy	-	-	4.16	-	6.4	6.36
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.444
Pot Cap-1 Maneuver	-	-	1282	-	209	751
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	384	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1279	-	195	748
Mov Cap-2 Maneuver	-	-	-	-	195	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	359	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	195	748	-	-	1279	-
HCM Lane V/C Ratio	0.154	0.104	-	-	0.065	-
HCM Control Delay (s)	26.8	10.4	-	-	8	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	0.3	-	-	0.2	-



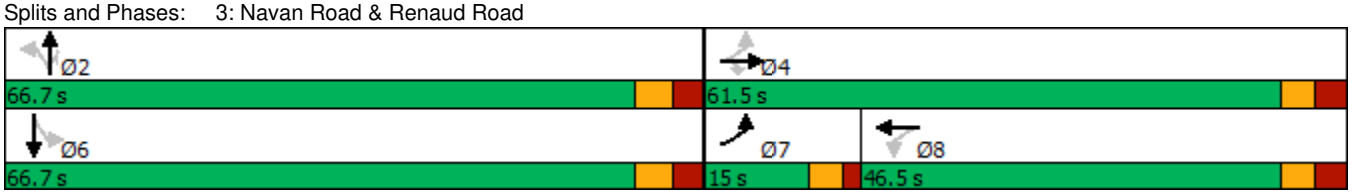
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	148	50	37	432	189	167	416	37	90	153	10
Future Volume (vph)	139	148	50	37	432	189	167	416	37	90	153	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	0.99	0.99		1.00		0.98	1.00	1.00	
Frt			0.850		0.954				0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1572	1717	1502	1372	1706	0	1679	1701	1300	1530	1493	0
Flt Permitted	0.156			0.663			0.651			0.275		
Satd. Flow (perm)	258	1717	1454	948	1706	0	1147	1701	1269	442	1493	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50		18				72		3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	4		3	3		4	2		2	2		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	6%	3%	26%	1%	0%	3%	7%	19%	13%	22%	0%
Adj. Flow (vph)	139	148	50	37	432	189	167	416	37	90	153	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	148	50	37	621	0	167	416	37	90	163	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	56.8	55.3	55.3	40.3	40.3		29.5	29.5	29.5	29.5	29.5	
Actuated g/C Ratio	0.58	0.56	0.56	0.41	0.41		0.30	0.30	0.30	0.30	0.30	
v/c Ratio	0.49	0.15	0.06	0.10	0.87		0.49	0.82	0.09	0.68	0.36	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	17.5	12.5	4.2	21.8	42.6		32.5	44.8	1.4	55.7	28.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	17.5	12.5	4.2	21.8	42.6		32.5	44.8	1.4	55.7	28.0	
LOS	B	B	A	C	D		C	D	A	E	C	
Approach Delay		13.3			41.5			38.9			37.8	
Approach LOS		B			D			D			D	
Queue Length 50th (m)	11.3	12.5	0.0	4.2	102.8		25.7	72.3	0.0	14.8	23.6	
Queue Length 95th (m)	26.7	28.9	5.9	12.8	#204.7		43.9	105.7	1.7	33.3	39.9	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	284	969	842	389	711		706	1047	809	272	920	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.49	0.15	0.06	0.10	0.87		0.24	0.40	0.05	0.33	0.18	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 98.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 35.0 Intersection LOS: D
Intersection Capacity Utilization 93.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Navan Road & Renaud Road



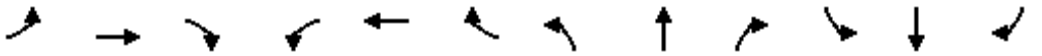
Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	0	3	2	0	35	99	497	0	7	197	29
Future Vol, veh/h	69	0	3	2	0	35	99	497	0	7	197	29
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	0	0	0	2	5	0	0	17	33
Mvmt Flow	69	0	3	2	0	35	99	497	0	7	197	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	925	907	198	922	936	497	227	0	0	497	0	0
Stage 1	212	212	-	695	695	-	-	-	-	-	-	-
Stage 2	713	695	-	227	241	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	240	278	848	253	267	577	1341	-	-	1077	-	-
Stage 1	770	731	-	436	447	-	-	-	-	-	-	-
Stage 2	409	447	-	780	710	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	207	248	847	231	238	577	1340	-	-	1077	-	-
Mov Cap-2 Maneuver	207	248	-	231	238	-	-	-	-	-	-	-
Stage 1	691	725	-	392	401	-	-	-	-	-	-	-
Stage 2	345	401	-	772	704	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.1	12.2	1.3	0.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1340	-	-	214	534	1077	-	-
HCM Lane V/C Ratio	0.074	-	-	0.336	0.069	0.006	-	-
HCM Control Delay (s)	7.9	0	-	30.1	12.2	8.4	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	0.2	0	-	-

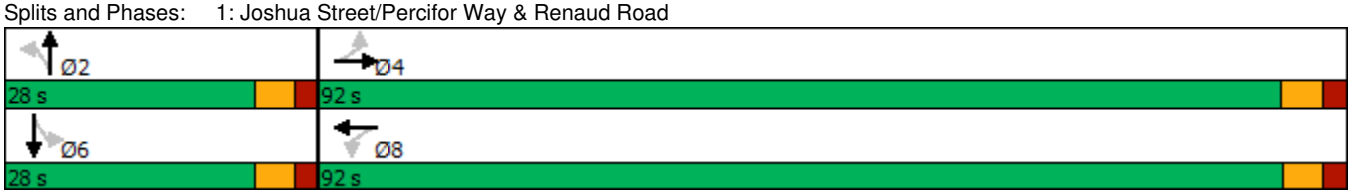


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	753	113	45	216	64	32	5	35	59	2	26
Future Volume (vph)	64	753	113	45	216	64	32	5	35	59	2	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				0.99		0.99	0.96		0.97	0.98	
Frt		0.980			0.966			0.869			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1768	0	1491	1653	0	1679	1511	0	1729	1529	0
Flt Permitted	0.588			0.212			0.739			0.731		
Satd. Flow (perm)	1055	1768	0	333	1653	0	1298	1511	0	1291	1529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			31			35			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	7					7	2		10	10		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	16%	7%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	64	753	113	45	216	64	32	5	35	59	2	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	866	0	45	280	0	32	40	0	59	28	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	92.0	92.0		92.0	92.0		28.0	28.0		28.0	28.0	
Total Split (%)	76.7%	76.7%		76.7%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	86.0	86.0		86.1	86.1		22.3	22.3		22.3	22.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	34.0	34.0		34.1	34.1		8.7	8.7		8.7	8.7	
Actuated g/C Ratio	0.61	0.61		0.62	0.62		0.16	0.16		0.16	0.16	
v/c Ratio	0.10	0.79		0.22	0.27		0.16	0.15		0.29	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.5	13.9		7.4	4.8		27.0	13.2		29.1	13.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.5	13.9		7.4	4.8		27.0	13.2		29.1	13.4	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		13.2			5.1			19.3			24.0	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.0	48.6		1.5	8.6		2.7	0.4		5.0	0.2	
Queue Length 95th (m)	6.3	106.4		6.3	20.1		11.9	8.6		18.7	6.9	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	1055	1768		333	1653		564	676		561	679	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.49		0.14	0.17		0.06	0.06		0.11	0.04	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 55.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 76.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



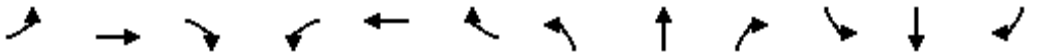
Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	830	28	71	330	12	75
Future Vol, veh/h	830	28	71	330	12	75
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	1	4	0	13
Mvmt Flow	830	28	71	330	12	75

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	858	0	1316	845
Stage 1	-	-	-	-	844	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	-	-	4.11	-	6.4	6.33
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.417
Pot Cap-1 Maneuver	-	-	787	-	176	347
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	632	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	787	-	160	347
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	575	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	19.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	160	347	-	-	787	-
HCM Lane V/C Ratio	0.075	0.216	-	-	0.09	-
HCM Control Delay (s)	29.3	18.2	-	-	10	-
HCM Lane LOS	D	C	-	-	B	-
HCM 95th %tile Q(veh)	0.2	0.8	-	-	0.3	-



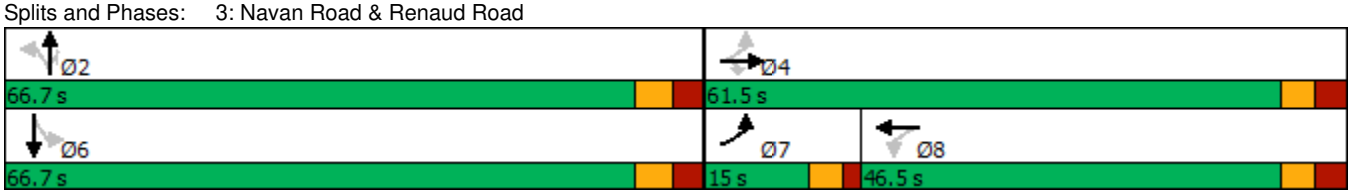
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	243	486	206	31	168	126	60	205	48	191	480	24
Future Volume (vph)	243	486	206	31	168	126	60	205	48	191	480	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	0.99	0.98		1.00		0.97	1.00	1.00	
Frt			0.850		0.936				0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1802	1502	1662	1634	0	1679	1640	1517	1712	1677	0
Flt Permitted	0.344			0.486			0.290			0.629		
Satd. Flow (perm)	602	1802	1425	839	1634	0	511	1640	1477	1129	1677	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			144		31				72		3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	7		8	8		7	3		3	3		3
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Adj. Flow (vph)	243	486	206	31	168	126	60	205	48	191	480	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	243	486	206	31	294	0	60	205	48	191	504	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	36.9	35.3	35.3	19.5	19.5		30.8	30.8	30.8	30.8	30.8	
Actuated g/C Ratio	0.46	0.44	0.44	0.24	0.24		0.38	0.38	0.38	0.38	0.38	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.58	0.61	0.29	0.15	0.70		0.31	0.33	0.08	0.44	0.78	
Control Delay	22.8	23.0	7.2	28.5	35.5		22.7	19.1	2.1	22.2	31.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	22.8	23.0	7.2	28.5	35.5		22.7	19.1	2.1	22.2	31.0	
LOS	C	C	A	C	D		C	B	A	C	C	
Approach Delay		19.5			34.9			17.2			28.6	
Approach LOS		B			C			B			C	
Queue Length 50th (m)	21.1	51.6	5.0	3.5	34.6		5.9	20.2	0.0	19.9	61.8	
Queue Length 95th (m)	52.9	117.1	23.0	12.7	77.4		18.0	43.4	3.6	44.8	120.1	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	419	1309	1075	443	878		397	1275	1165	878	1305	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.58	0.37	0.19	0.07	0.33		0.15	0.16	0.04	0.22	0.39	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 80
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 24.1 Intersection LOS: C
Intersection Capacity Utilization 89.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Navan Road & Renaud Road



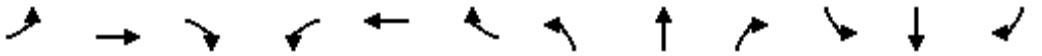
Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	0	25	1	0	17	25	244	2	31	573	91
Future Vol, veh/h	42	0	25	1	0	17	25	244	2	31	573	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	0	4	0	0	0	0	8	0	0	5	0
Mvmt Flow	42	0	25	1	0	17	25	244	2	31	573	91

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	939	931	573	988	1021	245	664	0	0	246	0	0
Stage 1	635	635	-	295	295	-	-	-	-	-	-	-
Stage 2	304	296	-	693	726	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	243	269	515	228	238	799	935	-	-	1332	-	-
Stage 1	465	476	-	718	673	-	-	-	-	-	-	-
Stage 2	703	672	-	437	433	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	226	251	515	206	222	799	935	-	-	1332	-	-
Mov Cap-2 Maneuver	226	251	-	206	222	-	-	-	-	-	-	-
Stage 1	451	458	-	696	652	-	-	-	-	-	-	-
Stage 2	667	651	-	400	417	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.4	10.4	0.8	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	935	-	-	286	689	1332	-	-
HCM Lane V/C Ratio	0.027	-	-	0.234	0.026	0.023	-	-
HCM Control Delay (s)	9	0	-	21.4	10.4	7.8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	0.1	0.1	-	-

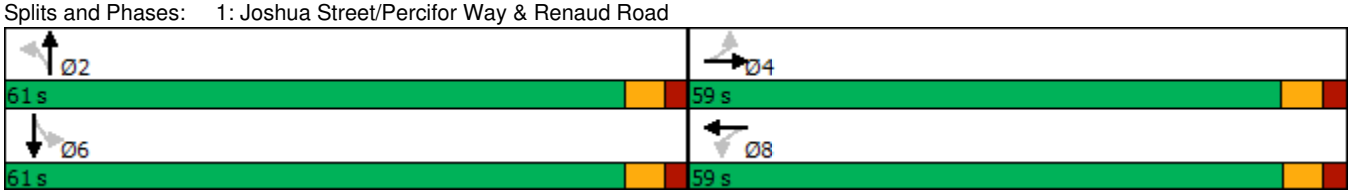


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	136	28	26	658	21	438	4	30	51	6	96
Future Volume (vph)	10	136	28	26	658	21	438	4	30	51	6	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00		0.99	0.96		0.97	0.98	
Frt		0.974			0.995			0.868			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1638	0	1184	1791	0	1712	1354	0	1695	1510	0
Flt Permitted	0.158			0.653			0.691			0.735		
Satd. Flow (perm)	288	1638	0	812	1791	0	1238	1354	0	1276	1510	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			2			30			96	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	6		1	1		6	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	8%	7%	46%	1%	0%	1%	25%	10%	2%	17%	0%
Adj. Flow (vph)	10	136	28	26	658	21	438	4	30	51	6	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	164	0	26	679	0	438	34	0	51	102	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	59.0	59.0		59.0	59.0		61.0	61.0		61.0	61.0	
Total Split (%)	49.2%	49.2%		49.2%	49.2%		50.8%	50.8%		50.8%	50.8%	
Maximum Green (s)	53.0	53.0		53.1	53.1		55.3	55.3		55.3	55.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	41.1	41.1		41.2	41.2		39.6	39.6		39.6	39.6	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.42	0.42		0.42	0.42	
v/c Ratio	0.08	0.23		0.07	0.86		0.83	0.06		0.09	0.15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	20.6	17.9		18.6	37.4		40.5	7.4		18.2	5.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.6	17.9		18.6	37.4		40.5	7.4		18.2	5.0	
LOS	C	B		B	D		D	A		B	A	
Approach Delay		18.0			36.7			38.1			9.4	
Approach LOS		B			D			D			A	
Queue Length 50th (m)	1.0	17.0		2.7	109.7		71.0	0.4		5.6	0.6	
Queue Length 95th (m)	5.0	36.3		9.1	#208.8		128.4	6.2		14.0	10.2	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	177	1013		500	1105		795	880		819	1004	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.16		0.05	0.61		0.55	0.04		0.06	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 93.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 32.2		Intersection LOS: C	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



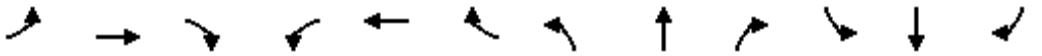
Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	208	14	104	677	30	117
Future Vol, veh/h	208	14	104	677	30	117
Conflicting Peds, #/hr	0	2	2	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	13	0	6	3	0	16
Mvmt Flow	208	14	104	677	30	117

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	224	0	1103	219
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	886	-
Critical Hdwy	-	-	4.16	-	6.4	6.36
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.444
Pot Cap-1 Maneuver	-	-	1321	-	236	787
Stage 1	-	-	-	-	824	-
Stage 2	-	-	-	-	406	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1318	-	217	784
Mov Cap-2 Maneuver	-	-	-	-	217	-
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	374	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	13.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	217	784	-	-	1318	-
HCM Lane V/C Ratio	0.138	0.149	-	-	0.079	-
HCM Control Delay (s)	24.2	10.4	-	-	8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	0.5	-	-	0.3	-

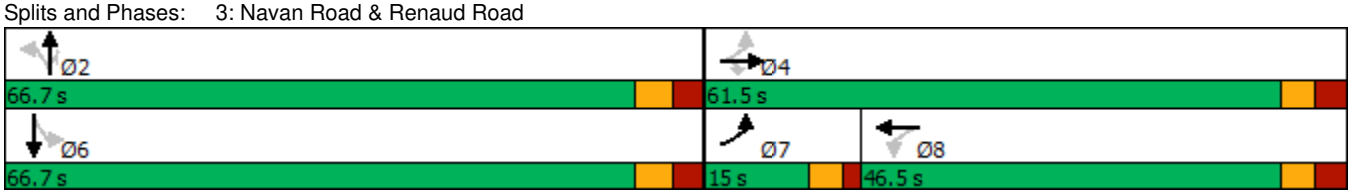


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	126	40	39	377	148	142	398	45	70	149	10
Future Volume (vph)	167	126	40	39	377	148	142	398	45	70	149	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	0.99	0.99		1.00		0.98	1.00	1.00	
Frt			0.850		0.958				0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1572	1717	1502	1372	1714	0	1679	1701	1300	1530	1493	0
Flt Permitted	0.220			0.676			0.656			0.309		
Satd. Flow (perm)	364	1717	1454	967	1714	0	1156	1701	1269	497	1493	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			40		16				72		4	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	4		3	3		4	2		2	2		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	6%	3%	26%	1%	0%	3%	7%	19%	13%	22%	0%
Adj. Flow (vph)	167	126	40	39	377	148	142	398	45	70	149	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	126	40	39	525	0	142	398	45	70	159	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	52.3	50.8	50.8	35.5	35.5		27.7	27.7	27.7	27.7	27.7	
Actuated g/C Ratio	0.57	0.55	0.55	0.39	0.39		0.30	0.30	0.30	0.30	0.30	
v/c Ratio	0.49	0.13	0.05	0.10	0.78		0.41	0.78	0.10	0.47	0.35	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	16.1	11.8	4.2	20.9	34.8		29.8	41.0	2.7	38.3	27.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.1	11.8	4.2	20.9	34.8		29.8	41.0	2.7	38.3	27.1	
LOS	B	B	A	C	C		C	D	A	D	C	
Approach Delay		13.0			33.8			35.3			30.5	
Approach LOS		B			C			D			C	
Queue Length 50th (m)	13.3	10.1	0.0	4.3	77.5		20.6	66.1	0.0	10.4	22.0	
Queue Length 95th (m)	30.1	23.8	5.2	12.7	#150.2		37.7	100.5	3.5	24.1	38.9	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	341	1048	903	429	769		770	1132	869	331	995	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.49	0.12	0.04	0.09	0.68		0.18	0.35	0.05	0.21	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 128.2			
Actuated Cycle Length: 91.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 29.9		Intersection LOS: C	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Navan Road & Renaud Road



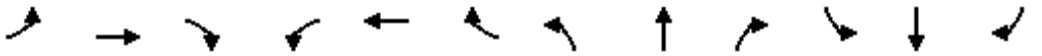
Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	112	0	6	2	0	35	101	430	0	7	167	52
Future Vol, veh/h	112	0	6	2	0	35	101	430	0	7	167	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	0	0	0	2	5	0	0	17	33
Mvmt Flow	112	0	6	2	0	35	101	430	0	7	167	52

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	832	814	168	842	866	430	220	0	0	430	0	0
Stage 1	182	182	-	632	632	-	-	-	-	-	-	-
Stage 2	650	632	-	210	234	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	278	315	881	286	293	629	1349	-	-	1140	-	-
Stage 1	799	753	-	472	477	-	-	-	-	-	-	-
Stage 2	443	477	-	797	715	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	241	282	880	261	262	629	1348	-	-	1140	-	-
Mov Cap-2 Maneuver	241	282	-	261	262	-	-	-	-	-	-	-
Stage 1	720	747	-	426	430	-	-	-	-	-	-	-
Stage 2	377	430	-	786	709	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.6	11.6	1.5	0.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1348	-	-	250	584	1140	-	-
HCM Lane V/C Ratio	0.075	-	-	0.472	0.063	0.006	-	-
HCM Control Delay (s)	7.9	0	-	31.6	11.6	8.2	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	2.3	0.2	0	-	-

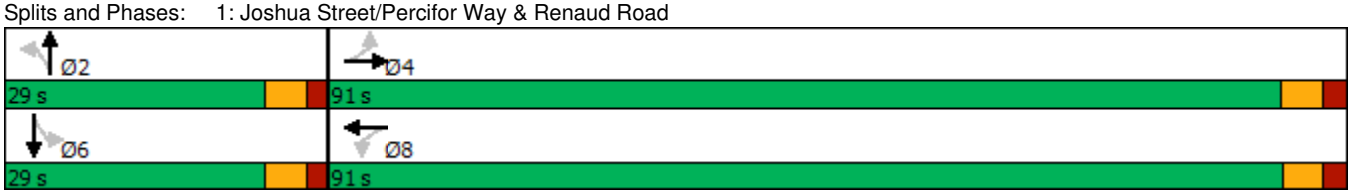


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	661	139	45	175	64	54	5	35	59	2	26
Future Volume (vph)	64	661	139	45	175	64	54	5	35	59	2	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98				0.99		0.99	0.96		0.97	0.98	
Frt		0.974			0.960			0.869			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1758	0	1491	1644	0	1679	1511	0	1729	1529	0
Flt Permitted	0.610			0.239			0.739			0.731		
Satd. Flow (perm)	1093	1758	0	375	1644	0	1298	1511	0	1291	1529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			38			35			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	7					7	2		10	10		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	16%	7%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	64	661	139	45	175	64	54	5	35	59	2	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	800	0	45	239	0	54	40	0	59	28	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	91.0	91.0		91.0	91.0		29.0	29.0		29.0	29.0	
Total Split (%)	75.8%	75.8%		75.8%	75.8%		24.2%	24.2%		24.2%	24.2%	
Maximum Green (s)	85.0	85.0		85.1	85.1		23.3	23.3		23.3	23.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	29.5	29.5		29.6	29.6		8.5	8.5		8.5	8.5	
Actuated g/C Ratio	0.58	0.58		0.59	0.59		0.17	0.17		0.17	0.17	
v/c Ratio	0.10	0.77		0.21	0.24		0.25	0.14		0.27	0.10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.7	13.3		7.2	4.6		25.5	12.1		25.9	12.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.7	13.3		7.2	4.6		25.5	12.1		25.9	12.3	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		12.7			5.0			19.8			21.5	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.0	40.9		1.5	6.6		4.1	0.4		4.5	0.2	
Queue Length 95th (m)	6.2	89.2		6.0	16.2		16.0	8.1		17.1	6.5	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	1093	1758		375	1644		642	764		638	769	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.46		0.12	0.15		0.08	0.05		0.09	0.04	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 50.5			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



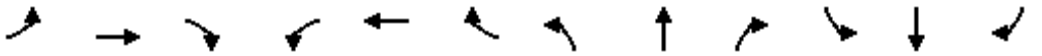
Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	733	28	108	280	12	107
Future Vol, veh/h	733	28	108	280	12	107
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	1	4	0	13
Mvmt Flow	733	28	108	280	12	107

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	761	0	1243	748
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	496	-
Critical Hdwy	-	-	4.11	-	6.4	6.33
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.417
Pot Cap-1 Maneuver	-	-	856	-	194	395
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	616	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	856	-	170	395
Mov Cap-2 Maneuver	-	-	-	-	170	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	538	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	18.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	170	395	-	-	856	-
HCM Lane V/C Ratio	0.071	0.271	-	-	0.126	-
HCM Control Delay (s)	27.8	17.5	-	-	9.8	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	1.1	-	-	0.4	-

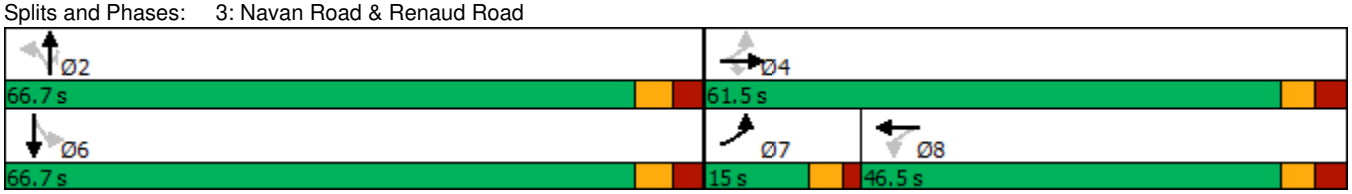


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	426	177	39	139	96	46	203	53	151	456	23
Future Volume (vph)	256	426	177	39	139	96	46	203	53	151	456	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	0.98	0.98		1.00		0.97	1.00	1.00	
Frt			0.850		0.939				0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1802	1502	1662	1641	0	1679	1640	1517	1712	1677	0
Flt Permitted	0.413			0.514			0.318			0.630		
Satd. Flow (perm)	720	1802	1425	884	1641	0	561	1640	1477	1131	1677	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			141		28				72		3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	7		8	8		7	3		3	3		3
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Adj. Flow (vph)	256	426	177	39	139	96	46	203	53	151	456	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	256	426	177	39	235	0	46	203	53	151	479	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	33.0	31.4	31.4	15.8	15.8		27.0	27.0	27.0	27.0	27.0	
Actuated g/C Ratio	0.46	0.43	0.43	0.22	0.22		0.37	0.37	0.37	0.37	0.37	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.55	0.54	0.25	0.20	0.62		0.22	0.33	0.09	0.36	0.76	
Control Delay	20.0	20.0	5.8	28.4	31.5		18.6	17.7	2.8	19.1	28.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	20.0	20.0	5.8	28.4	31.5		18.6	17.7	2.8	19.1	28.4	
LOS	B	B	A	C	C		B	B	A	B	C	
Approach Delay		17.1			31.1			15.2			26.1	
Approach LOS		B			C			B			C	
Queue Length 50th (m)	20.2	39.3	2.6	4.2	24.2		3.9	18.2	0.0	13.7	52.3	
Queue Length 95th (m)	50.2	89.3	16.5	14.2	56.3		12.6	38.2	4.2	31.4	99.6	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	467	1420	1153	510	958		472	1380	1254	952	1412	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.55	0.30	0.15	0.08	0.25		0.10	0.15	0.04	0.16	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 128.2			
Actuated Cycle Length: 72.2			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 85.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Navan Road & Renaud Road



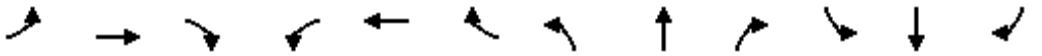
Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	76	0	28	1	0	17	28	204	2	31	500	131
Future Vol, veh/h	76	0	28	1	0	17	28	204	2	31	500	131
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	0	4	0	0	0	0	8	0	0	5	0
Mvmt Flow	76	0	28	1	0	17	28	204	2	31	500	131

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	832	824	500	903	954	205	631	0	0	206	0	0
Stage 1	562	562	-	261	261	-	-	-	-	-	-	-
Stage 2	270	262	-	642	693	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	287	310	567	260	261	841	961	-	-	1377	-	-
Stage 1	510	513	-	748	696	-	-	-	-	-	-	-
Stage 2	734	695	-	466	448	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	267	289	567	235	244	841	961	-	-	1377	-	-
Mov Cap-2 Maneuver	267	289	-	235	244	-	-	-	-	-	-	-
Stage 1	493	495	-	723	673	-	-	-	-	-	-	-
Stage 2	695	672	-	427	432	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.3	10	1.1	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	961	-	-	311	736	1377	-	-
HCM Lane V/C Ratio	0.029	-	-	0.334	0.024	0.023	-	-
HCM Control Delay (s)	8.9	0	-	22.3	10	7.7	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.4	0.1	0.1	-	-

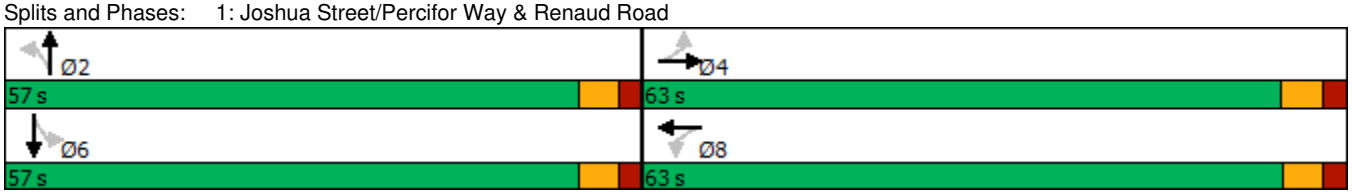


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	165	28	26	751	21	438	4	30	51	6	96
Future Volume (vph)	10	165	28	26	751	21	438	4	30	51	6	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00		0.99	0.96		0.97	0.98	
Frt		0.978			0.996			0.868			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1645	0	1184	1793	0	1712	1354	0	1695	1510	0
Flt Permitted	0.114			0.631			0.691			0.735		
Satd. Flow (perm)	207	1645	0	785	1793	0	1238	1354	0	1276	1510	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			2			30			96	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	6		1	1		6	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	8%	7%	46%	1%	0%	1%	25%	10%	2%	17%	0%
Adj. Flow (vph)	10	165	28	26	751	21	438	4	30	51	6	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	193	0	26	772	0	438	34	0	51	102	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	63.0	63.0		63.0	63.0		57.0	57.0		57.0	57.0	
Total Split (%)	52.5%	52.5%		52.5%	52.5%		47.5%	47.5%		47.5%	47.5%	
Maximum Green (s)	57.0	57.0		57.1	57.1		51.3	51.3		51.3	51.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	49.0	49.0		49.1	49.1		41.5	41.5		41.5	41.5	
Actuated g/C Ratio	0.48	0.48		0.48	0.48		0.40	0.40		0.40	0.40	
v/c Ratio	0.10	0.24		0.07	0.90		0.88	0.06		0.10	0.15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	20.5	17.3		17.2	41.1		49.5	8.3		21.1	5.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.5	17.3		17.2	41.1		49.5	8.3		21.1	5.5	
LOS	C	B		B	D		D	A		C	A	
Approach Delay		17.4			40.3			46.5			10.7	
Approach LOS		B			D			D			B	
Queue Length 50th (m)	1.2	22.7		3.0	148.8		89.7	0.5		7.0	0.8	
Queue Length 95th (m)	4.9	40.1		8.5	#241.8		#146.7	6.6		15.0	10.9	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	120	964		459	1049		650	725		670	838	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.20		0.06	0.74		0.67	0.05		0.08	0.12	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 102.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 36.5		Intersection LOS: D	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



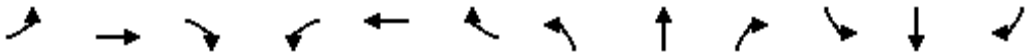
Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	244	14	104	771	30	117
Future Vol, veh/h	244	14	104	771	30	117
Conflicting Peds, #/hr	0	2	2	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	13	0	6	3	0	16
Mvmt Flow	244	14	104	771	30	117

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	260	0	1233	255
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	980	-
Critical Hdwy	-	-	4.16	-	6.4	6.36
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.444
Pot Cap-1 Maneuver	-	-	1282	-	197	751
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	367	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1279	-	180	748
Mov Cap-2 Maneuver	-	-	-	-	180	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	337	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	180	748	-	-	1279	-
HCM Lane V/C Ratio	0.167	0.156	-	-	0.081	-
HCM Control Delay (s)	29	10.7	-	-	8.1	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	0.6	-	-	0.3	-



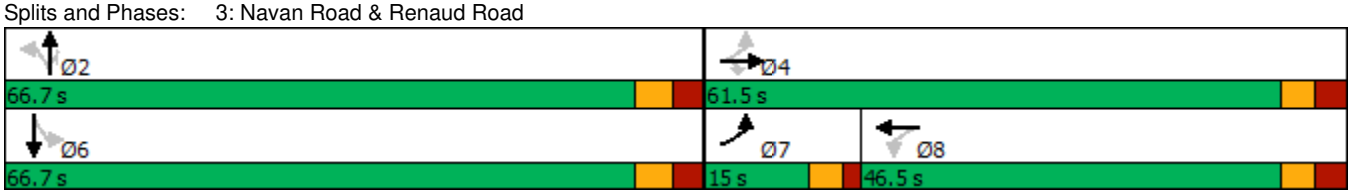
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	148	50	43	432	189	167	448	48	90	169	10
Future Volume (vph)	178	148	50	43	432	189	167	448	48	90	169	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	0.99	0.99		1.00		0.98	1.00	1.00	
Frt			0.850		0.954				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1572	1717	1502	1372	1706	0	1679	1701	1300	1530	1493	0
Flt Permitted	0.142			0.663			0.627			0.253		
Satd. Flow (perm)	235	1717	1454	948	1706	0	1105	1701	1269	407	1493	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50		18				72		3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	4		3	3		4	2		2	2		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	6%	3%	26%	1%	0%	3%	7%	19%	13%	22%	0%
Adj. Flow (vph)	178	148	50	43	432	189	167	448	48	90	169	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	148	50	43	621	0	167	448	48	90	179	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	56.9	55.4	55.4	40.3	40.3		32.2	32.2	32.2	32.2	32.2	
Actuated g/C Ratio	0.56	0.55	0.55	0.40	0.40		0.32	0.32	0.32	0.32	0.32	
v/c Ratio	0.67	0.16	0.06	0.11	0.90		0.47	0.83	0.11	0.69	0.37	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	27.5	13.7	4.5	23.3	47.0		31.6	44.8	2.7	57.6	27.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	27.5	13.7	4.5	23.3	47.0		31.6	44.8	2.7	57.6	27.7	
LOS	C	B	A	C	D		C	D	A	E	C	
Approach Delay		19.0			45.5			38.5			37.7	
Approach LOS		B			D			D			D	
Queue Length 50th (m)	15.8	13.3	0.0	5.1	107.5		25.8	79.9	0.0	15.2	26.2	
Queue Length 95th (m)	#49.3	30.6	6.3	15.1	#213.9		44.0	115.2	3.9	34.6	43.2	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	265	942	820	378	691		661	1018	788	243	895	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.67	0.16	0.06	0.11	0.90		0.25	0.44	0.06	0.37	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 100.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 37.0 Intersection LOS: D
Intersection Capacity Utilization 97.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Navan Road & Renaud Road



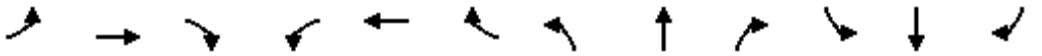
Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	112	0	6	2	0	35	101	497	0	7	197	52
Future Vol, veh/h	112	0	6	2	0	35	101	497	0	7	197	52
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	11	0	0	0	0	0	2	5	0	0	17	33
Mvmt Flow	112	0	6	2	0	35	101	497	0	7	197	52

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	929	911	198	939	963	497	250	0	0	497	0	0
Stage 1	212	212	-	699	699	-	-	-	-	-	-	-
Stage 2	717	699	-	240	264	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	239	276	848	246	258	577	1316	-	-	1077	-	-
Stage 1	770	731	-	434	445	-	-	-	-	-	-	-
Stage 2	407	445	-	768	694	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	205	245	847	223	229	577	1315	-	-	1077	-	-
Mov Cap-2 Maneuver	205	245	-	223	229	-	-	-	-	-	-	-
Stage 1	688	724	-	388	398	-	-	-	-	-	-	-
Stage 2	342	398	-	756	688	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	41.1	12.3	1.3	0.2
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1315	-	-	213	531	1077	-	-
HCM Lane V/C Ratio	0.077	-	-	0.554	0.07	0.006	-	-
HCM Control Delay (s)	8	0	-	41.1	12.3	8.4	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	3	0.2	0	-	-

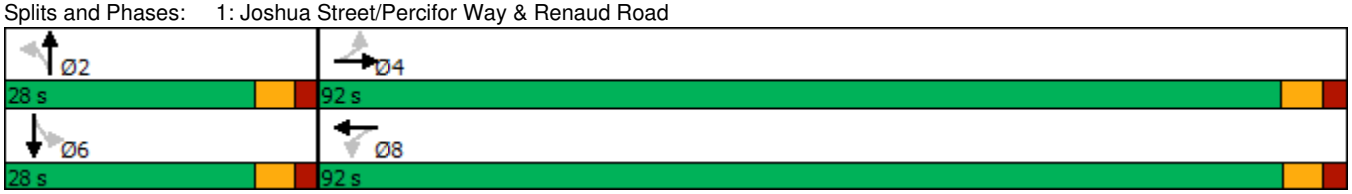


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	753	139	45	216	64	54	5	35	59	2	26
Future Volume (vph)	64	753	139	45	216	64	54	5	35	59	2	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	55.0		0.0	55.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				0.99		0.99	0.96		0.97	0.98	
Frt		0.977			0.966			0.869			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	1763	0	1491	1653	0	1679	1511	0	1729	1529	0
Flt Permitted	0.588			0.201			0.739			0.731		
Satd. Flow (perm)	1055	1763	0	315	1653	0	1298	1511	0	1291	1529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			31			35			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		299.6			505.9			301.3			298.7	
Travel Time (s)		21.6			36.4			21.7			21.5	
Confl. Peds. (#/hr)	7					7	2		10	10		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	16%	7%	0%	3%	0%	0%	0%	0%	0%
Adj. Flow (vph)	64	753	139	45	216	64	54	5	35	59	2	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	892	0	45	280	0	54	40	0	59	28	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		25.9	25.9		24.7	24.7		24.7	24.7	
Total Split (s)	92.0	92.0		92.0	92.0		28.0	28.0		28.0	28.0	
Total Split (%)	76.7%	76.7%		76.7%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	86.0	86.0		86.1	86.1		22.3	22.3		22.3	22.3	
Yellow Time (s)	3.6	3.6		3.5	3.5		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.9	5.9		5.7	5.7		5.7	5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		12.0	12.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	35.8	35.8		35.9	35.9		8.9	8.9		8.9	8.9	
Actuated g/C Ratio	0.62	0.62		0.63	0.63		0.16	0.16		0.16	0.16	
v/c Ratio	0.10	0.81		0.23	0.27		0.27	0.15		0.29	0.11	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	4.4	14.3		7.6	4.6		30.0	13.8		30.5	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.4	14.3		7.6	4.6		30.0	13.8		30.5	14.1	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		13.6			5.1			23.1			25.2	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	2.0	51.8		1.5	8.7		4.7	0.4		5.2	0.2	
Queue Length 95th (m)	6.3	114.2		6.3	20.2		18.3	8.9		19.7	7.2	
Internal Link Dist (m)		275.6			481.9			277.3			274.7	
Turn Bay Length (m)	55.0			55.0			25.0			25.0		
Base Capacity (vph)	1055	1763		315	1653		547	657		544	660	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.51		0.14	0.17		0.10	0.06		0.11	0.04	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 57.4			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Joshua Street/Percifor Way & Renaud Road



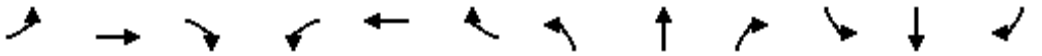
Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	830	28	108	330	12	107
Future Vol, veh/h	830	28	108	330	12	107
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	800	-	250	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	0	1	4	0	13
Mvmt Flow	830	28	108	330	12	107

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	858	0	1390	845
Stage 1	-	-	-	-	844	-
Stage 2	-	-	-	-	546	-
Critical Hdwy	-	-	4.11	-	6.4	6.33
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.417
Pot Cap-1 Maneuver	-	-	787	-	158	347
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	584	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	787	-	136	347
Mov Cap-2 Maneuver	-	-	-	-	136	-
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	504	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	21.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	136	347	-	-	787	-
HCM Lane V/C Ratio	0.088	0.308	-	-	0.137	-
HCM Control Delay (s)	34	19.9	-	-	10.3	-
HCM Lane LOS	D	C	-	-	B	-
HCM 95th %tile Q(veh)	0.3	1.3	-	-	0.5	-



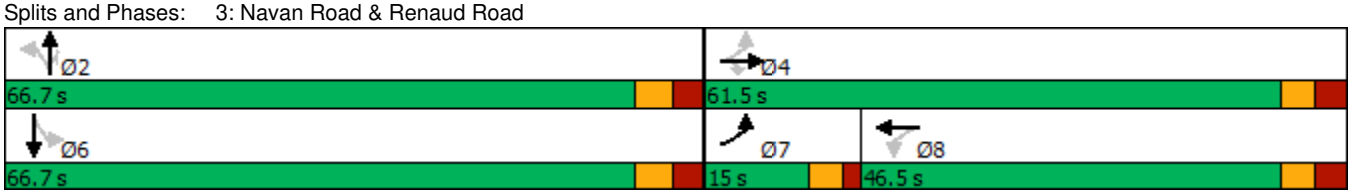
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	486	206	41	168	126	60	230	57	191	510	24
Future Volume (vph)	275	486	206	41	168	126	60	230	57	191	510	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	100.0		45.0	30.0		0.0	60.0		15.0	60.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	0.99	0.98		1.00		0.97	1.00	1.00	
Frt			0.850		0.936				0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1679	1802	1502	1662	1634	0	1679	1640	1517	1712	1677	0
Flt Permitted	0.338			0.486			0.268			0.605		
Satd. Flow (perm)	592	1802	1425	839	1634	0	473	1640	1477	1086	1677	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			144		31				72		2	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		274.8			305.6			250.1			301.9	
Travel Time (s)		19.8			22.0			15.0			18.1	
Confl. Peds. (#/hr)	7		8	8		7	3		3	3		3
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Adj. Flow (vph)	275	486	206	41	168	126	60	230	57	191	510	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	275	486	206	41	294	0	60	230	57	191	534	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	7	4	4	8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	22.5	22.5	22.5	22.5		41.7	41.7	41.7	41.7	41.7	
Total Split (s)	15.0	61.5	61.5	46.5	46.5		66.7	66.7	66.7	66.7	66.7	
Total Split (%)	11.7%	48.0%	48.0%	36.3%	36.3%		52.0%	52.0%	52.0%	52.0%	52.0%	
Maximum Green (s)	10.0	55.0	55.0	40.0	40.0		60.0	60.0	60.0	60.0	60.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	3.2	3.2	3.2	3.2		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min	Min	Min	Min	
Walk Time (s)		7.0	7.0	7.0	7.0		12.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)		9.0	9.0	9.0	9.0		23.0	23.0	23.0	23.0	23.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0	0	0	0	
Act Effct Green (s)	37.7	36.1	36.1	20.2	20.2		33.3	33.3	33.3	33.3	33.3	
Actuated g/C Ratio	0.45	0.43	0.43	0.24	0.24		0.40	0.40	0.40	0.40	0.40	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.68	0.62	0.30	0.20	0.70		0.32	0.35	0.09	0.44	0.80	
Control Delay	28.4	24.5	7.6	30.6	36.8		23.3	19.4	3.2	22.3	32.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	28.4	24.5	7.6	30.6	36.8		23.3	19.4	3.2	22.3	32.1	
LOS	C	C	A	C	D		C	B	A	C	C	
Approach Delay		22.0			36.0			17.4			29.5	
Approach LOS		C			D			B			C	
Queue Length 50th (m)	26.6	56.0	5.5	5.0	36.6		6.0	23.5	0.0	20.4	68.5	
Queue Length 95th (m)	#73.2	123.1	24.2	16.2	80.3		18.7	49.7	5.1	46.4	133.5	
Internal Link Dist (m)		250.8			281.6			226.1			277.9	
Turn Bay Length (m)	100.0		45.0	30.0			60.0		15.0	60.0		
Base Capacity (vph)	405	1259	1039	426	846		357	1238	1132	820	1266	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.68	0.39	0.20	0.10	0.35		0.17	0.19	0.05	0.23	0.42	

Intersection Summary

Area Type: Other
Cycle Length: 128.2
Actuated Cycle Length: 83.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 91.4% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Navan Road & Renaud Road



Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	76	0	28	1	0	17	28	244	2	31	573	131
Future Vol, veh/h	76	0	28	1	0	17	28	244	2	31	573	131
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	0	4	0	0	0	0	8	0	0	5	0
Mvmt Flow	76	0	28	1	0	17	28	244	2	31	573	131

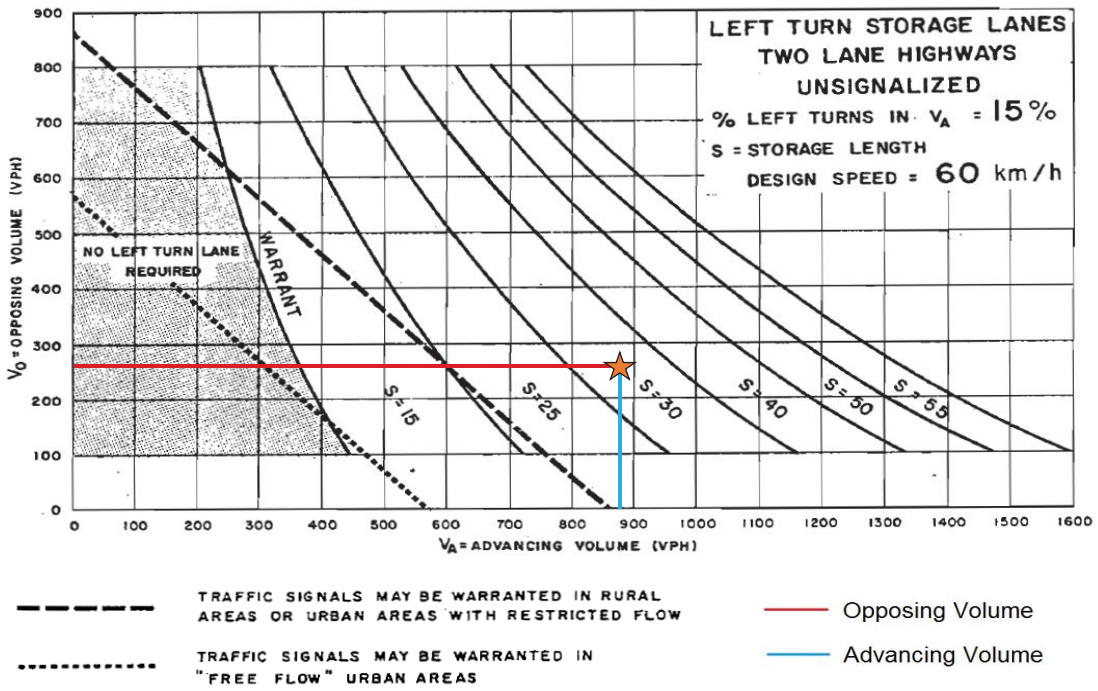
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	945	937	573	1016	1067	245	704	0	0	246	0	0
Stage 1	635	635	-	301	301	-	-	-	-	-	-	-
Stage 2	310	302	-	715	766	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	241	267	515	218	224	799	903	-	-	1332	-	-
Stage 1	465	476	-	712	669	-	-	-	-	-	-	-
Stage 2	698	668	-	425	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	223	247	515	194	207	799	903	-	-	1332	-	-
Mov Cap-2 Maneuver	223	247	-	194	207	-	-	-	-	-	-	-
Stage 1	448	457	-	686	645	-	-	-	-	-	-	-
Stage 2	659	644	-	386	399	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.4	10.4	0.9	0.3
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	903	-	-	263	681	1332	-	-
HCM Lane V/C Ratio	0.031	-	-	0.395	0.026	0.023	-	-
HCM Control Delay (s)	9.1	0	-	27.4	10.4	7.8	0	-
HCM Lane LOS	A	A	-	D	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.8	0.1	0.1	-	-

Appendix K – Auxiliary Lane Analysis

Future (2028) Total AM WBL - Renaud & Saddleridge



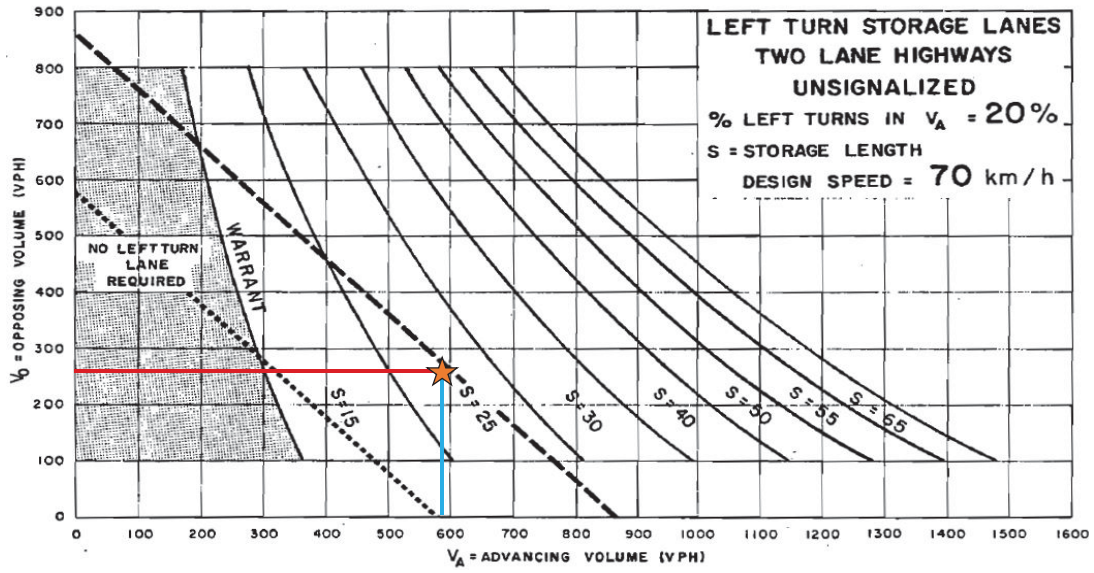
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2028) Total AM NBL - Navan & Spring Valley



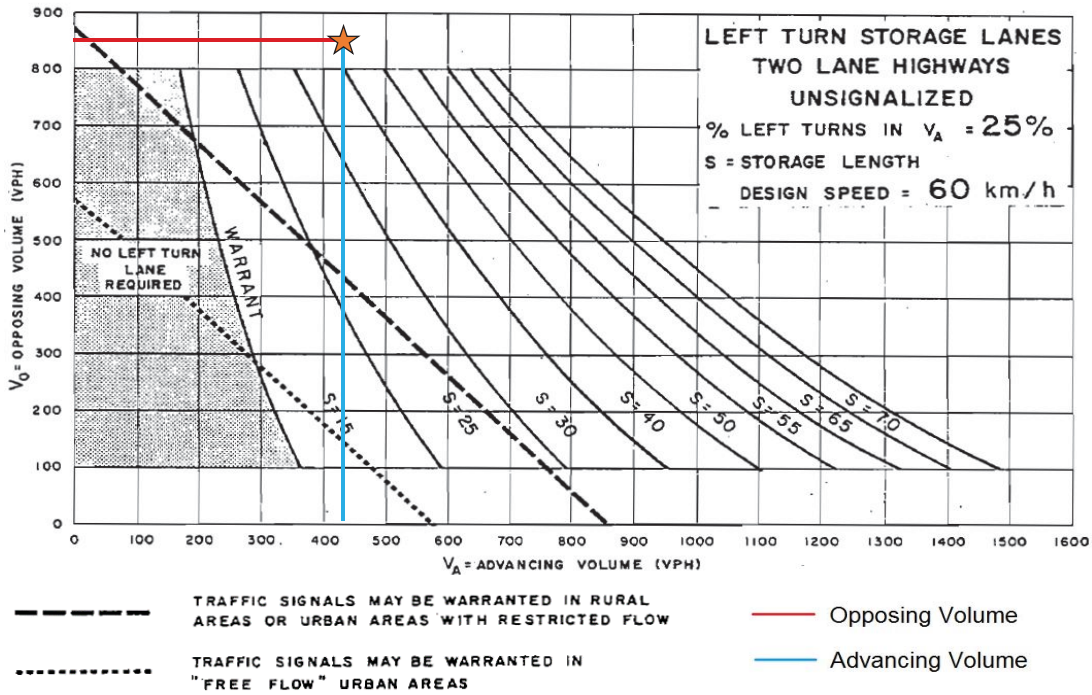
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Opposing Volume

Advancing Volume

Future (2028) Total PM WBL - Renaud & Saddleridge



Future (2028) Total PM NBL - Navan & Spring Valley