REPORT NO. 17M-02201-00

Transportation Impact Assessment

Phoenix Homes Subdivision
Old Montreal Road

March 2018

CONFIDENTIAL

ABOUT US

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TIA Plan Reports

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 associated 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[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering ☒ or transportation planning ☐.

[1,2] **License of 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, ON this 29 day of March, 2018.
(City)

Name: Sarah McDonald, P.Eng.
(Please Print)

Professional Title: Project Manager, Transportation Planning

S.J.E. McDonald

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

Office Contact Information (Please Print)
Address: 1145 Hunt Club Road, Suite 200
City / Postal Code: Ottawa, ON K1V 0Y3
Telephone / Extension: 613-690-1178
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Stamp

LICENSED PROFESSIONAL ENGINEER
S. J. E. MCDONALD
100115812
March 29, 2018
PROVINCE OF ONTARIO

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	1154, 1172, 1180, and 1208 Old Montreal Road
Description of Location	South side of Old Montreal Road, 800m east of Trim Road
Land Use Classification	
Development Size (units)	16 semi-detached, 467 town/terrace
Development Size (m^2)	
Number of Accesses and Locations	2 x full movement (800m + 1000m east of Trim), 2 x RIRO (880m + 940m e of Trim)
Phase of Development	
Buildout Year	

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

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.*

If the proposed development size is greater than the sizes identified above, <u>the Trip Generation Trigger is satisfied.</u>

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?	Spine	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*	DPA, Arterial Mainstreet	

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	X	
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)?		X
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

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).

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

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

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

TERRACE FLATS & TOWNS		FLATS	TOWNS
BLOCK 1 =	TERRACE FLATS / TWO STOREY TOWNS	48 UNITS	8 UNITS
BLOCK 2 =	TERRACE FLATS / TWO STOREY TOWNS	40 UNITS	7 UNITS
BLOCK 3 =	TERRACE FLATS / TWO STOREY TOWNS	40 UNITS	7 UNITS
BLOCK 4 =	TERRACE FLATS / TWO STOREY TOWNS	48 UNITS	8 UNITS
BLOCK 5 =	TERRACE FLATS	56 UNITS	
BLOCK 7 =	TERRACE FLATS	24 UNITS	
BLOCK 8 =	TERRACE FLATS	48 UNITS	
BLOCK 9 =	TERRACE FLATS	24 UNITS	
BLOCK 10 =	TERRACE FLATS	24 UNITS	
BLOCK 11 =	TERRACE FLATS	40 UNITS	
BLOCK 12 =	TERRACE FLATS	40 UNITS	
TOTAL =		432 UNITS	30 UNITS
SEMI-DETACHED			
SEMI-DETACHED =		16 UNITS	
TOWNHOMES			
TOWNHOMES =		5 UNITS	
TOTAL ALL UNITS =		483 UNITS	

M. David Blakely
Architect Inc.
2200 Prince of Wales Dr. - Suite 101
Ottawa, Ontario K2E 6Z9
Phone (613) 226-8811 Fax (613) 226-7942

GENERAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING ALL DIMENSIONS, ANY DISCREPANCY MUST BE REPORTED TO M. DAVID BLAKELY ARCHITECT INC.
2. ALL WORK AND MATERIALS TO BE IN COMPLIANCE WITH ALL CODES, REGULATIONS, AND BY-LAWS.
3. ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST THE PROPER EXECUTION OF WORK. SUCH DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH THE PLANS IN CONTRACT DOCUMENTS.
4. DO NOT SCALE DRAWINGS.
5. THIS DRAWING SHALL NOT BE USED FOR PERMIT OR CONSTRUCTION UNLESS THE DRAWING BEARS THE ARCHITECT'S SEAL AND SIGNATURE.
6. THIS REPRODUCTION SHALL NOT BE ALTERED

CONSTRUCTION NORTH

No.	DATE	DESCRIPTION	INIT.
10.			
9.			
8.			
7.			
6.			
5.	20/09/17	REVISED SITE LAYOUT	SM
4.	05/07/17	REVISED UNIT TYPES	SM
3.	13/04/17	REVISED SITE LAYOUT	SM
2.	21/12/16	REVISED 36 UNIT BLOCK LAYOUT	SM
1.	30/11/16	FOR REVIEW	SM

REVISIONS

No.	DATE	DESCRIPTION	INIT.
20.			
19.			
18.			
17.			
16.			
15.			
14.			
13.			
12.			
11.			

REVISIONS

A - DETAIL NUMBER
B - SHEET NUMBER (DETAIL REQUIRED)
C - SHEET NUMBER (DETAIL LOCATION)

SEAL

PROJECT
PROPOSED SUBDIVISION
OLD MONTREAL ROAD
OTTAWA, ONTARIO.

CLIENT
PHOENIX HOMES

DRAWING TITLE
PRELIMINARY DEVELOPMENT PLAN

DATE: NOV., 2016.
SCALE: 1 : 500
SHEET No.: SP-1
DRAWN BY: SBM
CHECKED: MDB

TRANSPORTATION IMPACT ASSESSMENT SCOPING REPORT

TO: Asad Yousfani, Project Manager, Infrastructure Approvals, City of Ottawa

FROM: Sarah McDonald, P. Eng. Project Manager, Transportation Planning, WSP

SUBJECT: **Phoenix Homes, Proposed Subdivision Old Montreal Road, Ottawa, ON**

DATE: **November 2017**

SCREENING FORM

This Transportation Impact Assessment (TIA) is being prepared in support of a Plan of Subdivision and Zoning By-Law Amendment Application. The screening form and preliminary site plan are attached.

DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development is located at 1154, 1172, 1180, and 1208 Old Montreal Road. It is approximately 800m east of Trim Road and within the general urban area defined by the City of Ottawa's Official Plan. The existing zoning on the properties is:

— Rural Residential (RR7), 1154 and 1180 Old Montreal Road
— RR7(19r), 1172 Old Montreal Road
— Rural Countryside (RU), 1208 Old Montreal Road

The rural exception on 1172 Old Montreal Road notes that the property is developable despite the lack of frontage onto a public street (Zoning By-Law 2008-250 Consolidation, Section.59).

The proposed development by Phoenix Homes includes 432 terrace flats, 35 townhomes, and 16 semi-detached homes. It includes the construction of one new public road and one private street as shown in the attached preliminary development plan (SP-1).

The timeline for the development has not been determined. For the purpose of this TIA it is assumed that the development will be fully occupied in December 2022, five years from now.

The exact number of parking spaces provided has not been determined at the time of this report. However, each of the 12 blocks with terrace flats will have two levels of indoor parking. Additionally, the following surface parking facilities are proposed:

— 25 street parking spaces on the south side of Private Street One
— 16 parking stalls on the north side of Private Street One
— 36 parking stalls for Blocks 9 & 10; 20 parking stalls adjacent to Block 11
— 12 parking stalls adjacent to Block 12
— 7 parking stalls behind the 5 townhomes that front onto the new public road
— Private driveways at each of the 16 semi-detached homes

There are four proposed accesses to this development from Old Montreal Road as described in Table 1.

Table 1. Development Accesses onto Old Montreal Road

IDENTIFIER	LOCATION	RESTRICTIONS	PROVIDES ACCESS TO
West Access	Opposite Famille-Laporte Avenue (800m east of Trim)	Full movement	New public road
Block 2/3 Parking	880m east of Trim	Right-In / Right-Out (RIRO)	Second level parking for Block 2 and Block 3
Block 1 Parking	940m east of Trim	RIRO	Second level parking for Block 1
East Access	1000m east of Trim	Full movement	New public road

EXISTING CONDITIONS

ROAD NETWORK

All roads in the study area are under the jurisdiction of the City of Ottawa.

Old Montreal Road is a two-lane arterial road that runs in an east-west direction between Trim Road and Ottawa Road 174 near the eastern edge of the City. The posted speed limit adjacent to the development property is 60 km/h.

Trim Road is a four-lane divided arterial road that runs in a north-south direction south from Ottawa Road 174. The posted speed limit is 70 km/h.

Dairy Drive is a two-lane local road that connects to Trim Road at a two-lane roundabout and to Old Montreal Road at stop control. It provides access to business and industry.

Famille-Laporte Avenue is a two-lane collector road that is part of the new Cardinal Creek subdivision. It is directly opposite the development property on Old Montreal Road.

INTERSECTIONS AND DRIVEWAYS

There are three intersections in the study area:

- Old Montreal Road and Trim Road (two lane roundabout, new summer 2015)
- Old Montreal Road and Dairy Drive (two-way stop control)
- Old Montreal and Famille-Laporte Avenue (one-way stop control, new 2014/2015)

There are a number of private residential driveways along Old Montreal Road in the study area. However, there are no existing commercial accesses.

CYCLE AND TRANSIT FACILITIES

There are eastbound and westbound cycling lanes on Old Montreal Road from Trim Road to Dairy Drive. There is a paved shoulder that could be used by cyclists from Dairy Drive eastward.

There is a separated sidewalk on the north side of Old Montreal Road between Trim Road and Dairy Drive that can be used by pedestrians.

OC Transpo bus route #221 travels along Old Montreal Road east of Trim Road, providing a connection between Cumberland and Downtown Ottawa. Bus service on this route includes two westbound trips in the morning and two eastbound trips in the evening.

The Trim Transit Station / Trim Park & Ride is located at Trim Road and Ottawa Road 174 and is accessible from Dairy Drive. It is served by rapid transit route 95, route 22, connection route 221, and local route 122. This Park & Ride can currently accommodate 1,089 vehicles.

AREA TRAFFIC MANAGEMENT MEASURES

There does not appear to be existing Area Traffic Management (ATM) measures along this section of Old Montreal Road.

PEAK HOUR TRAVEL DEMAND BY MODE

The results from the 2011 Origin-Destination (O-D) survey were reviewed to identify the existing peak hour travel demands by mode. Given the proximity of the development near the eastern boundary of the Orléans district, it was assumed that any trip without an O-D of the Rural East district would be to/from the Old Montreal Road / Trim Road intersection. According to the O-D survey, in the AM peak 2% of all Orléans trips go to Rural East and 5% originate from Rural East.

Based on the O-D survey, the peak hour travel demands by mode are:

Table 2. Peak Hour Travel Demands

MODE	AM PEAK (TO/FROM)	PM PEAK (TO/FROM)
Auto Driver	55% / 61%	64% / 56%
Auto Passenger	8% / 13%	21% / 11%
Transit	35% / 10%	12% / 32%
Bicycle	1% / 0%	0% / 1%
Walk	0% / 0%	0% / 0%
Other (primarily school bus)	2% / 16%	3% / 1%

CRASH HISTORY

The past 5-years of crash data (January 2012 – January 2017) for the three intersections in our study area and the section of Old Montreal Road adjacent to the development were obtained from the City of Ottawa and reviewed to determine any trends in collision history. The data available along Old Montreal Road is for the 1500m section between Grand Chene Cour Du Court and Ted Kelly Lane making it difficult to identify crash trends in the vicinity of the proposed development.

The intersection of Old Montreal Road and Trim Road was reconstructed from a signalized intersection to a two-lane roundabout in the summer of 2015. The crash history of the previous configuration has not been reviewed.

Table 3. Five-Year Review of Crash History (January 2012-January 2017)

LOCATION	TOTAL CRASHES	PROPERY DAMANGE ONLY	NON-FATAL
Old Montreal / Trim*	35	32	3
Old Montreal / Dairy	1	0	1
Old Montreal / Famille-Laporte	0	0	0
Old Montreal Segment *(Frank Kenny Road to Grand-Chene Cour du Court)*	16	12	4

** reviewed with roundabout configuration only (September 2015 – January 2017)*

Some of the crash trends identified from the crash reports include:

Old Montreal Road / Trim Road

- Majority of crashes occur between 12:00pm and 4:00pm
- 86% of all crashes occurred during clear weather with dry roads
- 17 angle and 12 sideswipe crashes indicate that drivers are adjusting to entering and manoeuvring through the roundabout
- The average crash rate doubled with the introduction of the roundabout (signalized 1.1 crashes per month, roundabout 2.2 crashes per month)

Old Montreal Road Segment

- 40% of crashes occur between 6:00pm and 11:00pm
- More than half the crashes occurred on adverse surface conditions (snow, ice, wet)
- 13 of 16 crashes involved a single motor vehicle
- There were no crashes reported between September 2015 and January 2017

PLANNED CONDITIONS

In the City of Ottawa's 2013 Transportation Master Plan (TMP), the section of Old Montreal Road between Trim Road and the edge of the urban boundary is planned to be widened from two to four lanes by 2031. The widening is proposed to provide capacity for development areas east of Trim Road. To be conservative, this widening will not be included in the traffic impact assessment for this development. This section of Old Montreal Road is designated as part of the cycling Spine Route and as a conceptual future transit corridor in the TMP.

Cardinal Creek Village is a large subdivision being developed opposite our proposed development on the north side of Old Montreal Road. The subdivision will ultimately accommodate 569 single/semi-detached dwellings and 681 attached dwellings, and several large blocks for mixed-use/commercial, school, and parkland purposes. We can use the Transportation Impact Study (October 2013) completed for the development to estimate vehicle trips generated by Cardinal Creek Village.

There is a proposed commercial development at 1015 Dairy Drive to relocate the corporate headquarters of Drytech International (disaster restoration equipment and services). The Transportation Brief (December 2013) for this development can be used to estimate vehicle trips generated by this development. The application file has been pending since February 2014.

There is a proposed commercial development at 1375 Trim Road, in the north-east corner of the Old Montreal Road / Trim Road intersection. The development includes a high-end coffee shop, a restaurant with a drive-thru, a sit-down restaurant, a retail building, and a medical building. One of the proposed accesses is directly onto Old Montreal Road. The Transportation Impact Study (July 2016) can be used to estimate vehicle trips generated by this development. The agreement was registered and final legal clearance given in July 2017.

STUDY AREA

Our proposed study area includes:

- Old Montreal Road between Trim Road and 200m east of the proposed development
- Three intersections along Old Montreal Road at:
  - Trim Road
  - Dairy Drive
  - Famille-Laporte Avenue

TIME PERIODS

Our proposed analysis periods for this traffic impact assessment are based on the 2017 turning movement counts at Old Montreal Road and Trim Road. We have selected the AM and PM peak hours: 7:15am – 8:15am and 4:30pm – 5:30pm.

HORIZON YEARS

Our assumed horizon years for the traffic analysis are:

- Full occupancy: 2022
- Occupancy plus five years: 2027

EXEMPTIONS REVIEW

The following table identifies the exemptions to the fourth step (Analysis) of the TIA process.

Table 4. Traffic Impact Module Exemptions

MODULE	ELEMENT	REQUIRED
4.1 Development Design	4.1.2 Circulation and Access	NO, only required for site plans
	4.1.3 New Street Networks	YES, plan of subdivision
4.2 Parking	4.2.1 Parking Supply	NO, only required for site plans
	4.2.2 Spillover Parking	NO, only required for site plans
4.5 Transportation Demand Management	All elements	NO, no employees or students
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	NO, does not rely on local or collector streets
4.8 Network Concept	-	NO, will not generate more than 200 person-trips in excess of the established zoning permissions

TRAFFIC IMPACT ASSESSMENT FORECASTING REPORT

TO: Asad Yousfani, Project Manager, Infrastructure Approvals, City of Ottawa

FROM: Sarah McDonald, P. Eng. Project Manager, Transportation Planning, WSP

CC: Paul Black, FOTENN

SUBJECT: **Phoenix Homes, Proposed Subdivision Old Montreal Road, Ottawa, ON**

DATE: **Revised March 9, 2018**

DEVELOPMENT GENERATED TRAFFIC

TRIP GENERATION

TRIP GENERATION RATES

Residential trip generation rates were selected from the 2009 TRANS Trip Generation Study. The semi-detached dwellings, townhouses, rowhouses land use from the TRANS Trip Generation Study was used to identify trip generation rates for the proposed development (Table 1).

Table 1. Trip Generation Rates, Semi-Detached, Townhouses, Rowhouses (Land Use 224)

PEAK PERIOD	TRANS RATE	INBOUND	OUTBOUND
AM	0.52	37%	64%
PM	0.61	53%	47%

The 2009 TRANS study provides residential mode shares by dwelling type for urban and suburban areas. The travel mode share for suburban areas is shown in Table 2.

Table 2. TRANS Trip Generation Study Suburban Mode Shares for Townhouses

TRAVEL MODE	AM	PM
Vehicle	55%	61%
Transit	27%	22%
Non-Motorised	8%	6%

The development has 538 units whose vehicle trips were estimated using the TRANS trip generation rates (Table 1). To forecast the person trips, the total calculated vehicle trips were

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divided by the vehicle percentage (Table 2). The resulting trips generated by this development are shown in the following table.

Table 3. Development Generated Vehicle and Person Trips

	AM			PM		
Trips	**Total**	**Enter**	**Exit**	**Total**	**Enter**	**Exit**
Vehicle	251	93	161	295	156	138
Person	457	169	292	483	256	227

There are no existing trips to deduct since this is a new development and not a redevelopment.

Since this is a residential development, it is not expected to attract any trips from the adjacent roadway (pass-by trips). Furthermore, there will be no synergy (internal capture) since this is a single use development.

MODE SHARES

The study mode shares were estimated by averaging the peak hour travel demands from the 2011 O-D survey data provided in the TIA Scoping Report. Mode share targets were applied to the person trips calculated in Table 3 to determine the number of peak period trips for each mode.

The following table summarizes the mode share targets and person trips generated by the proposed development.

Table 4. Future Mode Share Targets for the Development (TIA Guidelines Table 5)

TRAVEL MODE	MODE SHARE TARGET	AM PERSON TRIPS	PM PERSON TRIPS	TARGET RATIONALE
Transit	20%	102	108	Limited transit service along corridor, but close to Trim Transit Station. Old Montreal Road is part of a conceptual future transit corridor which will likely not be implemented during our study timeframe.
Walk	0%	0	0	Rural cross section with few amenities within walking distance.
Bicycle	5%	25	27	Rural cross section with few amenities within cycling distance.

Auto Passenger	15%	76	81	Vehicle occupancy unlikely to deviate significantly from existing O-D tendencies.
Auto Driver	60%	305	323	Rural cross section with no significant transit or pedestrian improvements in our study timeframe.

TRIP DISTRIBUTION

According to the O-D survey, in the AM peak 2% of all Orléans trips go to Rural East and 5% originate from Rural East. Therefore, to be conservative the assumption was made that 5% of all trips in both peak periods are to/from the east and the remaining 95% are to/from the west.

TRIP ASSIGNMENT

Vehicle trips were assigned to development accesses based on the proximity of dwellings to the two full access entrances and the right-in / right-out parking structure entrances. Intersections turning movements were assigned based on existing traffic patterns. The assignment is shown in the following figure.

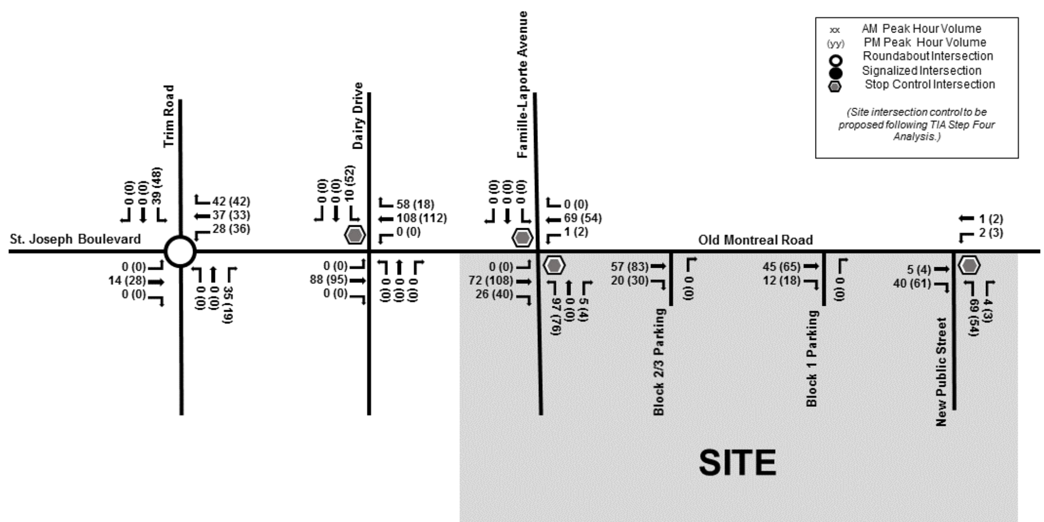

Figure 1. Development Trip Assignment

BACKGROUND NETWORK TRAFFIC

CHANGES TO THE BACKGROUND TRANSPORTATION NETWORK

The 2016 Ottawa Road 174-Prescott-Russel County Road Study 17 Environmental Assessment proposed widening of OR174 and CR17 to provide an additional arterial lane to address capacity deficiencies across the Frank Kenny screenline. The proposed widening includes:

— Widening OR 174 to 3 lanes in each direction between Highway 417 and Trim Road

— Widening OR 174 to 2 lanes in each direction between Trim Road and Canaan Road
— Widening CR 17 to 2 lanes in each direction between Canaan Road and Landry Road

These measures could reduce volumes on Old Montreal Road by attracting a higher percentage of trips from the City of Clarence Rockland to the OR174 / CR17 corridor.

Alternatively, the widening of Old Montreal Road from two lanes to four lanes east of Trim Road is part of the Network Concept in the City of Ottawa's 2013 Transportation Master Plan. The rationale of this widening is to provide capacity for the development areas east of Trim Road.

To be conservative, neither of these potential changes are considered in the analysis since their timeframes are unknown.

GENERAL BACKGROUND GROWTH RATES

The background growth rate along Old Montreal Road east of Trim Road is 1.8%. This is based on an analysis of historical traffic growth.

The 8-hour counts at Old Montreal Road / Trim Road were used to determine the 8-hour traffic volume east of the intersection in 2006, 2010, and 2011. The volumes were then plotted on an x-y scatter chart which identified 1.8% as the growth rate. Traffic counts from 2017 were available, but included the recent development growth from Cardinal Creek Village which is not representative of sustainable background growth. Future growth from Cardinal Creek Village will be considered as part of the other area development.

OTHER AREA DEVELOPMENT

We identified three developments in our Scoping Report that could impact our study area:

— Cardinal Creek Village
— 1015 Dairy Drive (Drytech International Headquarters)
— 1375 Trim Road (multi-use commercial development)

Estimated trips for these developments were taken from their TIAs at the appropriate time horizon.

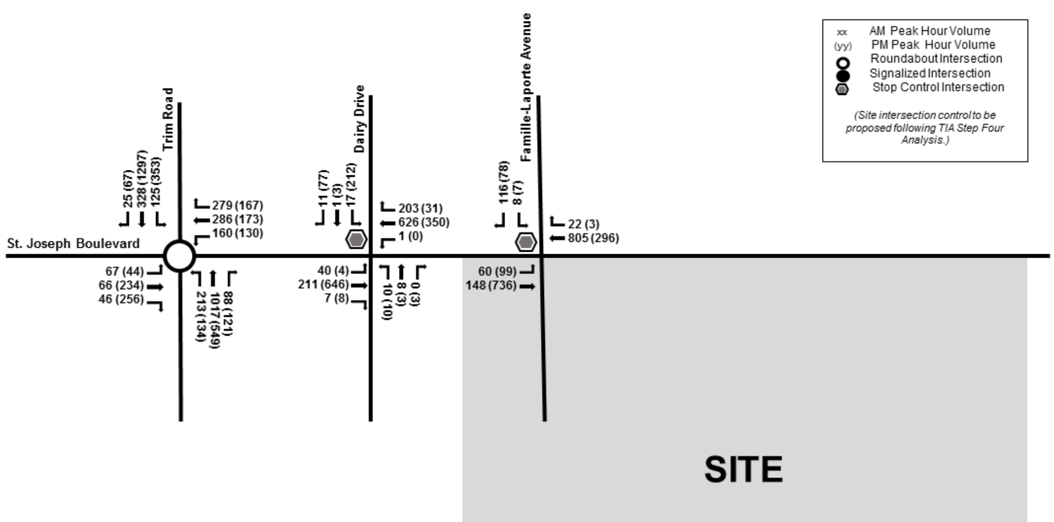

Figure 2. 2022 Background Traffic

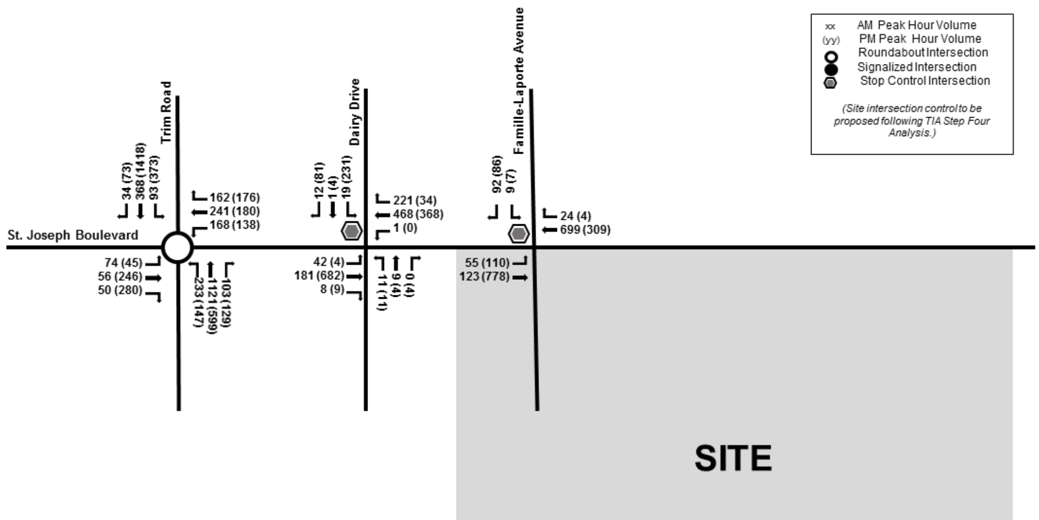

Figure 3. 2027 Background Traffic

DEMAND RATIONALIZATION

DESCRIPTION OF CAPACITY ISSUE(S)

Total traffic volumes for the 2022 and 2027 time horizons were estimated by:

- Applying a 1.8% annual growth rate to the 2017 traffic volumes
- Adding trips generated by other area development
- Adding trips generated by the Phoenix development (**Figure 1**)

The estimated total traffic volumes are shown in the following two figures.

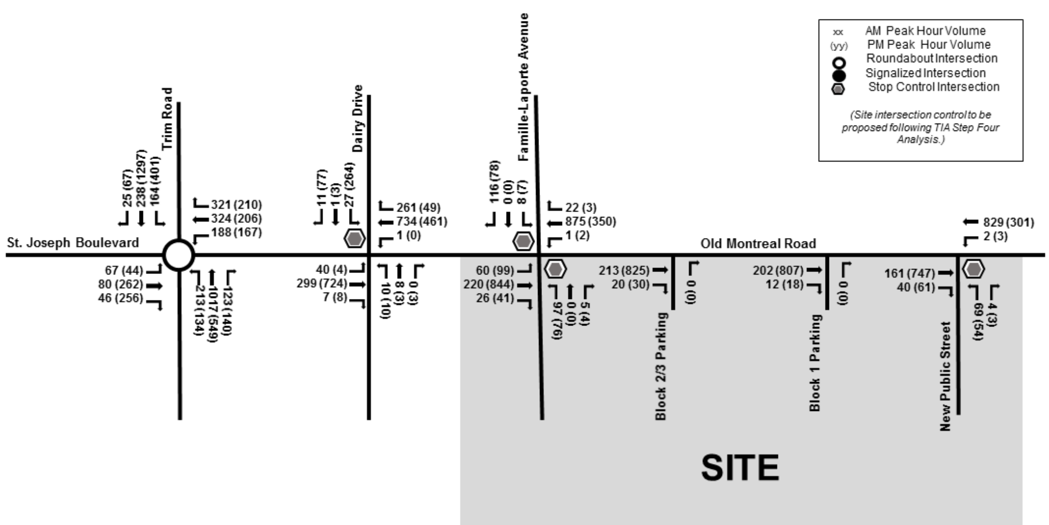

Figure 4. 2022 Total Traffic (Background + Other Development + Development)

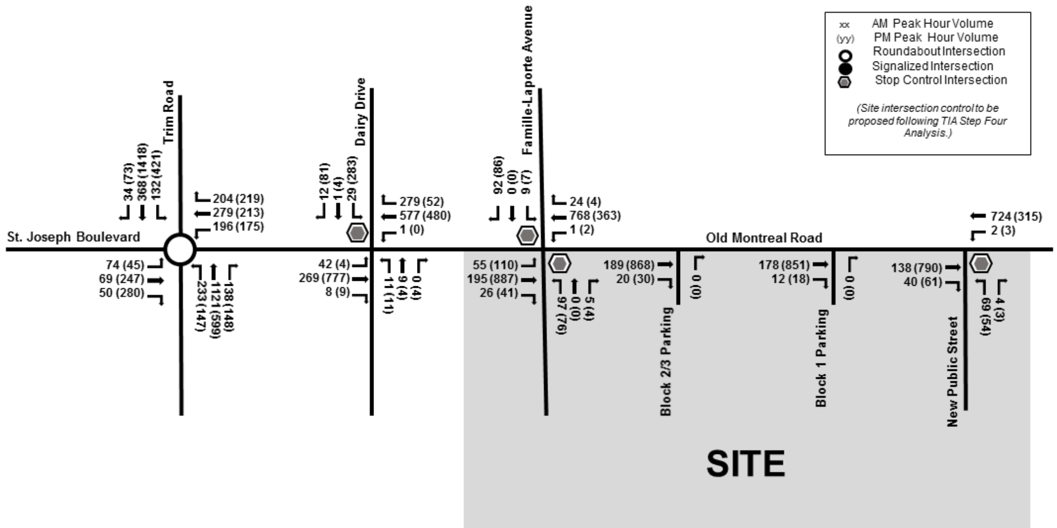

Figure 5. 2027 Total Traffic (Background + Other Development + Development)

The directional capacity of Old Montreal Road across the Frank Kenny screenline is 1050vph (2008 City of Ottawa Road Needs Study). The capacity at the proposed development should also be 1050vph since the same cross section (single lane in each direction) exists at the screenline and through our study area. The directional capacity of Old Montreal Road west of Famille-Laporte will be exceeded in the 2022 total traffic scenario with 1087 AM westbound trips (**Figure 4**). When considering the 2027 total traffic scenario, the AM westbound trips are expected to decrease to 957 vehicles as a result of the proposed Ottawa Road 174 connection in Cardinal Creek Village. The phasing of Cardinal Creek Village and timing of the proposed OR174 connection introduces uncertainty into the trip forecasting of the 2027 time horizon (background and total traffic). Any deviation from the assumptions of the Cardinal Creek TIA will have an impact on traffic operations in our study area. We applied the Cardinal Creek Village site generated traffic volumes as shown in the Cardinal Creek Village Phases 1-7 TIA (October 2013) Exhibits 10, 11, and 12.

The intersection of Old Montreal Road and Trim Road is a two-lane roundabout and capacity issues are not anticipated (to be confirmed in Step 4 Analysis).

ADJUSTMENT TO DEVELOPMENT GENERATED DEMANDS

Adjustment to the development generated demands will not reduce peak direction traffic volumes along Old Montreal Road enough to mitigate the long term capacity concerns. It is noted that as the area becomes more urbanised, increases in the active modes of transportation can be expected as well as used to access the future LRT station located to the north of this site. In general, the proposed development will generate approximately 165 and 150 peak direction vehicle trips during the AM and PM hour when the 2027 total traffic volumes along Old Montreal Rd, west of Famille-Laporte are 957vph and 1,064vph, respectively. Both the current TMP and the OR174/CR17 EA provide support for additional screenline capacity and would provide relief for the potential capacity deficiencies resulting from the Cardinal Creek Village and the planned office commercial development proposed within the broader area.

ADJUSTMENT TO BACKGROUND NETWORK DEMANDS

Adjustments to the background network demand might be able to reduce capacity issues along Old Montreal Road. However, mitigating network capacity concerns such as proposed in the City's TMP and OR174/CR17 EA are considered beyond the scope of this TIA. As indicated previously, these potential capacity issues within the broader study area are discussed and assessed in the OR174/CR17 EA and considered as part of the City's TMP Network Concept.

TRAFFIC IMPACT ASSESSMENT STRATEGY REPORT

TO: Asad Yousfani, Project Manager, Infrastructure Approvals, City of Ottawa

FROM: Sarah McDonald, P. Eng. Project Manager, Transportation Planning, WSP

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SUBJECT: **Proposed Subdivision Old Montreal Road, Ottawa, ON; Phoenix Homes**

DATE: **March 12, 2018**

1. INTRODUCTION

This Strategy Report was prepared on behalf of Phoenix Homes in support of a Plan of Subdivision and Zoning By-Law Amendment Application. The format and outline of the Strategy Report is based on the City of Ottawa's Transportation Impact Assessment (TIA) Guidelines (2017). The purpose of the Strategy Report is to confirm the transportation elements of the development align with the City of Ottawa's broader city-building objectives.

2. DEVELOPMENT DESIGN

The proposed development by Phoenix Homes is located at 1154, 1172, 1180, and 1208 Old Montreal Road. It is approximately 800m east of Trim Road and within the general urban area defined by the City of Ottawa's Official Plan. The development includes 432 terrace flats, 35 townhomes, and 16 semi-detached homes. It includes the construction of one new public road and one private street as shown in the attached preliminary development plan (SP-1).

2.1. DESIGN FOR SUSTAINABLE MODES

As required by the TIA Guidelines, the TDM-supportive Development Design and Infrastructure Checklist was completed to assess the opportunity to implement facilities that are supportive of sustainable modes. The checklist should be reassessed as part of the site plan submission when more detailed information is available related to both vehicle and bicycle parking supply and layout. The completed checklist is attached to this report as **Appendix A.**

Sustainable modes include cycling, walking, and transit. The proposed site accommodates these modes in the following ways:

- Provision for pedestrian sidewalks along the new public road and new private road
- The existing transit stops (two) located on Old Montreal Road adjacent to the proposed development.

A westbound transit stop is located at the northwest corner of the Famille-Laporte Avenue intersection. An eastbound transit stop is located at the northeast corner of the Grand Chène Court intersection that is located approximately 70m west of the site.

Approximately 87% and 71% of the proposed units are within a five minute walk (400m) of the westbound bus stop and eastbound bus stop, respectively. The following measures could be implemented to improve the percentage of units within walking distance to transit:

- Remove the deviation in the proposed sidewalk north of Block 9, if not otherwise required to comply with 5% maximum running slope per the Ottawa Accessibility Design Standards (2014)
- The City consider moving the nearby eastbound bus stop from Grand Chène Crescent to the northeast (far-side) corner of the intersection of Old Montreal Road with Famille-Laporte Avenue to reduce the walking distance from both Cardinal Creek Village and the proposed Phoenix development

2.2. CIRCULATION AND ACCESS

These design elements are not required for applications involving plans of subdivisions.

2.3. NEW STREET NETWORKS

The City of Ottawa's Urban Design Guides for Greenfield Neighbourhoods (2007) provide guidance for neighbourhood design during the subdivision review and zoning process. The TIA Guidelines suggest assessing the planned street network using the methods described in the Urban Design Guide. Guidelines relevant to the TIA process and notes on the planned development are shown in **Table 1**. Generally, the network design is consistent with a local road designed to distribute traffic from arterial and collector streets to individual properties. The design encourages travel by sustainable modes by providing sidewalks and connectivity to existing bus stops and paved shoulders for cycling on Old Montreal Road.

Table 1. Urban Design Guidelines Review

NO.	GUIDELINE DESCRIPTION	PLANNED STREET NETWORK
10	Create a walkable neighbourhood with pathways, trails and sidewalks that are accessible year-round and that connect destinations such as transit stops, commercial areas, schools, community facilities and parks.	The internal street network provides sidewalks that connect to Old Montreal Road. The intersection of Famille Laporte provides access to amenities located within the Cardinal Creek development to the north.
11	Connect new streets to existing streets in adjacent developments and plan for future connections to land that has yet to be developed.	One of the two proposed full-access movements onto Old Montreal Road is opposite the existing access to Cardinal Creek (Famille-Laporte). There is a proposed connection at the south-east corner of the property to a future development at 1296 Old Montreal Road.

NO.	GUIDELINE DESCRIPTION	PLANNED STREET NETWORK
12	Layer collector streets to be direct and continuous through the neighbourhood so homes are within 400m of transit and other destinations along them.	87% of the proposed units are within 400m of the westbound bus stop at Famille Laporte. 71% of the proposed units are within 400m from the eastbound bus stop at Grand Chène Crescent.
13	Layout local street patterns so that development blocks are easily walkable – between 150 and 250 m in length	The local street patterns are easily walkable with north-south connections to Old Montreal Road at each end of the development.
21	Select the most suitable zoning setback and road ROW width for the land use context and road function. Provide sufficient space for the various elements in the front yard, the boulevard, and the road including trees, sidewalks, utilities, cycling facilities, parking and travel lanes	Space for entrances, sidewalks, some on-street parking, and two drive lanes has been included in the proposed development plan.
25	Design roads at entrances to neighbourhoods to create a sense of arrival with such elements as enhanced landscape treatment in the boulevard and the median.	Inclusion of entrance features to be determined as part of the site planning.
26	Construct sidewalks on both sides of the street that serve key destinations, such as transit stops, greenspaces, or to community facilities like schools. Select the correct road ROW standard to allow sufficient space for sidewalks and all streetscape elements.	Sidewalks are proposed on at least one side of the street as per the site plan P1.
28	Design crosswalks in areas with higher pedestrian and vehicular volumes to be visually different form the street surface. Ensure they are universally accessible.	Inclusion of enhanced pedestrian crossing facilities to be determined as part of the site planning.
31	Create a cycling-supportive neighbourhood with bicycle routes that serve local destinations, and that are linked to the citywide network of bicycle routes. Routes include wide shared-use curb lanes, designated on-road bicycle lanes or multi-use pathways.	Internal road network links to Old Montreal Road that has paved shoulders that can be used by bicycles.
32	Design pathways, trails and walkways that are connected to the road right-of-way so that they link to a sidewalk and cross at an intersection.	Internal sidewalks all connect to Old Montreal Road at proposed intersections.

NO.	GUIDELINE DESCRIPTION	PLANNED STREET NETWORK
33	Construct streets, sidewalks, crosswalks and access to buildings that are universally accessible to a wide range of residents and abilities. Refer to accessibility standards such as the CSA (B651-04) "Accessible design for the built environment".	Accessibility features to be identified as part of the site planning.

3. PARKING

The Scoping Report submitted to the City of Ottawa on November 30, 2017 excluded scope associated with Parking.

4. BOUNDARY STREET DESIGN

Old Montreal Road is the only boundary street to the proposed development. The City of Ottawa has not prepared a Complete Street concept for this boundary street. As required by the TIA guidelines, we are providing a high level complete street concept for this boundary street considering mobility, road safety, and neighbourhood traffic management. This complete street concept could be considered as part of a larger study determining the feasibility of widening Old Montreal Road to provide additional arterial capacity in the rural east area of Ottawa.

4.1. MOBILITY

The City's Multi-Modal Level of Service (MMLOS) targets consider road classification, adjacent land-use designation, and special policy areas. The segment of Old Montreal Road adjacent to the development is an arterial road within the general urban area. It is not an arterial main street, within 600m of a rapid transit station, or within 300m of a school. The 2013 City of Ottawa Transportation Master Plan also designates this segment of Old Montreal Road as a Full Load Truck Route, a Cycling Spine Route, and a Conceptual Future Transit Corridor. Note that the 2015 MMLOS Guidelines do not specify a transit target for Conceptual Future Transit Corridor, and this study has instead used the target for Isolated Transit Priority Measures.

The resulting MMLOS targets range from 'C' for pedestrians and cycling to 'D' for transit and trucks, see **Table 2**.

Table 2. Segment MMLOS for Old Montreal Road Adjacent to the Proposed Development (2027)

	PLOS	BLOS	TLOS	TKLOS	VLOS
Target	**C**	**C**	**D**	**D**	VLOS Not Reported for Segments
Status Quo	F	E	D	C	
Proposed Development	D	E	D	C	
Conceptual Complete Street	C	A	D	A	

PLOS = Pedestrian Level of Service, BLOS = Bike Level of Service, TLOS = Transit Level of Service, TkLOS = Truck Level of Service, VLOS = Vehicle Level of Service

The **Status Quo** option assumes that infrastructure remains as is along Old Montreal Road. The MMLOS was assessed as:

- No sidewalk = PLOS ‘F’
- Paved shoulder of 1.8m which is assessed as a bike lane without parking = BLOS ‘E’
- Transit operating in mixed traffic with limited to no parking = TLOS ‘D’
- Bi-directional traffic in two travel lanes of 3.5m = TkLOS ‘C’

The **Development Buildout** option assumes that infrastructure is built as proposed by the current development plan. The MMLOS was assessed as:

- NEW 2.0m sidewalk along Old Montreal Road within the development = PLOS ‘D’
- No changes to the cycling infrastructure = BLOS ‘E’
- No changes to the existing lane geometry = TLOS ‘D’ and TkLOS ‘C’

The **Conceptual Complete Street** concept considers the City’s Official Plan (which protects Old Montreal Road between Trim Road and the East Urban Community limit for a 37.5m right-of-way) and City’s Transportation Master Plan (which indicates that this section of Old Montreal Road is planned to be widened from two to four lanes by 2031). A conceptual complete street concept could be considered as part of a larger road widening project. Such a project might consider a road design similar to Cross-Section 2 proposed in the City of Ottawa’s Arterial Road Cross-sections (**Figure 1**). This cross section was used to assess the Conceptual Complete Street MMLOS.

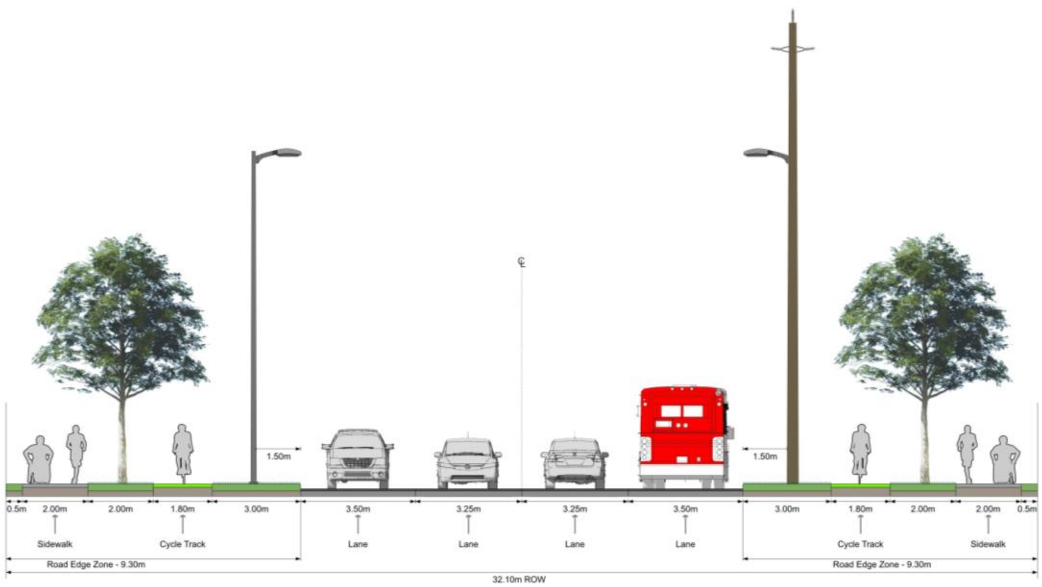


Figure 1. City of Ottawa Arterial Road Concept 2 – Separated Cycle Tracks / Sidewalks

4.2. ROAD SAFETY

Historical collision records for the study area were reviewed in the Collision Analysis section of the Scoping Report. The analysis reviewed the past 5-years of City of Ottawa crash data (January 2012 – January 2017) for roads and intersections within the study area. The data available along Old Montreal Road was for the 1500m section between Grand Chène Court and Ted Kelly Lane, which makes it difficult to identify specific crash trends in the more limited length of road that borders the proposed development. Following the TIA Guidelines we have identified patterns with six or more crashes in five years along this 1500m road segment; they include:

— Seven crashes occurred between 6:00pm and 11:00pm

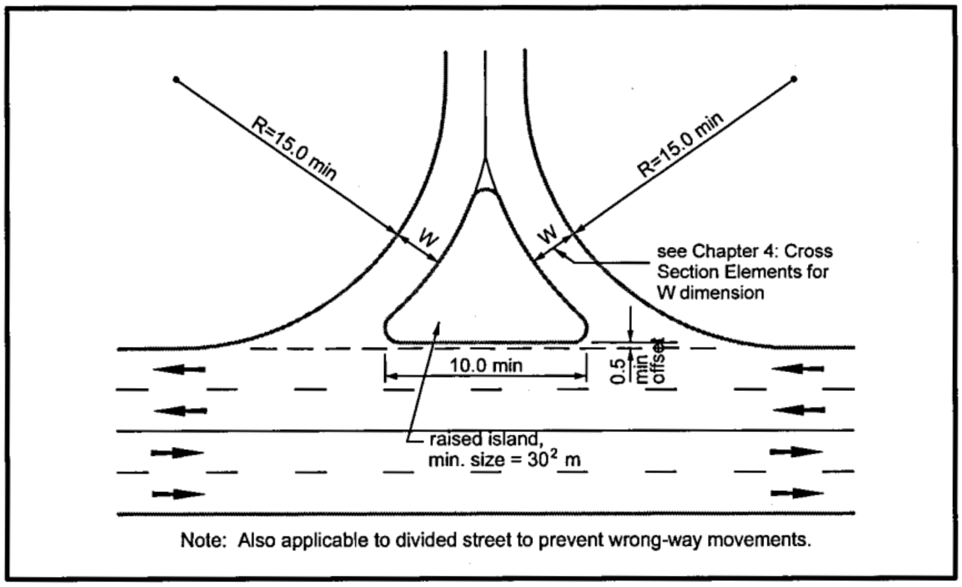
The area reviewed has a rural cross section and illumination is only provided in some sections which could have contributed to the time of day of the seven crashes. The City of Ottawa's Arterial Road Concept 2 (**Figure 1**) includes illumination on each side of the road.

5. ACCESS INTERSECTIONS

5.1. LOCATION AND DESIGN OF ACCESS

There are four proposed access points for this development from Old Montreal Road. They are all located at a distance greater than 800m from the nearest major intersection, which is the existing roundabout located at Montreal and Trim Road.

The existing cross section of Old Montreal Road in this area does not include a median. Therefore access restriction, such as left turn restrictions could be implemented at the two proposed "right-in and right-out" (RIRO) accesses to the Block 1, 2, 3 parking structures include a channelized triangular island similar to the one shown in **Figure 2.**



Source: Figure 8.9.1 of Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads

Figure 2. Left-Turn Restrictions, Undivided Road

5.2. INTERSECTION CONTROL

Traffic control signal warrants following Ontario Traffic Manual (OTM) Book 12 (2012) were completed for the four proposed accesses to the development under both scenarios (background and total) and future planning horizons (2022 and 2027).

Justification 7 (future volumes) was used to determine if a signal will be warranted. Justification 7 uses Average Hourly Volumes (AHV), which is defined as follows:

Average Hourly Volume (AHV) = (AM Peak Hour Volume + PM Peak Hour Volume) / 4

Based on future volumes, none of the accesses to the proposed development trigger a traffic signal warrant. The traffic signal warrant sheets are provided in **Appendix B**.

A capacity analysis was completed for both accesses and is provided in **Section 9.2.2**.

5.3. INTERSECTION DESIGN

An auxiliary left-turn lane analysis for the new accesses was completed for the worst case (2027 future total) traffic conditions. The analysis followed the left-turn warrant in the MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017 – Appendix 9A.

In the peak hours, the forecasted number of vehicles making a left turn into one of the site accesses is 3 or less. The percent left-turn volume compared to advancing traffic volumes is 1%. The left-turn warrant charts in the MTO Design Supplement are provided for locations where the perfect left-turn volume compared to advancing traffic volumes is 5% or higher. Therefore, the implementation of a left-turn lane is not warranted for either of the development accesses. Transportation Demand Management

The Scoping Report submitted to the City of Ottawa on November 30, 2017 excluded scope associated with Transportation Demand Management.

6. NEIGHBOURHOOD TRAFFIC MANAGEMENT

The Scoping Report submitted to the City of Ottawa on November 30, 2017 excluded scope associated with Neighbourhood Traffic Management.

7. TRANSIT

7.1. ROUTE CAPACITY

OC Transpo bus route #221 travels along Old Montreal Road east of Trim Road, providing a connection between Cumberland and Downtown Ottawa. Bus service on this route includes two westbound trips in the morning and two eastbound trips in the evening.

The Trim Transit Station / Trim Park & Ride is located at Trim Road and Ottawa Road 174 and is accessible from Dairy Drive. It is served by rapid transit route 95, route 22, connection route 221, and local route 122. This Park & Ride can currently accommodate 1,089 vehicles.

The Forecasting Report submitted to the City of Ottawa on December 12, 2017 indicated that this development would generate 102 new transit trips in the AM peak hour and 108 new transit trips in the PM peak hour. Applying the inbound and outbound trip percentages from the Forecasting Report provides an estimate of transit trips generated by this development as presented in the following table.

Table 3. Estimated Transit Trips Generated by Development (AM and PM Peak Hours)

PEAK HOUR	TOTALTRANSIT TRIPS	INBOUND %	INBOUND #	OUTBOUND %	OUTBOUND #
AM	102	37%	38	64%	65
PM	108	53%	57	47%	51

A measured and need based increase in transit service through the Old Montreal Road corridor should be provided. It is expected that the need for transit services will be driven by Cardinal Creek Village with a smaller ridership contribution from the proposed Phoenix development.

7.2. TRANSIT PRIORITY

This is a rural area transitioning into an urban area. It is not a candidate for transit priority measures.

8. REVIEW OF NETWORK CONCEPT

The Scoping Report submitted to the City of Ottawa on November 30, 2017 excluded scope associated with the Review of Network Concept.

9. INTERSECTION DESIGN

The study area includes three existing network intersections in the study area:

— Old Montreal Road and Trim Road (two lane roundabout)
— Old Montreal Road and Dairy Drive (two-way stop control)
— Old Montreal and Famille-Laporte Avenue (one-way stop control)

The development also proposes two new full-movement accesses:

— the West Access opposing the existing Famille-Laporte Avenue
the East Access approximately 200m east of the West Access / Famille-Laporte Avenue intersection

The study area intersections were evaluated in the morning and afternoon (AM and PM) peak hour traffic conditions at the following planning horizons:

— Existing (2017)
— Future Background (2022 and 2027)
— Future Total (2022 and 2027)

9.1. INTERSECTION CONTROL

Traffic control signal warrants following Ontario Traffic Manual (OTM) Book 12 (2012) Justification 7 were completed the Dairy Drive intersection under both scenarios (background and total) and future planning horizons (2022 and 2027). Traffic signal warrants for the two full movement accesses were presented in **Section 5**. The warrant calculations are provided in **Appendix B.**

At the Old Montreal Road and Dairy Drive intersection a traffic signal is not warranted under either future background scenario. However, they are warranted under both future total scenarios. When considering the 2022 background scenario, the Average Hourly Volume (equation in **Section 0**) on Old Montreal is within

45 vehicles of triggering the traffic signal warrant. This indicates that any proposed development growth on Old Montreal Road that generates vehicular traffic would likely satisfy the warrant.

The following table provides the AM and PM peak hour traffic volumes on Old Montreal Road in the existing, 2022 total, and 2027 total traffic scenarios to compare the estimated traffic contribution from both Cardinal Creek Village and the proposed Phoenix Development. In 2022, Cardinal Creek contributes over 65% of the new development traffic growth along this corridor. The contribution of Cardinal Creek in 2027 is highly dependant on the availability of the proposed Ottawa Road 174 access; without this new access then the contribution of Cardinal Creek to traffic on Old Montreal Road will increase instead of decrease as presented in the Cardinal Creek TIA and shown below.

Table 4. AM and PM volumes on Old Montreal Road at Dairy Drive

TRAFFIC	2018	2022	2027
Old Montreal Road at Dairy Drive (Total)	668 / (753)	1321 / (1519)	1155 / (1596)
Trips to/from Cardinal Creek Village	159 / (205)	478 / (618)	243 / (293)
Trips to/from Proposed Development	0 / (0)	264 / (277)	264 / (277)

Following the OTM Book 12 traffic signal warrants (Justification 7), the Dairy Drive / Old Montreal Road intersection warrants a traffic signal with known development traffic. An upgrade to the intersection should be considered by the City of Ottawa to provide more capacity through the maturing rural east sector

9.2. INTERSECTION DESIGN (OPERATIONS)

9.2.1. MMLOS ANALYSIS

Multi-Modal Level of Service (MMLOS) analysis methodology outlined in the City of Ottawa's MMLOS Guidelines (2015) states that intersection LOS measures are only to be evaluated at signalized intersections. Analysis of Vehicle Level of Service (VLOS) is detailed in **Section 9.2.2**.

Based on the traffic signal warrants (**Section 9.1**), Dairy Drive will warrant a traffic signal under 2022 and 2027 total traffic conditions. As discussed in **Section 9.1**, total traffic volumes are expected to be highest in 2022 at this intersection since the proposed OR 174 connection to Cardinal Creek will not have been constructed. Therefore, we have prepared an MMLOS analysis at this intersection for the 2022 total traffic scenario only since it will represent the worst case. Targets are taken from the General Urban Area Arterial Road Class.

Table 5. Intersection MMLOS for Old Montreal Road / Diary Drive under 2022 Total Traffic Conditions

	PLOS	BLOS	TLOS	TKLOS	VLOS
Target	**C**	**C**	**D**	**D**	Section 9.2.2
Old Montreal Road / Dairy Drive Intersection	C	F	D	E	

PLOS = Pedestrian Level of Service, BLOS = Bike Level of Service, TLOS = Transit Level of Service, TkLOS = Truck Level of Service, VLOS = Vehicle Level of Service

9.2.2. VEHICLE CAPACITY ANALYSIS

METHODOLOGY

The existing and future conditions were analyzed using the weekday peak hour traffic volumes presented during the previous Traffic Impact Assessment Forecasting Report.

All intersections in the study area are currently roundabouts or unsignalized (stop controlled) intersections. The Highway Capacity Manual (HCM) 2010, assigns the vehicle level of service (VLOS) based on ranges of movement delay, as indicated in **Table 6**. Delay is the increase in travel time due to an intersection control.

Table 6. Highway Capacity Manual 2010, LOS Criteria

VLOS	UNSIGNALIED INTERSECTIONS DELAY (SECONDS)	SIGNALIZED INTERSECTIONS DELAY (SECONDS)
A	0-10	0-10
B	>10-15	>10-20
C	>15-25	>20-35
D	>25-35	>35-55
E	>35-50	>55-80
F	>50	>80

The City's MMLOS Guidelines recommend a target VLOS of 'E' for the City's Central Area, for within 600m of a rapid transit station, or for within 300m of a school. The Guidelines recommend a target VLOS of 'D' for locations, such as the study area, that are not located in the aforementioned policy areas.

The following sections present the results of the intersection capacity analysis. Movement delay and VLOS are shown alongside volume, volume / capacity (v/c), and 95th percentile queue length. Unsignalized (stop-controlled) intersections were analyzed using Synchro 9, while the roundabout at Old Montreal Road and Trim Road was analyzed using SIDRA 7. **Appendix C** contains the detailed Synchro analysis sheets.

EXISTING CONDITIONS (2017)

The existing (2017) intersection capacity analysis results are summarized in **Table 7**. Both AM peak hour and PM peak hour are shown within the table, with the PM peak results shown within brackets. All three intersections currently operate with an acceptable VLOS. The highest volume to capacity (v/c) ratios are the southbound movements in the PM peak hour at the Old Montreal Road / Trim Road roundabout. The v/c ratio is 0.77 which indicates there is available capacity for future volumes.

Table 7. Intersection Capacity Summary – Existing (2017)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Trim Road (Roundabout)						
EBL	21 (17)	5.2 (16.7)	A (C)	0.03 (0.23)	-	0.9 (5.6)
EBT	24 (116)	4.7 (15.3)	A (C)	0.03 (0.23)	-	0.9 (5.6)
EBR	42 (234)	4.7 (24.4)	A (C)	0.05 (0.62)	-	1.4 (22.6)
WBL	98 (77)	14.6 (5.8)	B (A)	0.30 (0.11)	-	8.1 (3.0)
WBT	130 (70)	12.4 (6.4)	B (A)	0.30 (0.11)	-	8.2 (3.1)
WBR	147 (89)	10.3 (5.3)	B (A)	0.29 (0.12	-	8.2 (3.2)
NBL	195 (123)	9.3 (8.3)	A (A)	0.54 (0.40)	-	28.1 (14.7)
NBT	910 (490)	9.1 (8.1)	A (A)	0.54 (0.40)	-	28.1 (14.7)
NBR	61 (77)	9.2 (7.9)	A (A)	0.54 (0.40)	-	27.3 (14.7)
SBL	68 (199)	7.2 (18.1)	A (C)	0.26 (0.77)	-	8.0 (67.6)
SBT	300 (1186)	7.0 (17.6)	A (C)	0.26 (0.77)	-	8.0 (67.6)
SBR	23 (61)	6.8 (17.2)	A (C)	0.26 (0.77)	-	7.9 (67.2)
Old Montreal Road and Dairy Drive (Two-Way Stop Control)						
EBL	14 (1)	8.6 (7.7)	A (A)	0.02 (0.00)	-	0.3 (0.0)
EBTR	134 (354)	0.0 (0.0)	A (A)	0.09 (0.23)	-	0.0 (0.0)
WBL	1 (0)	7.5 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
WBTR	522 (210)	0.0 (0.0)	A (A)	0.34 (0.14)	-	0.0 (0.0)
NBTLR	16 (15)	15.9 (14.2)	C (B)	0.05 (0.04)	-	1.1 (0.9)
SBL	14 (190)	15.3 (23.6)	C (C)	0.04 (0.52)	-	1.0 (20.6)
SBTR	9 (48)	11.6 (10.0)	B (A)	0.02 (0.07)	-	0.4 (1.5)
Old Montreal Road and Famille-Laporte Avenue (Two-Way Stop Control)						
EBL	57 (101)	8.8 (7.7)	A (A)	0.06 (0.08)	-	1.4 (1.8)
EBTR	69 (418)	0.0 (0.0)	A (A)	0.05 (0.27)	-	0.0 (0.0)
WBTLR	516 (132)	0.0 (0.0)	A (A)	0.34 (0.09)	-	0.0 (0.0)
NBTLR	0 (0)	0.0 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
SBTLR	123 (84)	14.6 (10.2)	B (B)	0.27 (0.12)	-	7.7 (3.0)

Movement Legend:
NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right
Examples: WBL – westbound left-turn, SBTLR – shared southbound through / left-turn / right-turn lane.

FUTURE BACKGROUND CONDITIONS (2022)

The 2022 background intersection capacity analysis results are summarized in **Table 8**. Both AM peak hour and PM peak hour are shown within the table, with the PM peak results shown within brackets. Results that do not meet the City's target VLOS of 'D' are highlighted in red. With the future background and other development traffic the southbound left turning movements at both Trim Road and Dairy Drive are expected to experience a poor LOS in the PM peak hour. Notably drivers making a SBL at Dairy Drive are expected to experience approximately 110s (just under 2 minutes) of delay with a stop control.

Table 8. Intersection Capacity Summary – Future Background (2022)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Trim Road (Roundabout)						
EBL	67 (44)	5.4 (29.1)	A (D)	0.09 (0.49)	-	2.4 (14.1)
EBT	66 (234)	5.9 (26.3)	A (D)	0.09 (0.49)	-	2.4 (14.4)
EBR	46 (256)	4.8 (25.0)	A (C)	0.06 (0.62)	-	1.5 (22.6)
WBL	160 (130)	21.7 (7.8)	C (A)	0.53 (0.21)	-	17.7 (6.1)
WBT	286 (173)	19.2 (7.2)	C (A)	0.53 (0.21)	-	18.1 (6.1)
WBR	279 (167)	15.4 (6.3)	C (A)	0.50 (0.20)	-	18.2 (5.8)
NBL	213 (134)	11.7 (12.7)	B (B)	0.61 (0.52)	-	35.7 (22.5)
NBT	1017 (549)	11.5 (12.2)	B (B)	0.61 (0.52)	-	35.7 (22.5)
NBR	88 (121)	11.2 (11.8)	B (B)	0.61 (0.52)	-	34.6 (22.4)
SBL	125 (353)	9.3 **(35.8)**	A **(E)**	0.33 (0.92)	-	10.5 (129.2)
SBT	328 (1297)	9.0 (34.6)	A (D)	0.33 (0.92)	-	10.5 (131.1)
SBR	25 (67)	8.8 (34.0)	A (D)	0.33 (0.92)	-	10.3 (131.1)
Old Montreal Road and Dairy Drive (Two-Way Stop Control)						
EBL	40 (4)	9.7 (8.0)	A (A)	0.05 (0.00)	-	1.1 (0.1)
EBTR	216 (654)	0.0 (0.0)	A (A)	0.13 (0.38)	-	0.0 (0.0)
WBL	1 (0)	7.7 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
WBTR	827 (380)	0.0 (0.0)	A (A)	0.49 (0.22)	-	0.0 (0.0)
NBTLR	18 (16)	25.1 (23.5)	C (C)	0.08 (0.08)	-	1.9 (1.8)
SBL	17 (211)	24.7 **(111.3)**	C **(F)**	0.08 (1.00)	-	1.9 (62.5)
SBTR	12 (79)	14.3 (11.5)	B (B)	0.03 (0.12)	-	0.7 (3.0)
Old Montreal Road and Famille-Laporte Avenue (Two-Way Stop Control)						
EBL	60 (99)	9.8 (8.1)	A (A)	0.07 (0.08)	-	1.7 (1.8)
EBTR	148 (736)	0.0 (0.0)	A (A)	0.09 (0.43)	-	0.0 (0.0)
WBTLR	826 (298)	0.0 (0.0)	A (A)	0.49 (0.18)	-	0.0 (0.0)
NBTLR	0 (0)	0.0 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
SBTLR	122 (84)	19.7 (11.9)	C (B)	0.34 (0.15)	-	10.3 (3.6)

Movement Legend:
NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right
Examples: WBL – westbound left-turn, SBTLR – shared southbound through / left-turn / right-turn lane.

FUTURE BACKGROUND CONDITIONS (2027)

The 2027 background intersection capacity analysis results are summarized in **Table 9**. Both AM peak hour and PM peak hour are shown within the table, with the PM peak results shown within brackets. Results that do not meet the City's target VLOS of 'D' are highlighted in red. Under 2027 background traffic conditions, all the SB movements at the Trim Road roundabout are expected operate with a LOS 'F' in the PM peak hour. The EBL movement has a reduction in LOS to an 'E' as a result of high SB volumes. The SBL movement at Dairy Drive continues to operate with a LOS 'F' and high delays with a stop control.

Table 9. Intersection Capacity Summary – Future Background (2027)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Trim Road (Roundabout)						
EBL	74 (45)	9.3 **(36.1)**	A **(E)**	0.09 (0.56)	-	2.6 (16.6)
EBT	56 (246)	8.9 (32.6)	A (D)	0.08 (0.56)	-	2.2 (17.0)
EBR	50 (280)	8.7 (34.9)	A (D)	0.06 (0.73)	-	1.6 (29.9)
WBL	168 (138)	25.0 (8.5)	D (A)	0.54 (0.24)	-	17.8 (6.8)
WBT	241 (180)	21.6 (7.8)	C (A)	0.54 (0.24)	-	18.2 (6.8)
WBR	162 (176)	12.3 (6.8)	B (A)	0.32 (0.22)	-	9.4 (6.4)
NBL	233 (147)	12.7 (14.5)	B (B)	0.66 (0.58)	-	42.9 (27.1)
NBT	1121 (599)	12.4 (13.9)	B (B)	0.66 (0.58)	-	42.9 (27.1)
NBR	103 (129)	12.2 (13.5)	B (B)	0.66 (0.58)	-	41.4 (27.0)
SBL	93 (373)	9.3 **(59.4)**	A **(F)**	0.34 (1.03)	-	10.8 (243.8)
SBT	368 (1418)	8.9 **(58.1)**	A **(F)**	0.34 (1.03)	-	10.8 (254.6)
SBR	34 (73)	8.7 **(57.3)**	A **(F)**	0.34 (1.03)	-	10.6 (254.6)
Old Montreal Road and Dairy Drive (Two-Way Stop Control)						
EBL	41 (4)	9.1 (8.1)	A (A)	0.04 (0.00)	-	1.0 (0.1)
EBTR	187 (689)	0.0 (0.0)	A (A)	0.11 (0.41)	-	0.0 (0.0)
WBL	1 (0)	7.6 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
WBTR	689 (402)	0.0 (0.0)	A (A)	0.41 (0.24)	-	0.0 (0.0)
NBTLR	19 (17)	20.3 (25.9)	C (D)	0.07 (0.09)	-	1.5 (2.1)
SBL	18 (231)	19.6 **(177.5)**	C **(F)**	0.07 (1.20)	-	1.5 (84.0)
SBTR	13 (84)	12.6 (11.7)	B (B)	0.03 (0.14)	-	0.6 (3.3)
Old Montreal Road and Famille-Laporte Avenue (Two-Way Stop Control)						
EBL	55 (109)	9.3 (8.1)	A (A)	0.06 (0.09)	-	1.4 (2.0)
EBTR	123 (779)	0.0 (0.0)	A (A)	0.07 (0.46)	-	0.0 (0.0)
WBTLR	722 (311)	0.0 (0.0)	A (A)	0.42 (0.18)	-	0.0 (0.0)
NBTLR	0 (0)	0.0 (0.0)	A (A)	0.00 (0.00)	-	0.0 (0.0)
SBTLR	100 (93)	16.3 (12.4)	C (B)	0.24 (0.17)	-	6.6 (4.3)

Movement Legend: NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right.

FUTURE TOTAL CONDITIONS (2022)

The 2022 future total (future background plus additional site generated traffic) intersection capacity analysis results are summarized in **Table 10**. Both AM peak hour and PM peak hour are shown within the table, with the PM peak results shown within brackets. Results that do not meet the City's target VLOS of 'D' are highlighted in red.

With the addition of the development traffic, the SB movements at Trim Road experience a LOS 'F' in the 2022 planning horizon instead of the 2027 planning horizon that was anticipated as part of the background traffic analysis.

The delay experienced by vehicles making a SBL at Dairy Drive in the PM period increases from 110s to over 420s. This assumes that regular commuters do not adjust their route based on known conditions; it is unlikely that over 260 drivers will knowingly wait over 7 minutes at an intersection when there are other routes with less delay available.

Vehicles exiting the development at Famille-Laporte will experience high delay in the peak hours due to the existing high volumes along Old Montreal Road. It is likely that some residents will shift their exit point from the west access to the east access based on known traffic conditions. Anticipated delay is lower at the east access since there is not a north leg to the intersection, whichresults in fewer turning movements competing for the same gaps in traffic. Alternative future scenarios for Famille-Laporte, including traffic re-assignment and alternative intersection control, are presented in **Section 0**.

Table 10. Intersection Capacity Summary – Future Total (2022)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Trim Road (Roundabout)						
EBL	67 (44)	6.4 **(36.0)**	A **(E)**	0.10 (0.57)	-	2.8 (17.3)
EBT	80 (262)	5.8 (32.6)	A (D)	0.10 (0.57)	-	2.8 (17.6)
EBR	46 (256)	4.9 (26.2)	A (D)	0.06 (0.63)	-	1.5 (23.2)
WBL	188 (167)	25.2 (8.5)	D (A)	0.60 (0.26)	-	21.9 (7.8)
WBT	324 (206)	22.4 (7.8)	C (A)	0.60 (0.26)	-	22.5 (7.8)
WBR	321 (210)	18.0 (6.9)	C (A)	0.58 (0.26)	-	22.9 (7.6)
NBL	213 (134)	13.5 (14.7)	B (B)	0.66 (0.57)	-	42.7 (25.6)
NBT	1017 (549)	13.2 (14.1)	B (B)	0.66 (0.57)	-	42.7 (25.6)
NBR	123 (140)	12.9 (13.6)	B (B)	0.66 (0.57)	-	41.7 (25.6)
SBL	164 (401)	10.6 **(55.6)**	B **(F)**	0.38 (1.01)	-	12.8 (208.9)
SBT	328 (1297)	10.2 **(54.2)**	B **(F)**	0.38 (1.01)	-	12.8 (217.5)
SBR	25 (67)	10.0 **(53.4)**	A **(F)**	0.38 (1.01)	-	12.5 (217.5)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Dairy Drive (Signalized)						
EBL	40 (4)	4.7 (6.6)	A (A)	0.22 (0.01)	1.3 (0.2)	4.7 (1.3)
EBTR	304 (741)	4.3 (18.0)	A (B)	0.25 (0.84)	10.1 (50.0)	17.1 (117.6)
WBL	1 ()	3.5 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	0.3 (0.0)
WBTR	733 ()	13.7 (10.0)	B (A)	0.84 (0.57)	60.6 (27.2)	110.5 (54.9)
NBTLR	18 ()	21.6 (12.5)	C (B)	0.07 (0.03)	1.7 (0.9)	6.7 (3.9)
SBL	27 ()	21.9 (18.7)	C (B)	0.12 (0.64)	2.5 (21.4)	8.8 (41.1)
SBTR	12 ()	21.3 (12.6)	C (B)	0.01 (0.06)	0.1 (0.2)	4.0 (6.9)
Old Montreal Road and Famille-Laporte Avenue / West Access (Two-Way Stop Control)						
EBL	60 (99)	10.1 (8.2)	B (A)	0.08 (0.08)	-	1.8 (1.9)
EBTR	245 (884)	0.0 (0.0)	A (A)	0.14 (0.52)	-	0.0 (0.0)
WBL	1 (2)	7.7 (9.7)	A (A)	0.00 (0.00)	-	0.0 (0.1)
WBTR	895 (352)	0.0 (0.0)	A (A)	0.53 (0.21)	-	0.0 (0.0)
NBTLR	103 (78)	**210.4 (133.6)**	**F (F)**	1.19 (0.89)	-	51.0 (34.0)
SBTLR	122 (84)	22.9 (13.7)	C (B)	0.38 (0.17)	-	12.0 (4.2)
Old Montreal Road and East Access (Two-Way Stop Control)						
EBTR	201 (806)	0.0 (0.0)	A (A)	0.12 (0.47)	-	0.0 (0.0
WBL	2 (3)	7.6 (9.4)	A (A)	0.00 (0.00)	-	0.0 (0.1)
WBT	828 (301)	0.0 (0.0)	A (A)	0.49 (0.18)	-	0.0 (0.0)
NBLR	72 (55)	22.8 (23.8)	C (C)	0.26 (0.22)	-	7.2 (5.9)

Movement Legend:
NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right
Examples: WBL – westbound left-turn, SBTLR – shared southbound through / left-turn / right-turn lane.

FUTURE TOTAL CONDITIONS (2027)

The 2027 future total (future background plus additional site generated traffic) intersection capacity analysis results are summarized in **Table 11**. Both AM peak hour and PM peak hour are shown within the table, with the PM peak results shown within brackets. Results that do not meet the City's target VLOS of 'D' are highlighted in red.

Movements that had high delay and a poor LOS in the 2022 total traffic scenario continue to experience high delays.

Table 11. Intersection Capacity Summary – Future Total (2027)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and Trim Road (Roundabout)						
EBL	74 (45)	5.9 **(35.5)**	A **(E)**	0.10 (0.58)	-	2.7 (17.7)
EBT	69 (274)	6.5 (32.2)	A (D)	0.10 (0.58)	-	2.8 (18.1)
EBR	50 (280)	5.2 (29.3)	A (D)	0.06 (0.69)	-	1.7 (27.0)
WBL	196 (175)	29.6 (9.3)	D (A)	0.63 (0.29)	-	22.4 (8.6)
WBT	279 (213)	25.8 (8.5)	D (A)	0.63 (0.29)	-	23.1 (8.6)
WBR	204 (219)	14.0 (7.5)	B (A)	0.41 (0.27)	-	12.8 (8.3)
NBL	233 (147)	14.8 (16.1)	B (C)	0.70 (0.61)	-	51.9 (29.7)
NBT	1121 (599)	14.4 (15.5)	B (C)	0.70 (0.61)	-	51.9 (29.7)
NBR	138 (148)	14.1 (14.9)	B (B)	0.70 (0.61)	-	50.6 (29.7)
SBL	132 (421)	10.6 **(91.0)**	B **(F)**	0.38 (1.12)	-	13.1 (374.3)
SBT	368 (1418)	10.1 **(89.6)**	B **(F)**	0.38 (1.12)	-	13.1 (399.6)
SBR	34 (73)	9.9 **(89.9)**	A **(F)**	0.38 (1.12)	-	12.9 (399.6)
Old Montreal Road and Dairy Drive (Signalized)						
EBL	41 (4)	5.2 (6.6)	A (A)	0.20 (0.01)	1.3 (0.2)	4.7 (1.3)
EBTR	275 (784)	5.0 (11.5)	A (B)	0.25 (0.86)	9.0 (5.9)	16.5 (126.4)
WBL	1 (0)	4.2 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	0.4 (0.0)
WBTR	855 (531)	8.0 (10.2)	A (B)	0.81 (0.59)	42.8 (30.1)	84.2 (58.4)
NBTLR	18 (17)	16.3 (12.9)	B (B)	0.06 (0.03)	1.4 (0.9)	5.5 (4.2)
SBL	28 (283)	16.6 (21.1)	B (C)	0.10 (0.69)	2.1 (23.8)	7.2 (44.5)
SBTR	13 (84)	16.2 (13.0)	B (B)	0.01 (0.06)	0.1 (0.2)	3.4 (7.1)
Old Montreal Road and Famille-Laporte Avenue / West Access (Two-Way Stop Control)						
EBL	55 (109)	9.6 (8.3)	A (A)	0.07 (0.09)	-	1.5 (2.1)
EBTR	221 (927)	0.0 (0.0)	A (A)	0.13 (0.55)	-	0.0 (0.0)
WBL	1 (2)	7.6 (9.8)	A (A)	0.00 (0.00)	-	0.0 (0.1)
WBTR	791 (365)	0.0 (0.0)	A (A)	0.47 (0.21)	-	0.0 (0.0)
NBTLR	102 (78)	**85.2 (185.0)**	**F (F)**	0.79 (1.04)	-	33.1 (39.3)
SBTLR	100 (93)	18.6 (14.8)	C (B)	0.27 (0.20)	-	7.7 (5.1)

MOVEMENT	VOLUME (VPH)	DELAY (SEC)	VLOS	V/C	Q50th (m)	Q95th (m)
Old Montreal Road and East Access (Two-Way Stop Control)						
EBTR	177 (849)	0.0 (0.0)	A (A)	0.10 (0.50)	-	0.0 (0.0)
WBL	2 (3)	7.6 (9.5)	A (A)	0.00 (0.00)	-	0.0 (0.1)
WBT	724 (314)	0.0 (0.0)	A (A)	0.43 (0.18)	-	0.0 (0.0)
NBLR	72 (55)	19.1 (25.8)	C (D)	0.22 (0.24)	-	5.8 (6.4)

Movement Legend:
NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right
Examples: WBL – westbound left-turn, SBTLR – shared southbound through / left-turn / right-turn lane.

SUMMARY OF VEHICLE CAPACITY ANALYSIS

Old Montreal Road and Trim Road

— Analysed as a roundabout using the existing lane arrangement for all scenarios
— All southbound and the eastbound left movements operate over capacity in the PM peak hour by 2027 under the background traffic scenario

Old Montreal Road and Dairy Drive

— Analysed as a two-way stop control under existing, 2022 background, and 2027 background scenarios
— Analysed as a traffic signal under the 2022 total and 2027 total scenarios (the scenarios that traffic signal warrants were met)
— A traffic signal improves the intersection operations by reducing the delay experienced by vehicles making a northbound or southbound left/through movement

Old Montreal Road and Famille Laporte Avenue

— Analyzed as a two-way stop control using the existing lane arrangement on Old Montreal Road for all scenarios (no traffic signal warrant was met)
— Vehicles making a northbound left movement out of the proposed Phoenix development experience high delay
— Alternative intersection configurations are considered in **Section 0**

Old Montreal Road and East Access

— Analyzed as a two-way stop control with no eastbound left turn lane (left turn lane warrant not met)
— Intersection operates with an acceptable level of service for all scenarios

9.3. FAMILLE-LAPORTE AVENUE ALTERNATIVES

The analysis of intersection operations for the 2022 and 2027 future total conditions show that vehicles exiting the development at Famille-Laporte will experience high delay in the peak hours due to the existing high volumes along Old Montreal Road and conflicting vehicle movements entering/existing Cardinal Creek Village. Additional alternative scenarios at Famille-Laporte were considered and include

1 Reassignment of traffic from the west full movement access to east full movement access to determine if / when a balanced v/c ratio can be achieved
2 Roundabout (single lane)
3 Traffic signal with east & west left turn lanes

Reassignment: High delay at Famille-Laporte Avenue under baseline conditions would likely see a re-distribution of exiting traffic to the East Access. The northbound approach delay at these two intersections is expected to be approximately equal if 95% of exiting left-turn traffic uses the East Access. While feasible as an interim measure, this is not a long-term solution.

Roundabout: Roundabouts are not generally implemented along corridors with insufficient gaps in the major traffic flow to accommodate the minor flow or at intersections with significantly unbalanced traffic volumes on the approach roads which is the case at this location, therefore a roundabout was not further considered.

Crash history at this intersection was provided as part of the larger road segment. Of the nine crashes in this area, eight were single motor vehicle and not the head-on, right angle, or left-turn across crashes that indicate that a roundabout may be suitable. There were no fatal crashes.

Roundabouts are suitable for locations where there is a transition from a rural to an urban environment. In the 2022 and 2027 planning horizon it is expected that there will be two new accesses to Cardinal Creek Village to the east within the general urban area.

Traffic Signals: The addition of a traffic signal reduces the average delay for exiting northbound traffic at the West Access to approximately 20s during both peak hours. A signal introduces some minor delays to eastbound and westbound traffic. Overall average intersection delay is comparable to baseline conditions. See **Table 12** for the intersection operations summary.

Table 12. Intersection Capacity Summary – Famillle Laporte Avenue Traffic Signal – 2027 Total

MOVEMENT	VOLUME	DELAY (S)	VLOS	V/C	Q50th (M)	Q95th (M)
Old Montreal Road and Famille-Laporte Avenue / West Access						
EBL	55 (109)	4.1 (3.5)	A (A)	0.12 (0.15)	1.9 (3.8)	6.1 (9.2)
EBTR	221 (927)	4.0 (8.7)	A (B)	0.18 (0.70)	7.3 (58.7)	16.4 (111.3)
WBLTR	791 (365)	8.3 (3.9)	B (A)	0.64 (0.28)	43.4 (14.2)	87.7 (26.2)
NBTLR	102 (78)	26.6 (31.8)	C (C)	0.34 (0.29)	5.9 (4.9)	16.5 (15.2)
SBTLR	100 (93)	24.8 (30.3)	C (C)	0.09 (0.09)	0.7 (0.8)	10.4 (11.3)

Movement Legend:
NB / SB / EB / WB – northbound, southbound, eastbound, westbound
L / T/ R – left, through, right
Examples: WBL – westbound left-turn, SBTLR – shared southbound through / left-turn / right-turn lane.

Considering the baseline conditions and three alternatives, a traffic signal is most appropriate at this location.

10. SUMMARY OF IMPROVEMENTS AND MODIFICATION OPTIONS

10.1. CONCLUSIONS

Background traffic analysed includes known developments in the area. The largest known development is the multi-phased Cardinal Creek Village located directly to the north of the proposed Phoenix Development. Cardinal Creek Village is a major generator of traffic in this area. The 2022 planning horizon has indicated that an additional 374 westbound trips during the AM peak hour and 398 eastbound trips during the PM peak hour have been assigned to Old Montreal Road. By the 2027 planning horizon year, the Cardinal Creek Village will have a new signalized connection to Highway 174 approximately 1.5km east of Trim Road. This new intersection is expected to change internal traffic patterns and reduce the number of trips on Old Montreal Road. Also for the 2027 planning horizon, the Cardinal Creek Village will have added 182 westbound trips during the AM peak hour and 170 eastbound trips during the PM peak hour to Old Montreal Road.

As background traffic continues to increase there is a corresponding decrease in LOS and v/c ratios at existing intersections in the study area. By 2027, SB movements and the EBL movement at the Trim Road / Old Montreal Road roundabout are operating over capacity with a LOS 'E' or 'F'. This represents a degradation in the LOS when compared with the existing conditions. These reductions in LOS are typical as neighborhoods mature and as greenfields are developed for residential, commercial, or industrial uses.

The development of the Phoenix lands will increase pressures on the intersection LOS when compared to the background traffic scenarios. However, it is noted that new development growth along Old Montreal Road will also place additional pressure on the existing intersection conditions and cause similar reductions in LOS. Specifically, changes to the Cardinal Creek Village development (development plan, access locations, phasing) would impact on the Dairy Drive and Famille Laporte intersection operations.

In conclusion, the **proposed development by Phoenix Homes located at 1154, 1172, 1180, and 1208 Old Montreal:**

a) **is appropriately designed for sustainable modes,**

b) **is aligned with the City of Ottawa's broader city-building objectives,**

c) **generates fewer vehicle trips than the Cardinal Creek Village development,**

d) **can be accommodated with impacts to traffic operations for the 2022 and 2027 planning horizons being managed.**

The proposed development is appropriate from a transportation planning perspective taking into consideration the City of Ottawa's Transportation Master Plan, Official Plan, and the recommendations of this report (Section 0).

10.2. RECOMMENDATIONS

1. Designing for Sustainable Modes

To reduce walking distance to existing transit stops, consider:

a) Removing the deviation in the proposed sidewalk north of Block 9, if not otherwise required to comply with a 5% running slope.

b) Moving the nearby eastbound bus stop from Grand Chène Crescent to the northeast (far-side) corner of the intersection of Old Montreal Road with Famille-Laporte Avenue.

Reference: Section 2.1

2. Boundary Street Design

No modifications to the boundary street design are required to accommodate this development. The future widening of Old Montreal Road in this area proposed in the City's Transportation Master Plan could provide additional capacity and improved facilities for all transportation modes.

Reference: Section 4

3. Intersection Design

a) Old Montreal Road and Trim Road. No modifications are proposed. It is noted that southbound traffic movements at this location will exceed available intersection capacity without the addition of the proposed development generated traffic.

b) Old Montreal Road and Dairy Drive. The installation of a traffic signal is proposed as part of a City assessment focused on the provision of increased capacity to serve the rural areas located to the east. Alternatively, potential changes either in scale or phasing of the Cardinal Creek Village development (located to the north) would reduce pressure on Old Montreal Road.

c) Old Montreal Road and Famille-Laporte Avenue. The installation of a traffic signal is proposed to provide opportunities for vehicles to make left-turns to and from the north and south legs of the intersection without high levels of delay. The intersection should include accessible pedestrian crosswalks following OTM Book 11 (Pavement Markings) and Book 15 (Pedestrian Crossing Treatments).

d) Right-in / Right-out Accesses. Include a channelized island (**Figure 2**) to restrict left turns onto Old Montreal Road from the Famille-Laporte Avenue access location.

e) Old Montreal Road and East Access: One-way (northbound) stop control intersection with east-west accessible pedestrian crosswalk following OTM Book 11 (Pavement Markings) and Book 15 (Pedestrian Crossing Treatments). Westbound left turn volumes are expected to be low and do not require a left turn lane. Traffic signal warrants were not met.

Reference: Sections 0 and 9

11. ROAD MODIFICATION APPROVAL DRAWINGS

Following the City of Ottawa’s acceptance of the TIA Strategy Report, one RMA drawings would be prepared and submitted as follows:

1 Famille Laporte Intersection to be upgraded to a traffic signal with the following lane arrangement (**Section 0**):

- Eastbound Left (as existing)
- Eastbound Through / Right
- Westbound Left / Through / Right
- Northbound Left / Through / Right
- Southbound Left / Through / Right (as existing)

APPENDIX

A TDM CHECKLIST

1154, 1172, 1180, and 1208 Old Montreal Road

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	☑	No parking is located between any multi-unit building and the street / sidewalk
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑	Direct connections (<10m) between sidewalk and main building entrances. Majority of multi-unit buildings located closer to Old Montreal Road and nearest transit stop
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑	Building doors and windows face Old Montreal Road or internal site pedestrian facilities
	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)*	☑	Trim Road is nearest rapid transit station, at approximately 1250m walking distance. Concrete sidewalks provided on-site to connect to nearest transit stop on Old Montreal Road
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	☑	Direct connections (<10m) between main building entrances and sidewalks on Old Montreal Road or new internal roadways. Sidewalks are located in front of all multi-unit buildings

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
		weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	
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)*	☑ Sidewalks to be constructed of concrete to differentiate pedestrian areas from vehicle areas (to be confirmed during development of site plan). Crosswalks provided at all accesses along Old Montreal Road
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)*	☑ Sidewalks will have gradual grade transitions, depressed curbs at street corners, and access to the required number of accessible parking spaces. (to be confirmed during development of site plan)
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)*	☑ Pedestrian connections provided at east and west accesses. The proposed accesses also connect to paved shoulders / future bike lanes on Old Montreal Road. To be detailed during development of site plan.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑ On-site pedestrian pathways / sidewalks connect to existing transit stops on Old Montreal Road
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Eastbound transit stop on Old Montreal Road without direct pedestrian facilities
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	☑ Internal roads designed using a low target operating speed
	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	To be confirmed during site plan development
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)*	To be confirmed during site plan development
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)*	To be confirmed during site plan development
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)*	To be confirmed during site plan development
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)*	To be confirmed during site plan development
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	☒ There are no on-site transit stops proposed
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	☒ The site does not abut any off-site transit stops
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☒ There are no on-site transit stops proposed

		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	☑	The proposed number of parking spaces will meet the requirements of the City's Zoning By-law
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	☑	On-road and visitor parking spaces provided for short-term users.
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)		To be confirmed during site plan development

APPENDIX

B TRAFFIC SIGNAL WARRANTS

SCENARIO	Future Background	YEAR	2022
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Dairy Drive
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	565	620	110%	62%
1B - Minor Road	120	145	90	62%	
2A - Major Road	480	575	530	92%	92%
2B - Crossing Major Road	50	60	65	108%	

SCENARIO	Future Background	YEAR	2022
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Famille-Laporte / West Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	565	595	105%	34%
1B - Minor Road	120	145	50	34%	
2A - Major Road	480	575	545	95%	17%
2B - Crossing Major Road	50	60	10	17%	

SCENARIO	Future Background	YEAR	2027
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Dairy Drive
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	565	600	106%	66%
1B - Minor Road	120	145	95	66%	
2A - Major Road	480	575	505	88%	88%
2B - Crossing Major Road	50	60	75	125%	

SCENARIO	Future Background	YEAR	2027
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Famille-Laporte / West Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	565	575	102%	34%
1B - Minor Road	120	145	50	34%	
2A - Major Road	480	575	525	91%	17%
2B - Crossing Major Road	50	60	10	17%	

SCENARIO	Future Total	YEAR	2022
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Dairy Drive
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

JUSTIFICATION	MINIMUM REQUIREMENT FLOW	ADJ. FLOW	AHV	COMPLIANCE %	OVERALL %
1A - All Approaches	470	565	755	134%	72%
1B - Minor Road	120	145	105	72%	
2A - Major Road	480	575	650	113%	113%
2B - Crossing Major Road	50	60	85	142%	

SCENARIO	Future Total	YEAR	2022
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Famille-Laporte / West Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	No

JUSTIFICATION	MINIMUM REQUIREMENT FLOW	ADJ. FLOW	AHV	COMPLIANCE %	OVERALL %
1A - All Approaches	470	705	735	104%	56%
1B - Minor Road	120	180	100	56%	
2A - Major Road	480	720	635	88%	73%
2B - Crossing Major Road	50	75	55	73%	

SCENARIO	Future Total	YEAR	2022
MAJOR ROAD	Old Montreal Road	MINOR ROAD	East Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	Yes

JUSTIFICATION	MINIMUM REQUIREMENT FLOW	ADJ. FLOW	AHV	COMPLIANCE %	OVERALL %
1A - All Approaches	470	705	570	81%	11%
1B - Minor Road	120	270	30	11%	
2A - Major Road	480	720	535	74%	40%
2B - Crossing Major Road	50	75	30	40%	

SCENARIO	Future Total	YEAR	2027
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Dairy Drive
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	No	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	565	735	130%	76%
1B - Minor Road	120	145	110	76%	
2A - Major Road	480	575	625	109%	109%
2B - Crossing Major Road	50	60	90	150%	

SCENARIO	Future Total	YEAR	2027
MAJOR ROAD	Old Montreal Road	MINOR ROAD	Famille-Laporte / West Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	No

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	705	715	101%	53%
1B - Minor Road	120	180	95	53%	
2A - Major Road	480	720	620	86%	73%
2B - Crossing Major Road	50	75	55	73%	

SCENARIO	Future Total	YEAR	2027
MAJOR ROAD	Old Montreal Road	MINOR ROAD	East Access
FLOW TYPE	Restricted	ROAD TYPE	1 Lane
NEW ROAD / INT.	Yes	"T" INT.	Yes

	MINIMUM REQUIREMENT			COMPLIANCE	
JUSTIFICATION	FLOW	ADJ. FLOW	AHV	%	OVERALL %
1A - All Approaches	470	705	550	78%	11%
1B - Minor Road	120	270	30	11%	
2A - Major Road	480	720	520	72%	40%
2B - Crossing Major Road	50	75	30	40%	

APPENDIX

C DETAILED SYNCHRO SHEETS

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	347	7	0	182	28	9	3	3	190	3	45
Future Vol, veh/h	1	347	7	0	182	28	9	3	3	190	3	45
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	400	-	-	-	-	-	200	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	386	8	0	202	31	10	3	3	211	3	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	233	0	0	395	0	0	640	627	393	615	616	220
Stage 1	-	-	-	-	-	-	394	394	-	218	218	-
Stage 2	-	-	-	-	-	-	246	233	-	397	398	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1346	-	-	1175	-	-	391	403	660	406	409	825
Stage 1	-	-	-	-	-	-	635	609	-	789	726	-
Stage 2	-	-	-	-	-	-	762	716	-	633	606	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1344	-	-	1173	-	-	364	402	658	400	408	824
Mov Cap-2 Maneuver	-	-	-	-	-	-	364	402	-	400	408	-
Stage 1	-	-	-	-	-	-	633	608	-	788	726	-
Stage 2	-	-	-	-	-	-	711	716	-	625	605	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	14.2	20.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	408	1344	-	-	1173	-	-	400	775
HCM Lane V/C Ratio	0.041	0.001	-	-	-	-	-	0.528	0.069
HCM Control Delay (s)	14.2	7.7	-	-	0	-	-	23.6	10
HCM Lane LOS	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	3	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	101	417	128	4	7	77
Future Vol, veh/h	101	417	128	4	7	77
Conflicting Peds, #/hr	2	0	0	2	2	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	1250	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	112	463	142	4	8	86

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	149	0	-	0	836	147
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	690	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1445	-	-	-	340	905
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	502	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1444	-	-	-	313	903
Mov Cap-2 Maneuver	-	-	-	-	313	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1444	-	-	-	780
HCM Lane V/C Ratio	0.078	-	-	-	0.12
HCM Control Delay (s)	7.7	-	-	-	10.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.4

Intersection												
Int Delay, s/veh	1.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	210	6	1	625	202	10	8	0	17	1	11
Future Vol, veh/h	40	210	6	1	625	202	10	8	0	17	1	11
Conflicting Peds, #/hr	0	0	4	4	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	400	-	-	-	-	-	200	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	40	210	6	1	625	202	10	8	0	17	1	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	827	0	0	220	0	0	1031	1126	219	1027	1028	726
Stage 1	-	-	-	-	-	-	297	297	-	728	728	-
Stage 2	-	-	-	-	-	-	734	829	-	299	300	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	813	-	-	1361	-	-	213	207	826	215	236	428
Stage 1	-	-	-	-	-	-	716	671	-	418	432	-
Stage 2	-	-	-	-	-	-	415	388	-	714	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	813	-	-	1359	-	-	198	196	822	200	223	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	198	196	-	200	223	-
Stage 1	-	-	-	-	-	-	678	636	-	397	432	-
Stage 2	-	-	-	-	-	-	403	388	-	669	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0	25.1	20.4
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	197	813	-	-	1359	-	-	200	398
HCM Lane V/C Ratio	0.091	0.049	-	-	0.001	-	-	0.085	0.03
HCM Control Delay (s)	25.1	9.7	-	-	7.7	-	-	24.7	14.3
HCM Lane LOS	D	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0	-	-	0.3	0.1

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑		↰↱	
Traffic Vol, veh/h	60	148	805	21	7	115
Future Vol, veh/h	60	148	805	21	7	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	1250	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	60	148	805	21	7	115

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	826	0	-	0	1084	816
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	268	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	813	-	-	-	242	380
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	813	-	-	-	224	380
Mov Cap-2 Maneuver	-	-	-	-	224	-
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	724	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	19.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	813	-	-	-	365
HCM Lane V/C Ratio	0.074	-	-	-	0.334
HCM Control Delay (s)	9.8	-	-	-	19.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1.4

Intersection	
Int Delay, s/veh	18.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	646	8	0	349	31	10	3	3	211	3	76
Future Vol, veh/h	4	646	8	0	349	31	10	3	3	211	3	76
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	400	-	-	-	-	-	200	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	646	8	0	349	31	10	3	3	211	3	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	380	0	0	656	0	0	1066	1040	654	1028	1029	367
Stage 1	-	-	-	-	-	-	660	660	-	365	365	-
Stage 2	-	-	-	-	-	-	406	380	-	663	664	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1190	-	-	941	-	-	202	232	470	214	236	683
Stage 1	-	-	-	-	-	-	455	463	-	658	627	-
Stage 2	-	-	-	-	-	-	626	617	-	454	461	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1188	-	-	939	-	-	177	231	468	~ 210	235	682
Mov Cap-2 Maneuver	-	-	-	-	-	-	177	231	-	~ 210	235	-
Stage 1	-	-	-	-	-	-	453	461	-	656	627	-
Stage 2	-	-	-	-	-	-	553	617	-	446	459	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.5	84.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	211	1188	-	-	939	-	-	210	636
HCM Lane V/C Ratio	0.076	0.003	-	-	-	-	-	1.005	0.124
HCM Control Delay (s)	23.5	8	-	-	0	-	-	111.3	11.5
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	9	0.4

Notes

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

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	99	735	295	3	6	78
Future Vol, veh/h	99	735	295	3	6	78
Conflicting Peds, #/hr	2	0	0	2	2	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	1250	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	99	735	295	3	6	78

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	300	0	-	0	1234	300
Stage 1	-	-	-	-	299	-
Stage 2	-	-	-	-	935	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1273	-	-	-	197	744
Stage 1	-	-	-	-	757	-
Stage 2	-	-	-	-	385	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1272	-	-	-	181	742
Mov Cap-2 Maneuver	-	-	-	-	181	-
Stage 1	-	-	-	-	756	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1272	-	-	-	608
HCM Lane V/C Ratio	0.078	-	-	-	0.138
HCM Control Delay (s)	8.1	-	-	-	11.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			✥		↰	↑↱	
Traffic Vol, veh/h	41	180	7	1	468	221	11	8	0	18	1	12
Future Vol, veh/h	41	180	7	1	468	221	11	8	0	18	1	12
Conflicting Peds, #/hr	0	0	4	4	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	400	-	-	-	-	-	200	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	41	180	7	1	468	221	11	8	0	18	1	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	689	0	0	191	0	0	857	961	190	853	854	579
Stage 1	-	-	-	-	-	-	270	270	-	581	581	-
Stage 2	-	-	-	-	-	-	587	691	-	272	273	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	915	-	-	1395	-	-	280	258	857	281	298	519
Stage 1	-	-	-	-	-	-	740	690	-	503	503	-
Stage 2	-	-	-	-	-	-	499	449	-	738	688	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	915	-	-	1393	-	-	262	245	853	264	283	519
Mov Cap-2 Maneuver	-	-	-	-	-	-	262	245	-	264	283	-
Stage 1	-	-	-	-	-	-	704	657	-	480	503	-
Stage 2	-	-	-	-	-	-	486	449	-	695	655	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	0	20.3	16.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	255	915	-	-	1393	-	-	264	488
HCM Lane V/C Ratio	0.075	0.045	-	-	0.001	-	-	0.068	0.027
HCM Control Delay (s)	20.3	9.1	-	-	7.6	-	-	19.6	12.6
HCM Lane LOS	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.2	0.1

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	123	698	24	8	92
Future Vol, veh/h	55	123	698	24	8	92
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	1250	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	55	123	698	24	8	92

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	722	0	-	0	943	710
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	233	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	889	-	-	-	294	437
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	810	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	889	-	-	-	276	437
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	760	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	889	-	-	-	418
HCM Lane V/C Ratio	0.062	-	-	-	0.239
HCM Control Delay (s)	9.3	-	-	-	16.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9

Intersection	
Int Delay, s/veh	29.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	681	8	0	368	34	11	3	3	231	3	81
Future Vol, veh/h	4	681	8	0	368	34	11	3	3	231	3	81
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	-	400	-	-	-	-	-	200	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	681	8	0	368	34	11	3	3	231	3	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	402	0	0	691	0	0	1124	1097	689	1083	1084	387
Stage 1	-	-	-	-	-	-	695	695	-	385	385	-
Stage 2	-	-	-	-	-	-	429	402	-	698	699	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1168	-	-	913	-	-	184	215	449	~ 197	219	665
Stage 1	-	-	-	-	-	-	436	447	-	642	614	-
Stage 2	-	-	-	-	-	-	608	604	-	434	445	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1166	-	-	911	-	-	159	214	447	~ 193	218	664
Mov Cap-2 Maneuver	-	-	-	-	-	-	159	214	-	~ 193	218	-
Stage 1	-	-	-	-	-	-	434	445	-	640	614	-
Stage 2	-	-	-	-	-	-	530	604	-	426	443	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.9	133.3
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	189	1166	-	-	911	-	-	193	619
HCM Lane V/C Ratio	0.09	0.003	-	-	-	-	-	1.197	0.136
HCM Control Delay (s)	25.9	8.1	-	-	0	-	-	177.5	11.7
HCM Lane LOS	D	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	12	0.5

Notes

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

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	109	778	308	3	7	86
Future Vol, veh/h	109	778	308	3	7	86
Conflicting Peds, #/hr	2	0	0	2	2	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	1250	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	109	778	308	3	7	86

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	313	0	-	0	1310	313
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	998	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1259	-	-	-	177	732
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	360	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1258	-	-	-	161	730
Mov Cap-2 Maneuver	-	-	-	-	161	-
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	328	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1258	-	-	-	577
HCM Lane V/C Ratio	0.087	-	-	-	0.161
HCM Control Delay (s)	8.1	-	-	-	12.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			✥		↰	↱	
Traffic Volume (vph)	40	298	6	1	733	260	10	8	0	27	1	11
Future Volume (vph)	40	298	6	1	733	260	10	8	0	27	1	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.2	5.2			5.2		5.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1729	1814		1721	1749			1771		1723	1570	
Flt Permitted	0.15	1.00		0.57	1.00			0.86		0.75	1.00	
Satd. Flow (perm)	277	1814		1042	1749			1574		1353	1570	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	298	6	1	733	260	10	8	0	27	1	11
RTOR Reduction (vph)	0	1	0	0	14	0	0	0	0	0	9	0
Lane Group Flow (vph)	40	303	0	1	979	0	0	18	0	27	3	0
Confl. Peds. (#/hr)			4	4					2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.5	40.5		40.5	40.5			10.2		10.2	10.2	
Effective Green, g (s)	40.5	40.5		40.5	40.5			10.2		10.2	10.2	
Actuated g/C Ratio	0.66	0.66		0.66	0.66			0.17		0.17	0.17	
Clearance Time (s)	5.2	5.2		5.2	5.2			5.2		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	183	1202		690	1159			262		225	262	
v/s Ratio Prot		0.17			c0.56						0.00	
v/s Ratio Perm	0.14			0.00				0.01		c0.02		
v/c Ratio	0.22	0.25		0.00	0.84			0.07		0.12	0.01	
Uniform Delay, d1	4.1	4.2		3.5	7.9			21.4		21.6	21.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.1		0.0	5.8			0.1		0.2	0.0	
Delay (s)	4.7	4.3		3.5	13.7			21.6		21.9	21.3	
Level of Service	A	A		A	B			C		C	C	
Approach Delay (s)		4.3			13.7			21.6			21.7	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	10.4
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	17.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	219	26	1	874	21	97	0	5	7	0	115
Future Vol, veh/h	60	219	26	1	874	21	97	0	5	7	0	115
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1250	-	-	-	-	-	-	-	-	-	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	60	219	26	1	874	21	97	0	5	7	0	115

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	895	0	0	245	0	0	1296	1249	232	1242	1252	885
Stage 1	-	-	-	-	-	-	352	352	-	887	887	-
Stage 2	-	-	-	-	-	-	944	897	-	355	365	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	767	-	-	1333	-	-	140	175	812	153	174	347
Stage 1	-	-	-	-	-	-	669	635	-	341	365	-
Stage 2	-	-	-	-	-	-	317	361	-	666	627	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	767	-	-	1333	-	-	~ 88	161	812	143	160	347
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 88	161	-	143	160	-
Stage 1	-	-	-	-	-	-	617	585	-	314	365	-
Stage 2	-	-	-	-	-	-	212	361	-	610	578	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0	210.4	22.9
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	92	767	-	-	1333	-	-	321
HCM Lane V/C Ratio	1.109	0.078	-	-	0.001	-	-	0.38
HCM Control Delay (s)	210.4	10.1	-	-	7.7	0	-	22.9
HCM Lane LOS	F	B	-	-	A	A	-	C
HCM 95th %tile Q(veh)	6.8	0.3	-	-	0	-	-	1.7

Notes

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

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↑		↱
Traffic Vol, veh/h	213	19	0	897	0	0
Future Vol, veh/h	213	19	0	897	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	213	19	0	897	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	223
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	822
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	822
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↑		↱
Traffic Vol, veh/h	201	11	0	897	0	0
Future Vol, veh/h	201	11	0	897	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	201	11	0	897	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	207
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	839
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	839
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	161	40	2	828	69	3
Future Vol, veh/h	161	40	2	828	69	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	161	40	2	828	69	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	201	0	1013	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	832	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1383	-	267	867
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	431	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1383	-	266	867
Mov Cap-2 Maneuver	-	-	-	-	266	-
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	430	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	22.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	274	-	-	1383	-
HCM Lane V/C Ratio	0.263	-	-	0.001	-
HCM Control Delay (s)	22.8	-	-	7.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	741	8	0	461	48	10	3	3	264	3	76
Future Volume (vph)	4	741	8	0	461	48	10	3	3	264	3	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2			5.2			5.2		5.2	5.2	
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	
Frt	1.00	1.00			0.99			0.97		1.00	0.86	
Flt Protected	0.95	1.00			1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1729	1817			1794			1710		1724	1523	
Flt Permitted	0.38	1.00			1.00			0.87		0.75	1.00	
Satd. Flow (perm)	695	1817			1794			1529		1356	1523	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	741	8	0	461	48	10	3	3	264	3	76
RTOR Reduction (vph)	0	1	0	0	6	0	0	2	0	0	53	0
Lane Group Flow (vph)	4	748	0	0	503	0	0	14	0	264	26	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.9	24.9			24.9			15.3		15.3	15.3	
Effective Green, g (s)	24.9	24.9			24.9			15.3		15.3	15.3	
Actuated g/C Ratio	0.49	0.49			0.49			0.30		0.30	0.30	
Clearance Time (s)	5.2	5.2			5.2			5.2		5.2	5.2	
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	342	894			882			462		410	460	
v/s Ratio Prot		c0.41			0.28						0.02	
v/s Ratio Perm	0.01							0.01		c0.19		
v/c Ratio	0.01	0.84			0.57			0.03		0.64	0.06	
Uniform Delay, d1	6.6	11.1			9.1			12.4		15.3	12.5	
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	6.9			0.9			0.0		3.5	0.1	
Delay (s)	6.6	18.0			10.0			12.5		18.7	12.6	
Level of Service	A	B			A			B		B	B	
Approach Delay (s)		17.9			10.0			12.5			17.3	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	50.6	Sum of lost time (s)	10.4
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	8.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	99	844	40	2	349	3	75	0	3	6	0	78
Future Vol, veh/h	99	844	40	2	349	3	75	0	3	6	0	78
Conflicting Peds, #/hr	2	0	0	0	0	2	1	0	2	2	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1250	-	-	-	-	-	-	-	-	-	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	99	844	40	2	349	3	75	0	3	6	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	354	0	0	884	0	0	1457	1420	866	1423	1439	354
Stage 1	-	-	-	-	-	-	1062	1062	-	357	357	-
Stage 2	-	-	-	-	-	-	395	358	-	1066	1082	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1216	-	-	774	-	-	109	138	356	115	134	694
Stage 1	-	-	-	-	-	-	273	303	-	665	632	-
Stage 2	-	-	-	-	-	-	634	631	-	271	296	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1215	-	-	773	-	-	90	126	355	106	122	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	126	-	106	122	-
Stage 1	-	-	-	-	-	-	251	278	-	609	629	-
Stage 2	-	-	-	-	-	-	560	628	-	246	272	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	133.6	13.7
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	93	1215	-	-	773	-	-	496
HCM Lane V/C Ratio	0.839	0.081	-	-	0.003	-	-	0.169
HCM Control Delay (s)	133.6	8.2	-	-	9.7	0	-	13.7
HCM Lane LOS	F	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	4.6	0.3	-	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	825	29	0	355	0	0
Future Vol, veh/h	825	29	0	355	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	825	29	0	355	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	840
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	368
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	368
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	807	17	0	355	0	0
Future Vol, veh/h	807	17	0	355	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	807	17	0	355	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	816
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	380
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	380
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection						
Int Delay, s/veh	1.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	746	60	3	301	53	2
Future Vol, veh/h	746	60	3	301	53	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	746	60	3	301	53	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	806	0	1083	776
Stage 1	-	-	-	-	776	-
Stage 2	-	-	-	-	307	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	828	-	243	401
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	751	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	828	-	242	401
Mov Cap-2 Maneuver	-	-	-	-	242	-
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	748	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	23.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	246	-	-	828	-
HCM Lane V/C Ratio	0.224	-	-	0.004	-
HCM Control Delay (s)	23.8	-	-	9.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	268	7	1	576	279	11	8	0	28	1	12
Future Volume (vph)	41	268	7	1	576	279	11	8	0	28	1	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.2	5.2			5.2		5.2	5.2	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.95			1.00		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1729	1812		1722	1731			1769		1724	1568	
Flt Permitted	0.19	1.00		0.59	1.00			0.86		0.75	1.00	
Satd. Flow (perm)	348	1812		1070	1731			1567		1352	1568	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	41	268	7	1	576	279	11	8	0	28	1	12
RTOR Reduction (vph)	0	1	0	0	24	0	0	0	0	0	10	0
Lane Group Flow (vph)	41	274	0	1	831	0	0	19	0	28	3	0
Confl. Peds. (#/hr)			4	4					2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.9	29.9		29.9	29.9			10.1		10.1	10.1	
Effective Green, g (s)	29.9	29.9		29.9	29.9			10.1		10.1	10.1	
Actuated g/C Ratio	0.59	0.59		0.59	0.59			0.20		0.20	0.20	
Clearance Time (s)	5.2	5.2		5.2	5.2			5.2		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	206	1074		634	1026			314		270	314	
v/s Ratio Prot		0.15			c0.48						0.00	
v/s Ratio Perm	0.12			0.00				0.01		c0.02		
v/c Ratio	0.20	0.25		0.00	0.81			0.06		0.10	0.01	
Uniform Delay, d1	4.7	4.9		4.2	8.0			16.3		16.5	16.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.1		0.0	4.9			0.1		0.2	0.0	
Delay (s)	5.2	5.0		4.2	13.0			16.4		16.6	16.2	
Level of Service	A	A		A	B			B		B	B	
Approach Delay (s)		5.1			13.0			16.4			16.5	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	10.4
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	195	26	1	767	24	97	0	5	8	0	92
Future Vol, veh/h	55	195	26	1	767	24	97	0	5	8	0	92
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1250	-	-	-	-	-	-	-	-	-	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	55	195	26	1	767	24	97	0	5	8	0	92

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	791	0	0	221	0	0	1145	1111	208	1102	1112	779
Stage 1	-	-	-	-	-	-	318	318	-	781	781	-
Stage 2	-	-	-	-	-	-	827	793	-	321	331	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	838	-	-	1360	-	-	178	211	837	191	211	399
Stage 1	-	-	-	-	-	-	698	657	-	391	408	-
Stage 2	-	-	-	-	-	-	369	403	-	695	649	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	838	-	-	1360	-	-	130	197	837	180	197	399
Mov Cap-2 Maneuver	-	-	-	-	-	-	130	197	-	180	197	-
Stage 1	-	-	-	-	-	-	652	614	-	365	408	-
Stage 2	-	-	-	-	-	-	284	403	-	646	606	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0	85.2	18.6
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	136	838	-	-	1360	-	-	364
HCM Lane V/C Ratio	0.75	0.066	-	-	0.001	-	-	0.275
HCM Control Delay (s)	85.2	9.6	-	-	7.6	0	-	18.6
HCM Lane LOS	F	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	4.4	0.2	-	-	0	-	-	1.1

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	189	19	0	793	0	0
Future Vol, veh/h	189	19	0	793	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	189	19	0	793	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	199
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	847
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	847
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	177	11	0	793	0	0
Future Vol, veh/h	177	11	0	793	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	177	11	0	793	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	183
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	865
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	865
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	137	40	2	724	69	3
Future Vol, veh/h	137	40	2	724	69	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	137	40	2	724	69	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	177	0	885	157
Stage 1	-	-	-	-	157	-
Stage 2	-	-	-	-	728	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1411	-	318	894
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1411	-	317	894
Mov Cap-2 Maneuver	-	-	-	-	317	-
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	481	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	326	-	-	1411	-
HCM Lane V/C Ratio	0.221	-	-	0.001	-
HCM Control Delay (s)	19.1	-	-	7.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			✥		↰	↱	
Traffic Volume (vph)	4	776	8	0	480	51	11	3	3	283	3	81
Future Volume (vph)	4	776	8	0	480	51	11	3	3	283	3	81
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2			5.2			5.2		5.2	5.2	
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	
Frt	1.00	1.00			0.99			0.98		1.00	0.86	
Flt Protected	0.95	1.00			1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1729	1817			1794			1711		1724	1522	
Flt Permitted	0.36	1.00			1.00			0.86		0.75	1.00	
Satd. Flow (perm)	662	1817			1794			1520		1355	1522	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	776	8	0	480	51	11	3	3	283	3	81
RTOR Reduction (vph)	0	1	0	0	7	0	0	2	0	0	57	0
Lane Group Flow (vph)	4	783	0	0	524	0	0	15	0	283	27	0
Confl. Peds. (#/hr)			2	2			2		2	2		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.0	26.0			26.0			15.7		15.7	15.7	
Effective Green, g (s)	26.0	26.0			26.0			15.7		15.7	15.7	
Actuated g/C Ratio	0.50	0.50			0.50			0.30		0.30	0.30	
Clearance Time (s)	5.2	5.2			5.2			5.2		5.2	5.2	
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	330	906			895			458		408	458	
v/s Ratio Prot		c0.43			0.29						0.02	
v/s Ratio Perm	0.01							0.01		c0.21		
v/c Ratio	0.01	0.86			0.59			0.03		0.69	0.06	
Uniform Delay, d1	6.6	11.5			9.2			12.8		16.1	12.9	
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	8.6			1.0			0.0		5.0	0.1	
Delay (s)	6.6	20.1			10.2			12.9		21.1	13.0	
Level of Service	A	C			B			B		C	B	
Approach Delay (s)		20.1			10.2			12.9			19.3	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	10.4
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	10.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱			✥			✥			✥	
Traffic Vol, veh/h	109	886	41	2	362	3	75	0	3	7	0	86
Future Vol, veh/h	109	886	41	2	362	3	75	0	3	7	0	86
Conflicting Peds, #/hr	2	0	0	0	0	2	1	0	2	2	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1250	-	-	-	-	-	-	-	-	-	-	-
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, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	109	886	41	2	362	3	75	0	3	7	0	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	367	0	0	927	0	0	1537	1496	909	1498	1515	367
Stage 1	-	-	-	-	-	-	1125	1125	-	370	370	-
Stage 2	-	-	-	-	-	-	412	371	-	1128	1145	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1203	-	-	746	-	-	96	124	336	102	121	683
Stage 1	-	-	-	-	-	-	251	283	-	654	624	-
Stage 2	-	-	-	-	-	-	621	623	-	250	277	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1202	-	-	745	-	-	78	112	335	93	109	681
Mov Cap-2 Maneuver	-	-	-	-	-	-	78	112	-	93	109	-
Stage 1	-	-	-	-	-	-	228	257	-	593	621	-
Stage 2	-	-	-	-	-	-	540	620	-	225	252	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.1	185	14.8
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	80	1202	-	-	745	-	-	461
HCM Lane V/C Ratio	0.975	0.091	-	-	0.003	-	-	0.202
HCM Control Delay (s)	185	8.3	-	-	9.8	0	-	14.8
HCM Lane LOS	F	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	5.3	0.3	-	-	0	-	-	0.7

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↑		↱
Traffic Vol, veh/h	868	29	0	368	0	0
Future Vol, veh/h	868	29	0	368	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	868	29	0	368	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	883
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	348
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	348
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	850	17	0	368	0	0
Future Vol, veh/h	850	17	0	368	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	850	17	0	368	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	859
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	359
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	359
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	789	60	3	314	53	2
Future Vol, veh/h	789	60	3	314	53	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	789	60	3	314	53	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	849	0	1139	819
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	320	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	798	-	225	379
Stage 1	-	-	-	-	437	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	798	-	224	379
Mov Cap-2 Maneuver	-	-	-	-	224	-
Stage 1	-	-	-	-	437	-
Stage 2	-	-	-	-	737	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	25.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	227	-	-	798	-
HCM Lane V/C Ratio	0.242	-	-	0.004	-
HCM Control Delay (s)	25.9	-	-	9.5	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	195	26	1	767	24	97	0	5	8	0	92
Future Volume (vph)	55	195	26	1	767	24	97	0	5	8	0	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	4.8	3.7
Total Lost time (s)	5.9	5.9			5.9			6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	0.98			1.00			0.99			0.88	
Flt Protected	0.95	1.00			1.00			0.95			1.00	
Satd. Flow (prot)	1729	1788			1812			1726			1780	
Flt Permitted	0.37	1.00			1.00			0.82			0.96	
Satd. Flow (perm)	671	1788			1812			1480			1720	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	195	26	1	767	24	97	0	5	8	0	92
RTOR Reduction (vph)	0	4	0	0	1	0	0	35	0	0	80	0
Lane Group Flow (vph)	55	217	0	0	791	0	0	67	0	0	20	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.4	44.4			44.4			8.7			8.7	
Effective Green, g (s)	44.4	44.4			44.4			8.7			8.7	
Actuated g/C Ratio	0.68	0.68			0.68			0.13			0.13	
Clearance Time (s)	5.9	5.9			5.9			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	458	1221			1237			198			230	
v/s Ratio Prot		0.12										
v/s Ratio Perm	0.08				0.44			c0.05			0.01	
v/c Ratio	0.12	0.18			0.64			0.34			0.09	
Uniform Delay, d1	3.6	3.7			5.8			25.5			24.7	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.3			2.5			1.0			0.2	
Delay (s)	4.1	4.0			8.3			26.6			24.8	
Level of Service	A	A			A			C			C	
Approach Delay (s)		4.0			8.3			26.6			24.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	11.9
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	886	41	2	362	3	75	0	3	7	0	86
Future Volume (vph)	109	886	41	2	362	3	75	0	3	7	0	86
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	4.8	3.7
Total Lost time (s)	5.9	5.9			5.9			6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			0.98	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	0.99			1.00			0.99			0.88	
Flt Protected	0.95	1.00			1.00			0.95			1.00	
Satd. Flow (prot)	1726	1808			1817			1724			1743	
Flt Permitted	0.54	1.00			1.00			0.80			0.97	
Satd. Flow (perm)	986	1808			1812			1441			1691	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	109	886	41	2	362	3	75	0	3	7	0	86
RTOR Reduction (vph)	0	1	0	0	0	0	0	31	0	0	76	0
Lane Group Flow (vph)	109	926	0	0	367	0	0	47	0	0	17	0
Confl. Peds. (#/hr)	2					2	1		2	2		1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	55.1	55.1			55.1			8.4			8.4	
Effective Green, g (s)	55.1	55.1			55.1			8.4			8.4	
Actuated g/C Ratio	0.73	0.73			0.73			0.11			0.11	
Clearance Time (s)	5.9	5.9			5.9			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	720	1321			1324			160			188	
v/s Ratio Prot		c0.51										
v/s Ratio Perm	0.11				0.20			c0.03			0.01	
v/c Ratio	0.15	0.70			0.28			0.29			0.09	
Uniform Delay, d1	3.1	5.6			3.4			30.8			30.1	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	0.4	3.1			0.5			1.0			0.2	
Delay (s)	3.5	8.7			3.9			31.8			30.3	
Level of Service	A	A			A			C			C	
Approach Delay (s)		8.2			3.9			31.8			30.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	75.4	Sum of lost time (s)	11.9
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group