245- 275 Lamarche Avenue

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (revision 1)

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1 Screening

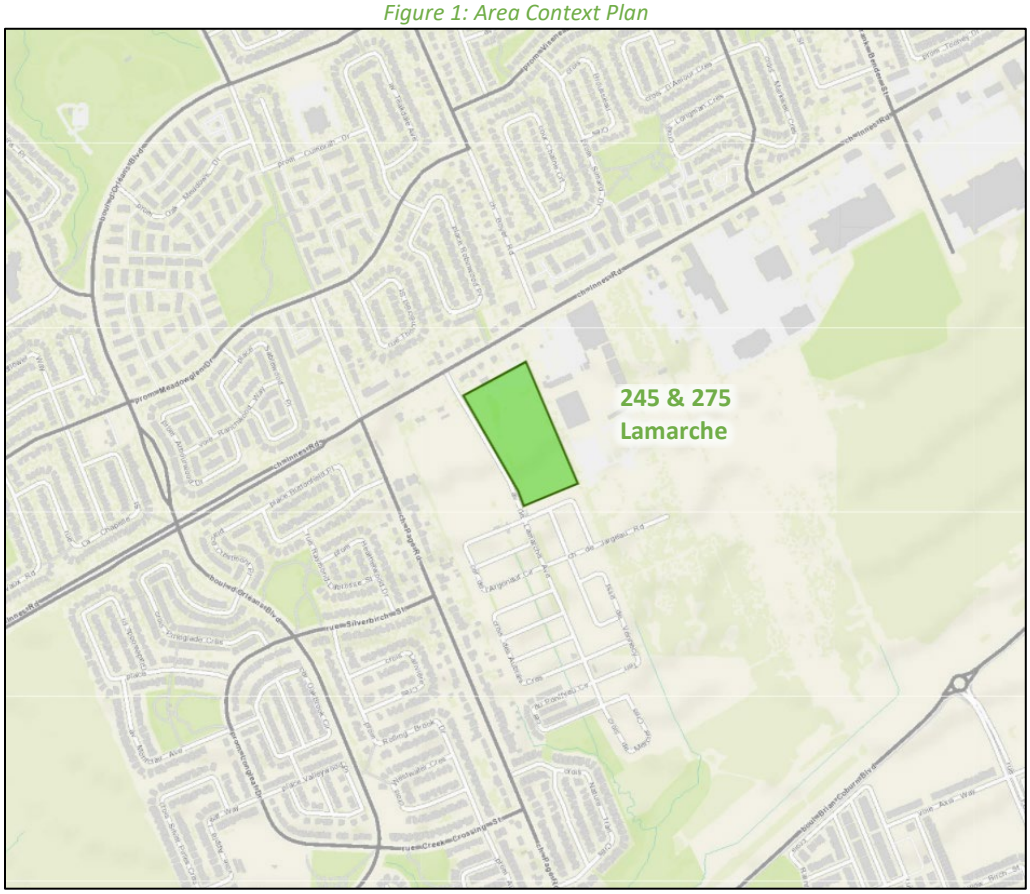
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for the TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component. This study has been prepared to support a zoning by-law amendment and draft plan of subdivision application.

2 Existing and Planned Conditions

2.1 Proposed Development

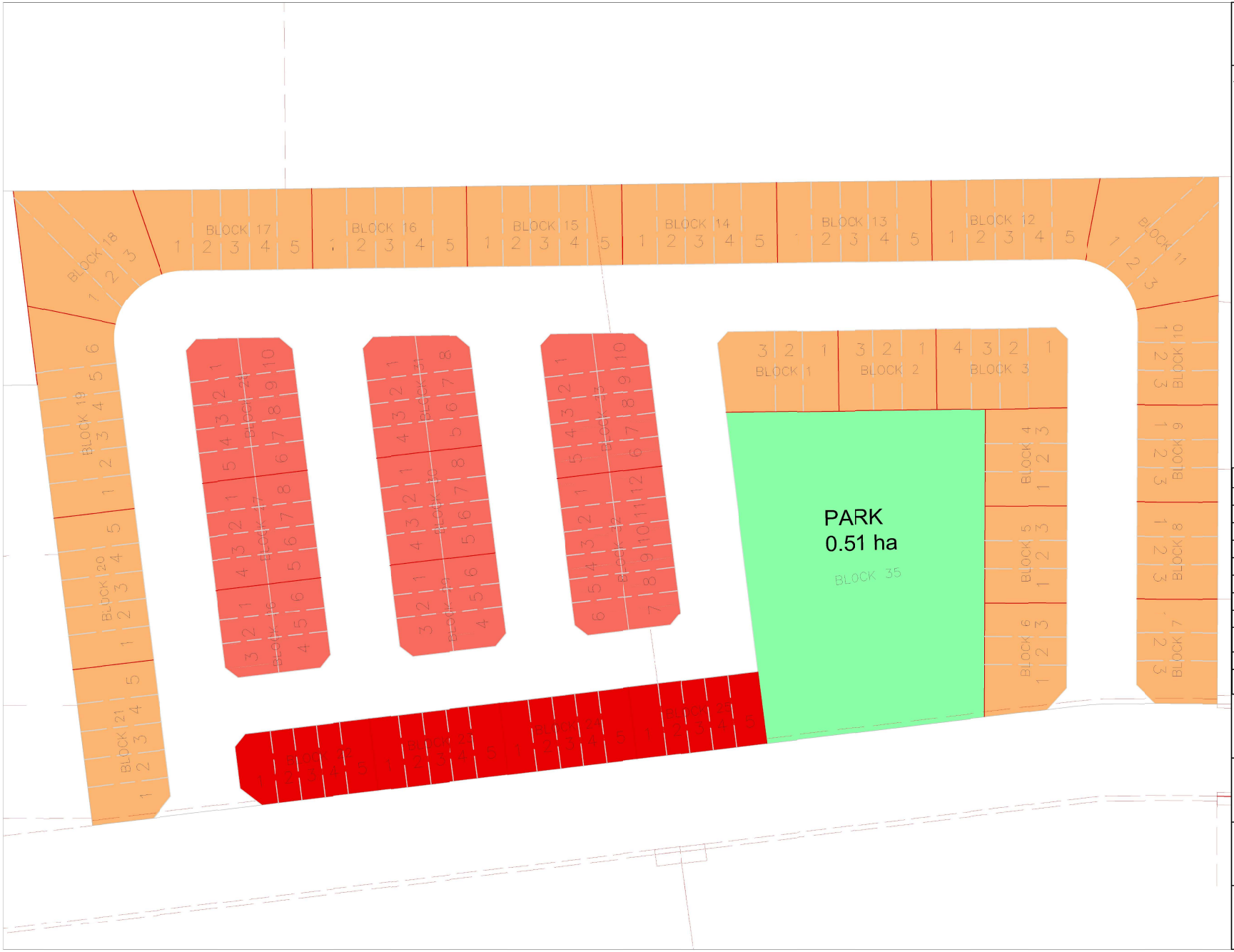
The existing site, located at 245 and 275 Lamarche Avenue, is zoned as Development Reserve (DR). The proposed development consists of 103 townhomes and 68 back-to-backs dwellings. The new development will constitute the second phase of the Orleans Village subdivision. The concept plan includes two full-movement accesses onto Lamarche Avenue. The anticipated full build-out and occupancy horizon is 2025 with construction occurring in a single phase. The site is located within the Innes Arterial Mainstreet area. Figure 1 illustrates the study area context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 21, 2022

Figure 2: Concept Plan



2.2 Existing Conditions

2.2.1 Area Road Network

Innes Road: Innes Road is a City of Ottawa arterial road. It has a divided four-lane cross-section west of Page Road, and five-lane urban cross-section including a two-way left-turn lane to the east. Bike lanes and sidewalks are provided on both sides of the road east of Orleans Boulevard, and bike lane is also present on the north side of the road west of Orleans Boulevard. The posted speed limit is 60 km/h within the study area and the City-protected right-of-way is 37.5 metres. Innes Road is designated as a truck route.

Orleans Boulevard: Orleans Boulevard is a City of Ottawa arterial road with a four-lane divided cross-section and a two-lane cross-section south of Silverbirch Street. Sidewalks are present on both sides of the road to the north and on the west side of the road to the south of Silverbirch Street. The posted speed limit is 60 km/h north of Innes Road, and 50 km/h to the south. The city-protected right-of-way is 37.5 metres north of Innes Road, and the measured right-of-way is 34.0 metres south of Innes Road. Orleans Boulevard is designated as a truck route north of Innes Road.

Viseneau Drive: Viseneau Drive is a City of Ottawa collector road with a two-lane cross-section. A sidewalk is present on the west side of the road. The posted speed limit is 40 km/h and the city-protected right-of-way is 26.0 metres.

Page Road: Page Road is a City of Ottawa local road with a two-lane semi-urban cross-section north of Innes Road and a collector road with a two-lane urban cross-section south of Innes Road. Sidewalks are present on the west side of the road and for 205 metres south of Innes Road on east side of the road. The posted speed limit is 40 km/h and the measured right-of-way varies between 20.0 and 22.0 metres north of Silverbirch Street, and the City-protected right-of-way is 24.0 metres south of Silverbirch Street.

Lamarche Avenue: Lamarche Avenue is a City of Ottawa local road with a two-lane cross. A MUP is present on the west side of the road. A sidewalk is present on the east side of the road south of Argonaut Circle and is planning to be provided on the east side of the road north of Argonaut Circle. On-street parking is permitted on both sides of the road. The unposted speed limit is assumed to be 50 km/h, and the measured right-of-way is 24.0 metres.

2.2.2 Existing Intersections

The key existing signalized area intersections within one kilometre of the site have been summarized below:

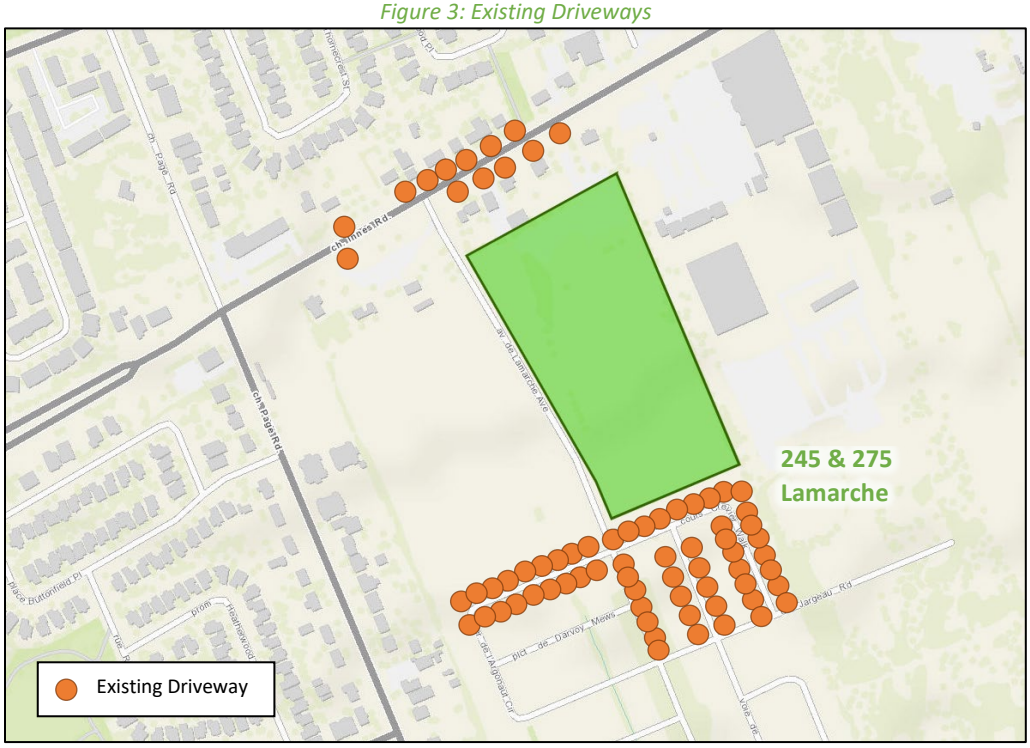
Innes Road at Orleans Boulevard	The intersection of Innes Road at Orleans Boulevard is a signalized intersection. The northbound and southbound approaches each consist of an auxiliary left-turn lane, two through lanes, and an auxiliary channelized right-turn lane. The eastbound approach consists of two auxiliary left-turn lanes, two through lanes, and an auxiliary channelized right-turn lane, and the westbound approach consists of an auxiliary left-turn lane, two through lanes, a bike lane, and an auxiliary channelized right-turn lane. Trucks are restricted on southbound movement.
Innes Road at Page Road	The intersection of Innes Road at Page Road is a signalized intersection. The northbound and southbound approaches each consist of a shared all-movement lane. The eastbound approach consists of an auxiliary left-turn lane, a through lane, a shared through/right-turn lane, and a bike, and westbound approach consists of an auxiliary left-turn lane, which develops from the two-way left-

	turn lane, a through lane, a shared through/right-turn lane, and a bike lane. No turn restrictions were noted.
Innes Road at Lamarche Avenue	The intersection of Innes Road at Lamarche Avenue is a T-intersection stop-controlled on the minor approach of Lamarche Avenue. The northbound approach consists of a shared all-movement lane. The eastbound approach consists of a through lane and a shared through/right-turn lane, and westbound approach consists of two through lanes. A two-way left-tun lane is present through the intersection on Innes Road. No turn restrictions were noted.
Innes Road at 3615 Innes Road/3636 Innes Road Access	The intersection of Innes Road at the 3615 Innes Road/3636 Innes Road access is a signalized intersection. The northbound approach functions as a left-turn lane and a shared through/right-turn lane, and the southbound approach consists of a shared all-movement lane. The eastbound approach consists of an auxiliary left-turn lane, which develops from the two-way left-turn lane, a through lane, a shared through/right-turn lane, and a bike lane, and the westbound approach consists of an auxiliary left-turn lane, a through lane, a shared through/right-turn lane, and a bike lane. No turn restrictions were noted.
Innes Road at Viseneau Drive	The intersection of Innes Road at Viseneau Drive is a signalized intersection. The northbound approach consists of a left-turn lane, a through lane, and an auxiliary right-turn lane, and the southbound approach consists of a shared all-movement lane. The eastbound approach consists of an auxiliary left-turn lane, two through lanes, a bike lane, and an auxiliary right-turn lane, and the westbound approach consists of an auxiliary left-turn lane, a through lane, a shared through/right-turn lane, and a bike lane. No turn restrictions were noted.

2.2.3 Existing Driveways

Within 200 metres of the site accesses, six driveways to detached homes and one to a clinic are located on the north side of Innes Road, and one driveway to a school bus parking lot, one to an office, one to a food truck and three to detached homes are located on the south side of Innes Road. South of the future access, driveways are provided to townhouses. Figure 3 illustrates the existing driveways.

Figure 3: Existing Driveways



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 21, 2022

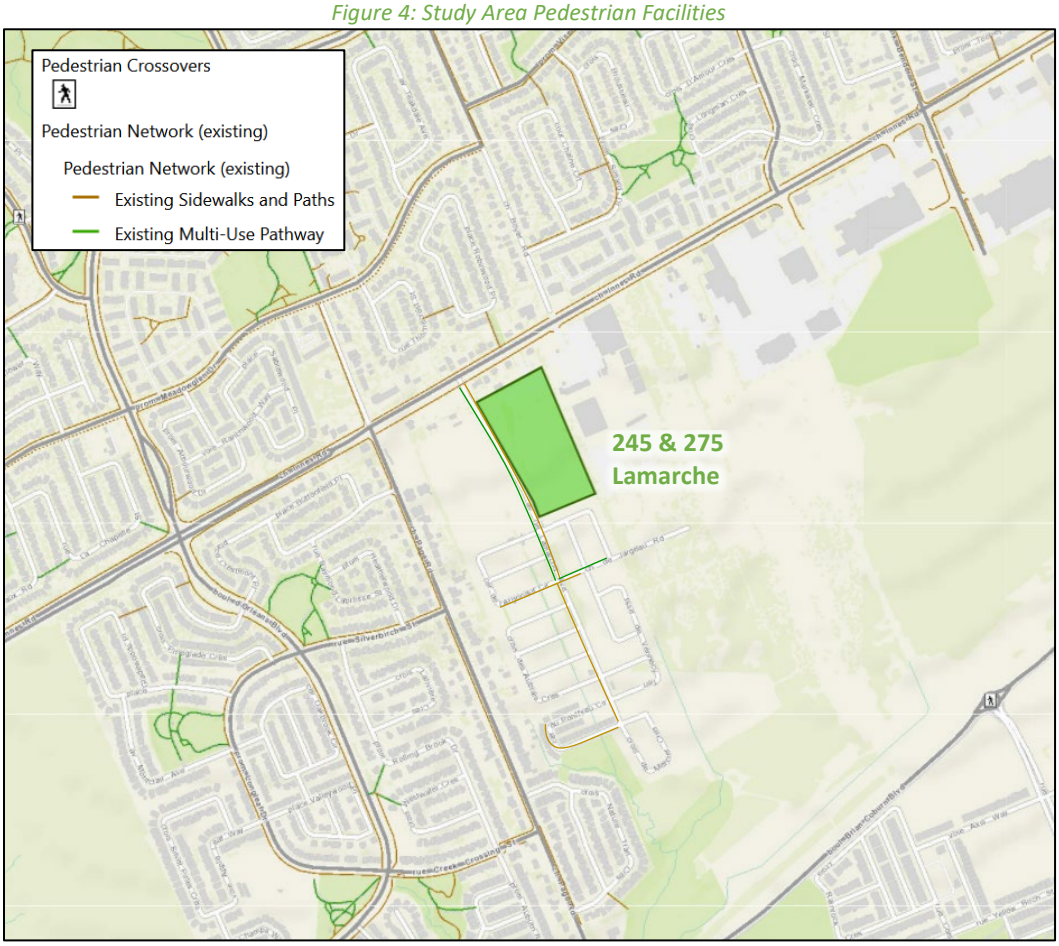
2.2.4 Cycling and Pedestrian Facilities

Figure 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

Sidewalks are provided along both sides of Innes Road, on the west side of Page Road, on east side of Page Road for 205 metres south of Innes Road, and on the east side of Lamarche Avenue south of Argonaut Circle.

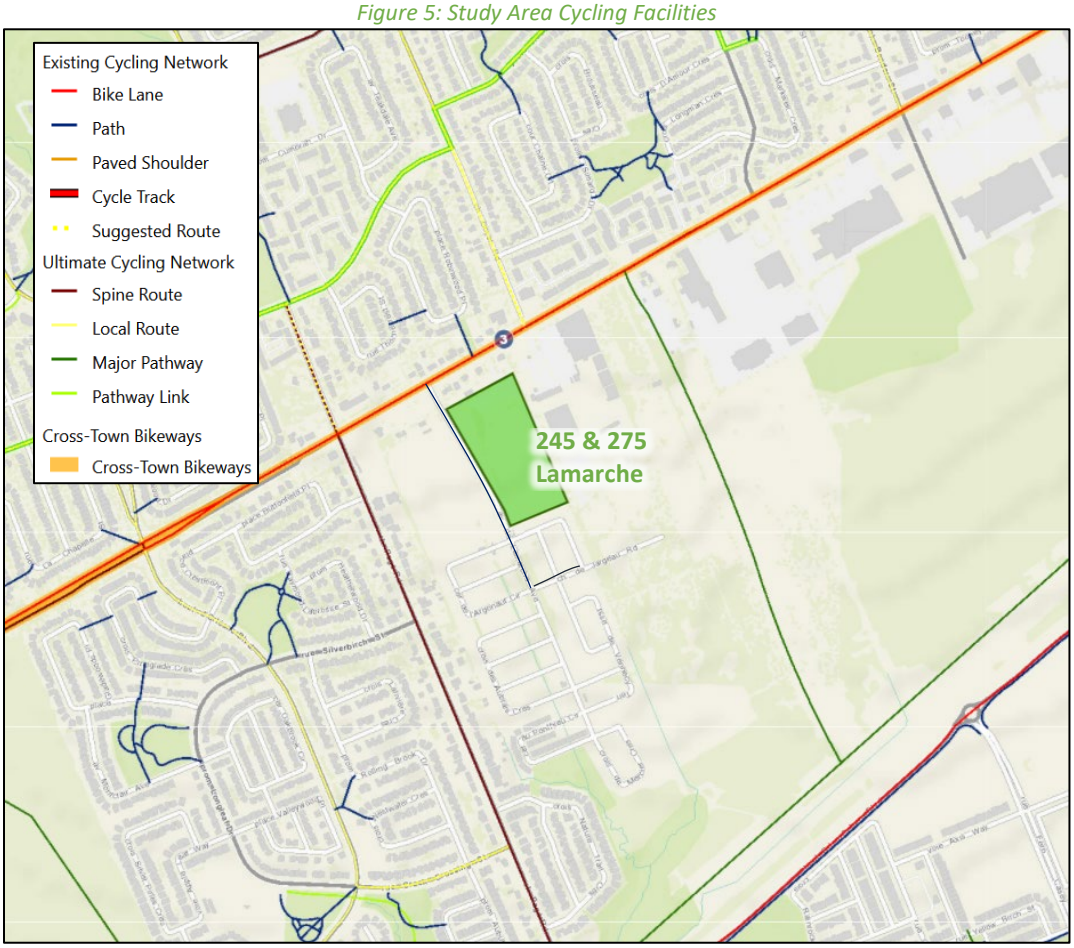
Cycling facilities include bike lanes along both side of Innes Road. A path is provided to connect Innes Road and Robinwood Place. A MUP is provided on the west side of Lamarche Avenue, and a major pathway is planned to be provided along Fern Casey Street connecting Innes Road to the Brian Coburn pathways. Innes Road, Orleans Boulevard are spine route, and Page Road north of Innes Road is suggested route. Innes Road is a cross-town bikeway.

Figure 4: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 21, 2022

Figure 5: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 21, 2022

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 6 and Figure 7, respectively.

Figure 6: Existing Pedestrian Volumes

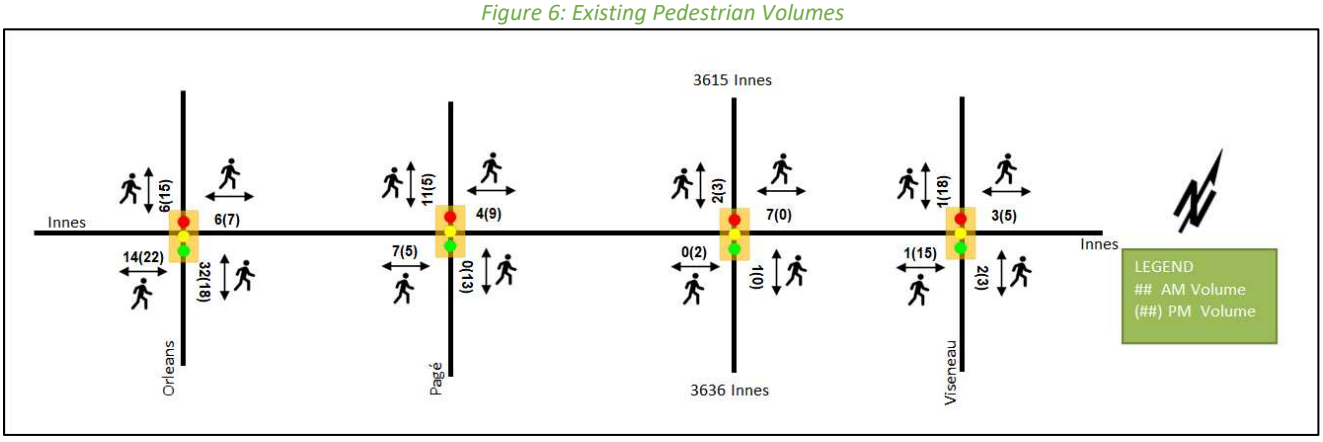
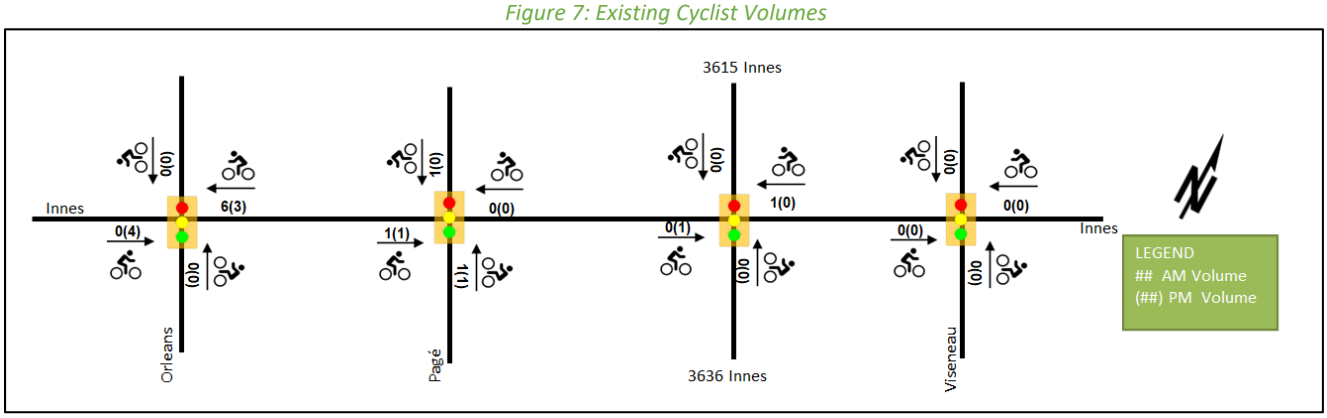


Figure 7: Existing Cyclist Volumes



2.2.5 Existing Transit

Within the study area, routes # 25, #612, and #648 travel along Innes Road, and route # 34 travels along Orleans Boulevard. Primary stops are located at Innes Road at 3615 Innes Road/3636 Innes Road access and Innes Road at Page Road. The frequency of these routes within proximity of the proposed site currently are:

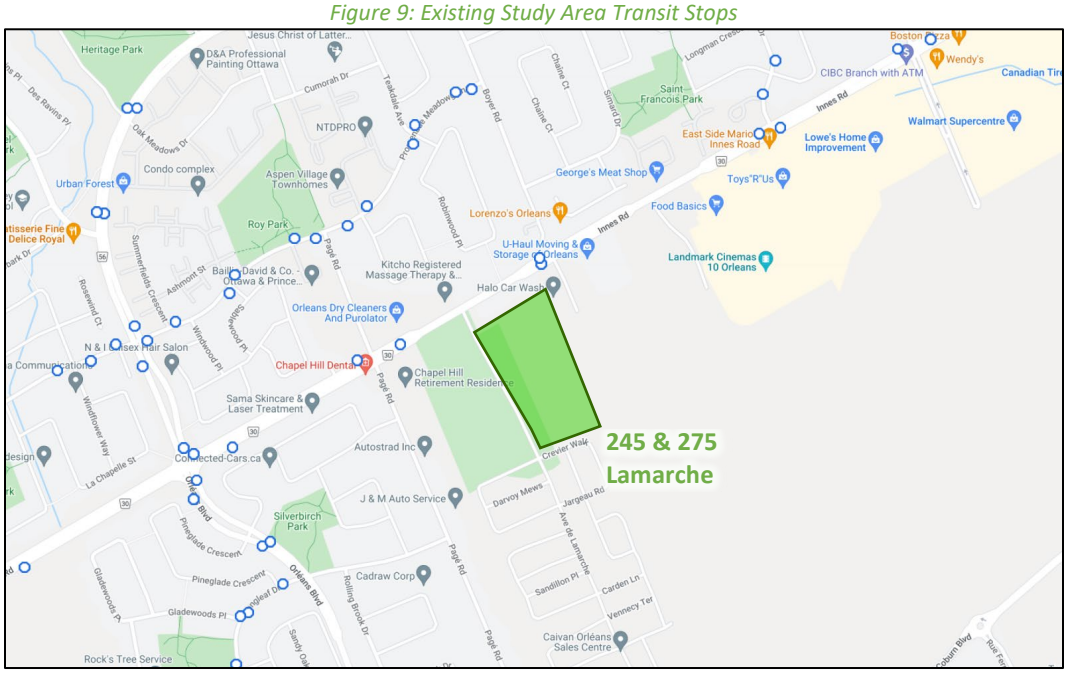
- Route # 25 – 10-15-minute service in the peak period/direction, 15-minute daytime service, 30-minute service after 8:00 PM

Figure 8 illustrates the transit system map in the study area and Figure 9 illustrates nearby transit stops.

Figure 8: Existing Study Area Transit Service

Source: http://www.octranspo.com/ Accessed: March 21, 2022

Figure 9: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: March 21, 2022

2.2.6 Existing Area Traffic Management Measures

On-street parking is permitted on both sides of Lamarche Avenue and speed humps are present on Page Road north of Innes Road.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing study area key intersections. It is confirmed that 131 townhomes and 121 detached houses of the 3490 Innes Road Phase 1-3 development have been constructed and are occupied, and the development trip generation using the TRANS Trip Generation Manual (2020) has been included in the existing conditions. The intersection of Innes Road at Lamarche Avenue has been estimated from the site trip generation of the previous phase of 3490 Innes Road development, and all intersections were balanced and grown to 2022. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date	Source
Innes Road @ Orleans Boulevard	Wednesday, May 03, 2017	City of Ottawa
Innes Road @ Page Road	Tuesday, January 08, 2019	City of Ottawa
Innes Road @ 3615 Innes Road/3636 Innes Road Access	Thursday, January 31, 2019	City of Ottawa
Innes Road @ Viseneau Drive	Wednesday, January 25, 2017	City of Ottawa

Figure 10 illustrates the existing traffic counts balanced along Innes Road and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on volume-to-capacity (v/c) calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 10: Existing Traffic Counts

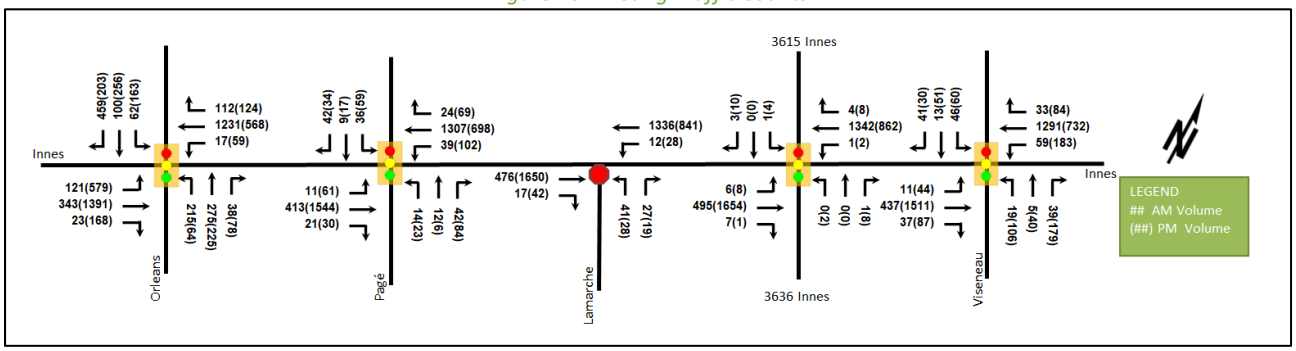


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Innes Road at Orleans Boulevard *Signalized*	EBL	D	0.85	**101.3**	**#36.1**	E	0.92	61.7	**#100.9**
	EBT	A	0.22	18.9	42.1	**F**	**1.11**	**91.0**	**#254.2**
	EBR	A	0.03	0.1	0.0	A	0.27	5.9	16.8
	WBL	A	0.23	66.4	13.0	A	0.51	56.0	29.7
	WBT	E	0.91	43.6	**#207.8**	C	0.74	52.8	94.8
	WBR	A	0.17	2.7	7.9	A	0.25	11.9	27.3
	NBL	B	0.61	40.2	70.1	A	0.22	26.5	20.4
	NBT	A	0.26	31.2	41.0	A	0.22	25.9	29.4
	NBR	A	0.08	0.8	1.0	A	0.14	0.5	0.0
	SBL	A	0.36	50.8	30.2	B	0.68	52.3	**#69.2**
	SBT	A	0.17	43.6	20.9	A	0.33	35.1	39.1
	SBR	**F**	**1.23**	**155.9**	**#197.0**	A	0.42	7.1	18.4
	Overall	**E**	**0.99**	**56.8**	**-**	**E**	**0.99**	**57.9**	**-**
Innes Road at Page Road *Signalized*	EBL	A	0.07	8.6	3.7	A	0.18	2.4	m1.8
	EBT/R	A	0.20	6.2	31.3	C	0.75	7.3	m23.7
	WBL	A	0.07	5.4	m2.8	**F**	**1.08**	**136.7**	**#56.7**
	WBT/R	B	0.61	8.0	27.3	A	0.37	12.4	109.1
	NB	A	0.29	20.4	17.4	A	0.47	36.6	33.5
	SB	A	0.40	30.4	25.2	A	0.53	40.0	33.7
	Overall	**A**	**0.55**	**9.3**	**-**	**E**	**0.95**	**16.0**	**-**
Innes Road at Lamarche Avenue *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	8.6	0.0	C	0.10	17.7	2.3
	WBT	-	-	-	-	-	-	-	-
	NB	C	0.20	17.2	6.0	**F**	**0.44**	**57.8**	**14.3**
	Overall	**A**	**-**	**0.7**	**-**	**A**	**-**	**1.2**	**-**
Innes Road at Access 3615 Innes Road/3636 Innes Road *Signalized*	EBL	A	0.03	3.5	m1.9	A	0.02	1.5	m0.2
	EBT/R	A	0.18	1.9	27.4	B	0.62	3.3	162.7
	WBL	A	0.00	7.0	m0.2	A	0.01	5.0	1.0
	WBT/R	A	0.48	5.5	140.4	A	0.33	3.6	61.9
	NBL	A	0.00	0.0	0.0	A	0.01	38.0	2.3
	NBT/R	-	-	-	-	A	0.04	0.4	0.3
	SB	A	0.02	0.2	0.0	A	0.08	5.1	2.5
	Overall	**A**	**0.50**	**4.1**	**-**	**B**	**0.63**	**3.4**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Viseneau Drive *Signalized*	EBL	A	0.06	8.1	1.3	A	0.16	19.5	15.9
	EBT	A	0.22	7.1	11.7	E	0.91	35.9	**#292.4**
	EBR	A	0.04	0.1	0.0	A	0.12	3.2	8.0
	WBL	A	0.10	5.3	10.4	C	0.77	51.9	63.1
	WBT/R	A	0.59	8.6	131.6	A	0.38	7.5	61.8
	NBL	A	0.14	44.6	10.6	C	0.73	75.1	47.3
	NBT	A	0.03	40.6	4.6	A	0.16	44.8	19.3
	NBR	A	0.15	1.2	0.0	A	0.50	9.9	19.3
	SB	A	0.55	45.0	32.1	B	0.67	60.3	55.1
	Overall	**B**	**0.62**	**10.1**	**-**	**D**	**0.87**	**29.3**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

During both the AM and PM peak hours, capacity issues are noted at the intersection of Innes Road at Orleans Boulevard. At this intersection, the southbound right-turn movement during AM peak hour and the eastbound through movement are over theoretical capacity during the PM peak hour and may be subject to high delays and extended queues. Extended queues may be exhibited on the eastbound left-turn and westbound through movements during the AM peak hour, and on the eastbound and southbound left-turn movements during PM peak hour. High delays and are anticipated on the eastbound left-turn movement during AM peak hour.

The intersection of the Innes Road and Page Road may be subject to high delays and extended queues on the westbound left-turn movement during PM peak hour. The City may improve the operation by changing the eastbound and westbound left-turn to be protected/permissive phasing, and it would be subject to coordination of the Innes Road corridor.

At the intersection of Innes Road at Lamarche Avenue, the northbound movement experiences a delay of over 50 seconds during the PM peak hour. The intersection does not meet signal warrants, as provided in Appendix D.

The eastbound through movement at the intersection of Innes Road and Viseneau Drive may exhibit extended queues during PM peak hour.

2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Within the study area, the segments of Innes Road between Page Road and the 3615 Innes Road/3636 Innes Road access is the only location noted to have experienced collisions. Figure 11 illustrates the intersections and segments analyzed. Table 3 summarizes the collision types and conditions for the location. Collision data are included in Appendix E.

Figure 11: Study Area Collision Records – Representation of Study Area Collisions

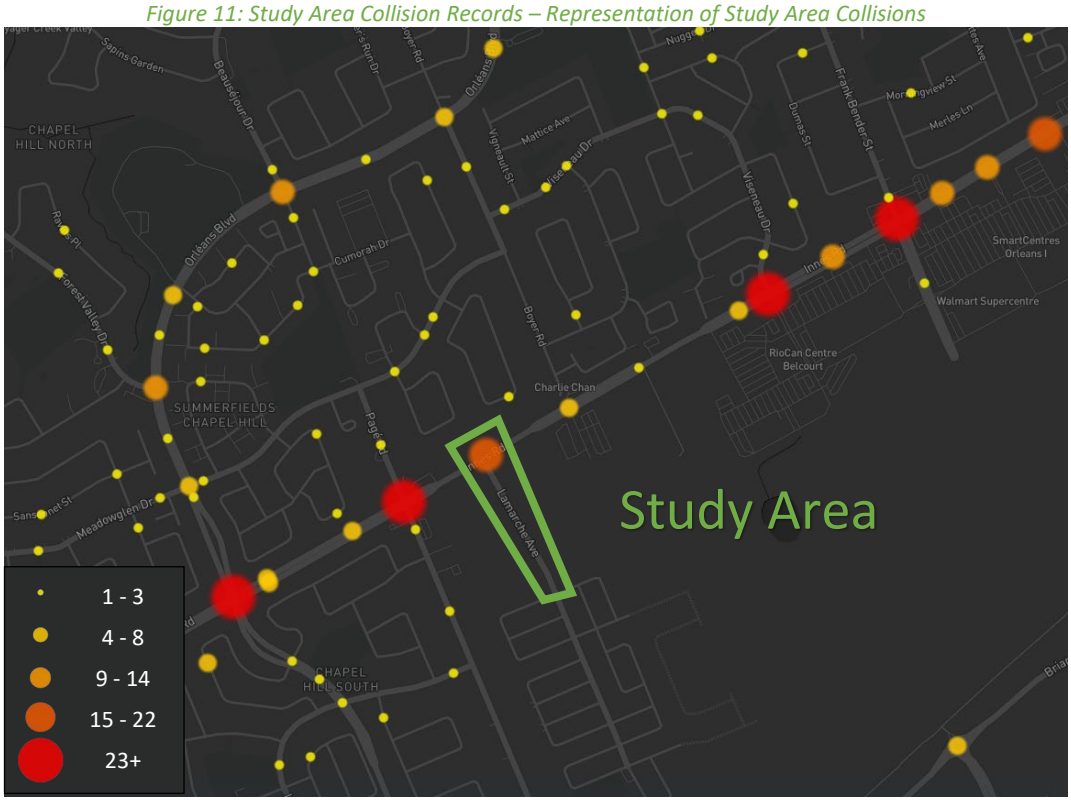


Table 3: Segments of Innes Road between Page Road & The 3615 Innes Road/3636 Innes Road Access Collision Summary, 2016-2020

		Number	%
Total Collisions		16	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	3	19%
	Property Damage Only	13	81%
Initial Impact Type	**Angle**	5	31%
	Rear end	4	25%
	Sideswipe	3	19%
	Turning Movement	1	6%
	SMV Other	3	19%
Road Surface Condition	**Dry**	12	75%
	Loose Snow	1	6%
	Slush	1	6%
	Packed Snow	2	13%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The segments of Innes Road between Page Road and the 3615 Innes Road/3636 Innes Road access intersection had a total of 16 collisions during the 2016-2020 time period, with 13 involving property damage only and the remaining three having non-fatal injuries. The collision types are most represented by angle with five collisions, followed by four rear end collisions, three collisions each for the sideswipe and SMV Other, and with the remaining one collision as turning movement. No pattern is noted from the collision distribution summarized above. Weather conditions do not affect collisions at this location.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

Within the Transportation Master Plan, the Rapid Transit and Transit Priority Network's Network Concept diagram shows an isolated transit priority measures along Innes Road. The subject development is not within the CDP Area.

The intersection of Innes Road and Lamarche Avenue is listed on the City's DC By-law funded projects and is anticipated to be constructed by 2025. The intersection would include signalization of the existing minor stop control, an auxiliary westbound left-turn lane, an auxiliary northbound left-turn lane, an auxiliary eastbound right-turn lane, and protected intersection features for pedestrian and cycling crossings. As noted in Section 2.2.7, the intersection does not currently meet signalization warrants.

2.3.2 Other Study Area Developments

3817-3843 Innes Road

The proposed development application includes a site plan application for three apartment buildings with a total of 97 residential units. The development is assumed to be built out in 2024 and is predicted to generate 35 new AM and 45 new PM two-way peak hour auto trips. (D. J. Halpenny & Associates Ltd, 2021)

3490 Innes Road - Phase 1-3

The proposed development application includes a zoning by-law amendment and plan of subdivision. Phase 1 consists of approximately 267 units and has been built, and Phase 2 consists of the remaining 267 units expected to be constructed by 2024. Phase 1 was forecasted to generate 130 new AM and 165 new PM two-way peak hour auto trips. Phase 2 is forecasted to generate 112 new AM and 137 new PM two-way peak hour auto trips (Parsons, 2016). It has been confirmed that 131 townhomes and 121 detached of the development have been constructed, which is estimated to generate 97 new AM and 118 new PM two-way peak hour auto trips, and the traffic is included in the existing conditions. Approximately 208 detached, which is forecasted to generate 99 new AM and 121 new PM two-way peak hour auto trips, and the traffic will be included in the future horizons.

3484 Innes Road, *240 & 270 Lamarche Avenue*

The proposed development application includes a zoning by-law amendment and plan of subdivision. The current option includes five seven-storey with a total of 525 residential units, 10,631 ft^2 of commercial space, a 26,905 ft^2 grocery store, a 2,217 ft^2 coffee shop with drive-thru, and a 1,550 ft^2 gas bar. The full buildout is currently estimated by 2031 and is forecasted to generate 261 new AM and 276 new PM two-way peak hour auto trips. Zone 1 and Zone 2 including all residential units is forecasted to generate 75 new AM and 42 new PM two-way peak hour auto trips. Zones 1 and 2 are predicted to be completed by 2030 and will be included in the 2030 future horizons. (Parsons, 2021)

3604 Innes Road

The proposed development application includes a plan of subdivision for the construction of 180 single detached homes, 109 townhouse units and 168 stacked townhouses in two phases. Phase 1 is anticipated to be built by 2023 and is forecasted to generate 70 new AM and 92 new PM two-way peak-hour auto trips. Phase 2 is anticipated to be built by 2025 and is forecasted to generate 200 new AM two-way peak hour auto trips and 256 new PM two-way peak hour auto trips. (Novatech, 2019)

3443 Innes Road &3437 Innes Road

The proposed development application includes a site plan application to include a six-storey, mixed-use building with ground floor commercial and 35 residential units. The development is anticipated to be built by 2023 and is forecasted to generate 24 new AM and 27 new PM two-way peak hour auto trips. (Novatech, 2018)

3672 Innes Road, 3730 Innes Road, and 3828 Innes Road

The proposed development application includes a zoning by-law amendment to permit the construction of 340 singles detached homes, 529 townhouses, 114 back-to-back townhomes, and 1,060 apartment units. Phase 1, which is anticipated to be built by 2037, is forecasted to generate 312-341 new AM and 380-415 new PM two-way peak hour auto trips. Phase 2, which is anticipated to be built by 2042, is forecasted to generate 603-659 new AM and 725-793 new PM two-way peak hour auto trips. Phase 3, which is anticipated to be built by 2047, is forecasted to generate 968-1,056 new AM and 1,166-1,275 new PM two-way peak hour auto trips. (Castleglenn Consultants, 2021)

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of:

- Innes Road at:
  - Orleans Boulevard
  - Page Road
  - Lamarche Avenue
  - 3615 Innes Road/3636 Innes Road Access
  - Viseneau Drive

The boundary road will be Innes Road and Lamarche Avenue and SL 47 screenlines is present within proximity to the site but will not be analyzed as part of this study.

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2025. As a result, the full build-out plus five years horizon year is 2030.

4 Exemption Review

Table 4 summarizes the exemptions for this TIA.

Table 4: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Exempt
	4.1.3 New Street Networks	Only required for plans of subdivision	Required
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Exempt
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			

Module	Element	Explanation	Exempt/Required
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Exempt
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Exempt

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for Orleans have been summarized in Table 5.

Table 5: TRANS Trip Generation Manual Recommended Mode Shares – Orleans

Travel Mode	Multi-Unit (Low-Rise)	
	AM	PM
Auto Driver	47%	51%
Auto Passenger	15%	19%
Transit	29%	24%
Cycling	1%	1%
Walking	9%	6%
Total	**100%**	**100%**

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020). Table 6 summarizes the person trip rates for the proposed residential land uses for each peak period.

Table 6: Trip Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Person Trip Rates
Multi-Unit (Low-Rise)	220 (TRANS)	AM	1.35
		PM	1.58

Using the above person trip rates, the total person trip generation has been estimated. Table 7 summarizes the total person trip generation for the residential land use.

Table 7: Total Residential Person Trip Generation by Peak Period

Land Use	Units	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Multi-Unit (Low-Rise)	171	69	162	231	151	119	270

Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020) for the residential component. Table 8 summarizes the residential trip generation.

Table 8: Trip Generation by Mode

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Multi-Unit (Low-Rise)	Auto Driver	**47%**	15	36	51	**51%**	34	27	61
	Auto Passenger	**15%**	5	12	17	**19%**	12	10	22
	Transit	**29%**	11	26	37	**24%**	17	14	31
	Cycling	**1%**	1	1	2	**1%**	1	0	1
	Walking	**9%**	3	9	12	**6%**	5	4	9
	Total	**100%**	**35**	**81**	**116**	**100%**	**66**	**52**	**119**

As shown above, a total of 51 AM and 61 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development, the OD Survey has been reviewed to determine the travel for the residential component, and these patterns were applied based on the build-out of Orleans. Table 9 below summarizes the distributions.

Table 9: OD Survey Distribution – Orleans

To/From	Residential % of Trips
North	15%
South	0%
East	40%
West	45%
Total	**100%**

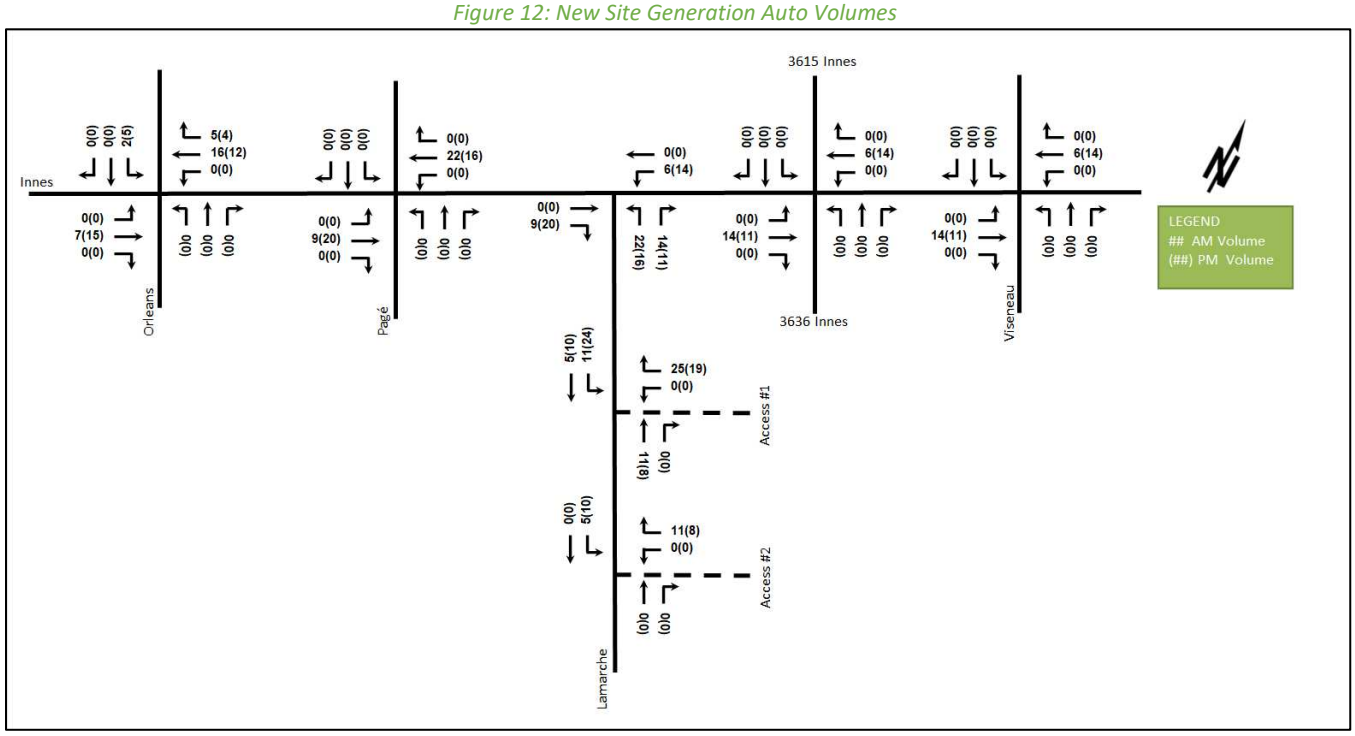
5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the study area road network. Table 10 summarizes the proportional assignment to the study area roadways, and Figure 12 illustrates the new site generated volumes.

Table 10: Trip Assignment

To/From	Via
North	15% Orleans Boulevard (N)
South	-
East	40% Innes Road (E)
West	45% Innes Road (W)
Total	**100%**

Figure 12: New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. The intersection of Innes Road and Lamarche Avenue is anticipated to become a signalized intersection with an auxiliary westbound left-turn lane, an auxiliary northbound left-turn lane, an auxiliary eastbound right-turn lane, and protected intersection features for pedestrian and cycling crossings.

6.2 Background Growth

A review of the background projections from the City's TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. The background TRANS model growth rates are summarized in Table 11 and the TRANS model plots are provided in Appendix F.

Table 11: TRANS Regional Model Projections – Study Area Growth Rates

Street	TRANS Rate		Existing to 2031	
	Eastbound	**Westbound**	**Eastbound**	**Westbound**
Innes Road	-0.28%	-1.64%	-3.14%	-5.02%
	Northbound	**Southbound**	**Northbound**	**Southbound**
Orleans Boulevard	4.02%	-0.95%	0.45%	1.92%

In general, the growth rates in the study area derived from the two TRANS model horizons are projected to be negative along Innes Road in the eastbound and westbound directions and slightly positive along Orleans Boulevard in the northbound direction. The existing volumes are noted to be exceed the TRANS 2031 model forecasts for Innes Road.

As the continued development is expected in Orleans and result in additional volumes along the area road network, beyond the developments considered in Section 6.3, it is assumed that a 1.00% growth rate will be

applied to Innes Road and a 2.00% growth rate will be applied on Orleans Boulevard in peak directions. The modified growth rates have been applied to the study area network, and it is summarized in Table 12.

Table 12: Recommended Area Growth Rates

Street	AM Peak Hour		PM Peak Hour	
	Eastbound	**Westbound**	**Eastbound**	**Westbound**
Innes Road	1.00%	1.00%	1.00%	1.00%
	Northbound	**Southbound**	**Northbound**	**Southbound**
Orleans Boulevard	2.00%	-	-	2.00%

6.3 Other Developments

The background developments explicitly considered in the background conditions (Section 6.2) include:

- 3817-3843 Innes Road
- 3490 Innes Road - Phase 1-3
- 3443 Innes Road & 3437 Innes Road
- 3484 Innes Road, 240 & 270 Lamarche Avenue
- 3604 Innes Road

The background development volumes within the study area have been provided in Appendix G.

7 Demand Rationalization

7.1 2025 Future Background Operations

The intersection of Innes Road at Lamarche is anticipated to be signalized by 2025 and has been modelled as a signal for all future horizons. The intersection does not meet signalization warrants, which have been provided in Appendix D.

Figure 13 illustrates the 2025 background volumes and Table 13 summarizes the 2025 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2025 future background horizon are provided in Appendix H.

Figure 13: 2025 Future Background Volumes

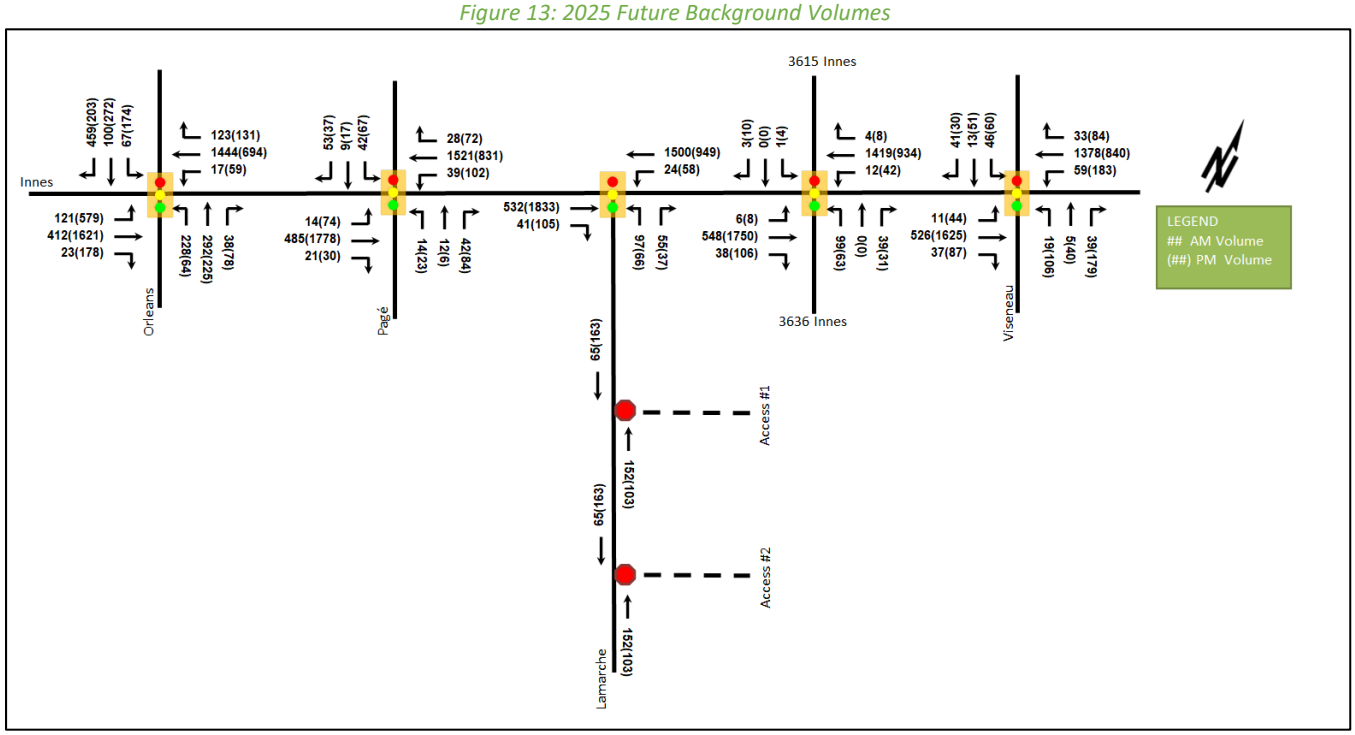


Table 13: 2025 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Orleans Boulevard *Signalized*	EBL	C	0.77	**90.3**	**#31.4**	D	0.86	55.6	**#82.8**
	EBT	A	0.24	19.1	45.6	**F**	**1.16**	**110.2**	**#272.1**
	EBR	A	0.03	0.1	0.0	A	0.26	5.3	15.3
	WBL	A	0.21	65.5	12.2	A	0.46	51.3	27.2
	WBT	E	0.96	50.8	**#237.0**	C	0.79	64.5	**#104.9**
	WBR	A	0.17	2.7	7.7	A	0.24	12.1	25.3
	NBL	A	0.57	38.9	66.7	A	0.20	26.1	18.8
	NBT	A	0.25	31.0	39.3	A	0.19	25.7	26.6
	NBR	A	0.07	0.3	0.0	A	0.13	0.4	0.0
	SBL	A	0.34	50.3	29.3	B	0.64	49.7	**#63.9**
	SBT	A	0.15	43.4	19.2	A	0.31	35.0	37.4
	SBR	**F**	**1.11**	**109.2**	**#166.8**	A	0.38	5.4	13.5
	Overall	**E**	**0.97**	**51.0**	-	**E**	**0.99**	**67.3**	-
Innes Road at Page Road *Signalized*	EBL	A	0.09	9.1	4.3	A	0.21	2.3	m1.8
	EBT/R	A	0.21	6.3	33.0	C	0.77	9.3	m21.8
	WBL	A	0.07	6.4	m5.9	**F**	**1.09**	**137.7**	**m#58.3**
	WBT/R	B	0.64	16.6	228.4	A	0.39	3.6	m0.0
	NB	A	0.26	20.2	16.0	A	0.42	35.6	30.6
	SB	A	0.42	30.2	26.3	A	0.51	39.0	33.3
	Overall	**A**	**0.58**	**14.8**	-	**E**	**0.95**	**13.8**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Signalized*	EBT	A	0.26	10.3	32.4	E	1.00	49.3	**#262.8**
	EBR	A	0.04	9.9	8.0	A	0.13	14.8	m12.6
	WBL	A	0.29	65.4	m10.7	C	0.77	**102.4**	**#36.0**
	WBT	B	0.66	11.9	91.3	A	0.45	12.8	95.7
	NBL	C	0.74	**85.6**	**#48.3**	D	0.88	**127.9**	**#40.4**
	NBR	A	0.18	40.5	22.2	A	0.10	33.1	14.6
	Overall	**B**	**0.65**	**15.9**	-	**D**	**0.81**	**39.3**	-
Innes Road at Access 3615 Innes Road/3636 Innes Road *Signalized*	EBL	A	0.03	3.0	m0.7	A	0.02	2.4	m0.5
	EBT/R	A	0.23	2.6	11.1	B	0.70	12.1	m226.5
	WBL	A	0.02	7.4	m2.5	A	0.34	16.4	16.1
	WBT/R	A	0.56	9.2	130.4	A	0.35	5.1	59.7
	NB	A	0.57	60.6	36.3	A	0.38	49.0	22.6
	NBT/R	A	0.07	0.3	0.0	A	0.14	14.1	7.5
	SB	A	0.02	0.2	0.0	A	0.07	4.5	2.2
	Overall	**A**	**0.56**	**9.5**	-	**B**	**0.69**	**10.7**	-
Innes Road at Viseneau Drive *Signalized*	EBL	A	0.05	6.5	1.3	A	0.14	18.6	14.4
	EBT	A	0.24	4.9	21.2	D	0.85	30.4	**#277.3**
	EBR	A	0.04	0.1	0.0	A	0.10	2.4	6.1
	WBL	A	0.10	5.2	9.6	C	0.72	43.6	53.6
	WBT/R	A	0.56	8.0	122.2	A	0.38	7.4	63.5
	NBL	A	0.13	44.5	9.8	B	0.66	69.3	42.5
	NBT	A	0.02	40.6	4.2	A	0.15	45.0	18.2
	NBR	A	0.14	1.1	0.0	A	0.48	10.2	18.6
	SB	A	0.51	42.3	28.9	B	0.62	58.1	49.7
	Overall	**A**	**0.59**	**8.9**	-	**D**	**0.81**	**25.3**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

Overall, the study area intersections will operate similar to the existing conditions, with decreasing operations due to the background growth and background development.

The westbound through movement during the PM peak hour at Innes Road at Orleans Boulevard intersection may exhibit extended queues.

The westbound left-turn movement at the intersection of Innes Road and Page Road may be subject to high delays and extended queues during the PM peak hour, which is similar to the existing conditions. A City review for a protected/permissive phasing should be conducted.

At the intersection of Innes Road at Lamarche Avenue, with the background development volumes, the northbound left-turn movement may be subject to high delays and extended queues during the AM peak hour. During the PM peak hour, the eastbound through movement may be subject to extended queues, and the westbound and northbound left-turn movements may be subject to high delays and extended queues. The operations are influenced by the expected protection for the cycling and pedestrian crossings, as it reduces the available green time for the auto movements.

7.1.1 2025 Future Background Operations - Unsignalized Innes and Lamarche Intersection

As an additional sensitivity was requested by City of Ottawa staff, the intersection of Innes Road and Lamarche Avenue has been assessed for the 2025 future background conditions assuming it remains as an unsignalized intersection. Table 14 summarizes the intersection operations and the synchro worksheets are provided in Appendix H.

Table 14: 2025 Future Background Operations- Unsignalized Intersection of Innes Road and Lamarche Avenue

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.02	8.7	0.8	C	0.19	19.9	5.3
	WBT	-	-	-	-	-	-	-	-
	NB	C	0.44	23.2	15.8	**F**	**1.01**	**169.2**	**47.3**
	Overall	**A**	**-**	**1.6**	**-**	**A**	**-**	**6.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The northbound movement may be subject to high delays during PM peak when the intersection is unsignalized. Compared to the existing condition, the delay will increase from 57.8 seconds to 169.2 seconds during the PM peak hour.

7.2 2030 Future Background Operations

Figure 14 illustrates the 2030 background volumes and Table 15 summarizes the 2030 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2030 future background horizon are provided in Appendix I. The signalization warrant for the Innes Road and Lamarche Avenue intersection is provided in Appendix D.

Figure 14: 2030 Future Background Volumes

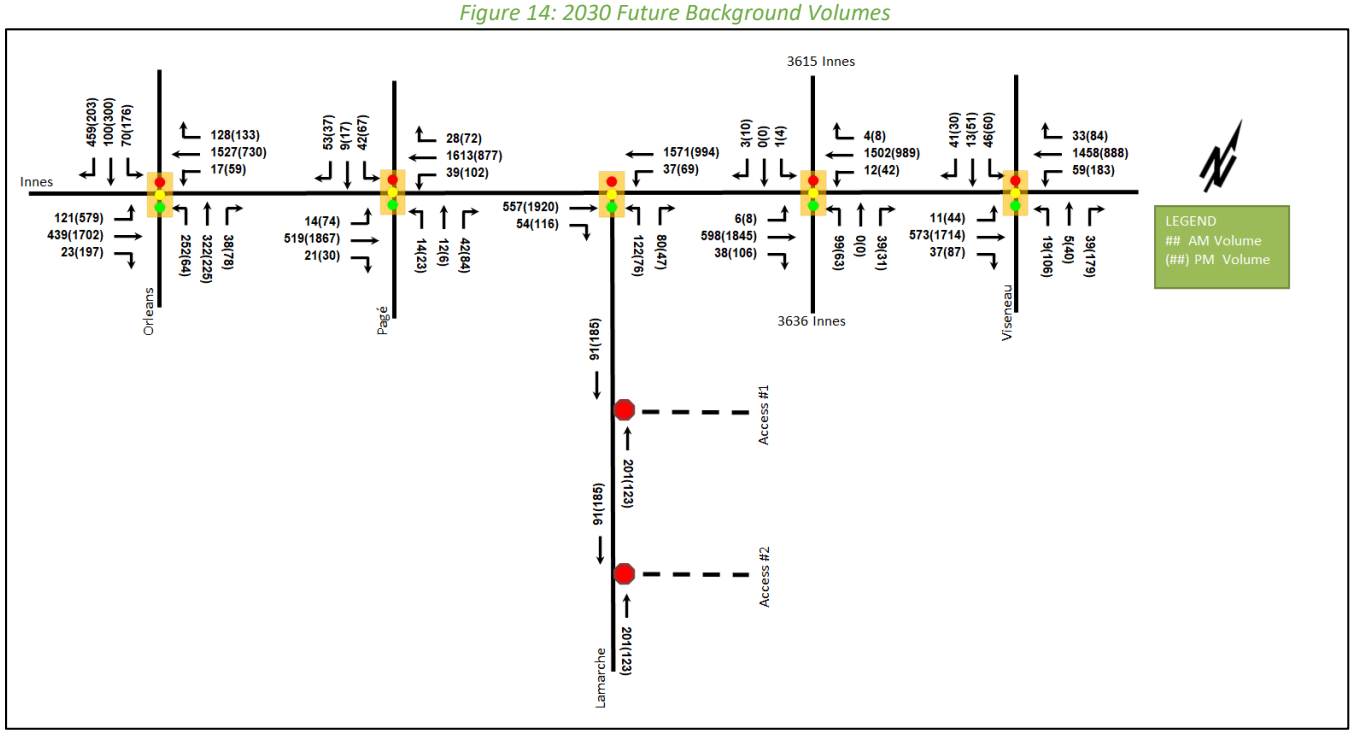


Table 15: 2030 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Orleans Boulevard *Signalized*	EBL	C	0.77	**90.3**	**#31.4**	D	0.86	55.6	**#82.8**
	EBT	A	0.26	19.3	48.6	**F**	**1.21**	**133.8**	**#291.2**
	EBR	A	0.03	0.1	0.0	A	0.29	6.5	18.8
	WBL	A	0.21	65.5	12.2	A	0.46	51.1	27.2
	WBT	**F**	**1.02**	**63.5**	**#260.2**	D	0.83	66.3	**#114.1**
	WBR	A	0.18	3.0	8.6	A	0.24	12.2	25.6
	NBL	B	0.63	41.4	73.7	A	0.21	26.2	18.8
	NBT	A	0.28	31.4	43.0	A	0.19	25.7	26.6
	NBR	A	0.07	0.3	0.0	A	0.13	0.4	0.0
	SBL	A	0.37	51.3	30.6	B	0.64	50.1	**#65.2**
	SBT	A	0.15	43.4	19.2	A	0.35	35.4	41.1
	SBR	**F**	**1.13**	**116.7**	**#170.7**	A	0.38	5.4	13.5
	Overall	**F**	**1.02**	**57.2**	**-**	**F**	**1.03**	**77.0**	**-**
Innes Road at Page Road *Signalized*	EBL	A	0.10	9.7	4.5	A	0.22	2.3	m1.8
	EBT/R	A	0.22	6.4	35.4	D	0.81	13.1	m21.4
	WBL	A	0.07	6.5	m5.4	**F**	**1.29**	**214.3**	**m#60.4**
	WBT/R	B	0.68	17.9	240.6	A	0.41	3.6	m21.4
	NB	A	0.26	20.2	16.0	A	0.43	37.3	31.3
	SB	A	0.43	33.3	28.0	A	0.51	39.0	33.3
	Overall	**B**	**0.62**	**15.8**	-	**F**	**1.12**	**18.2**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Signalized*	EBT	A	0.27	10.0	33.2	**F**	**1.09**	**73.3**	**#284.1**
	EBR	A	0.06	9.5	9.2	A	0.15	15.1	m13.3
	WBL	A	0.44	71.1	m15.4	E	0.92	**132.1**	**#42.7**
	WBT	B	0.69	12.0	91.2	A	0.47	13.4	105.6
	NBL	D	0.90	**108.6**	**#64.5**	E	0.97	**148.9**	**#46.0**
	NBR	A	0.26	43.0	30.4	A	0.13	33.5	17.5
	Overall	**B**	**0.69**	**18.3**	-	**D**	**0.86**	**55.2**	-
Innes Road at Access 3615 Innes Road/3636 Innes Road *Signalized*	EBL	A	0.03	3.7	m0.8	A	0.02	2.4	m0.5
	EBT/R	A	0.25	3.1	15.8	C	0.74	13.6	m218.2
	WBL	A	0.02	7.5	m2.3	A	0.40	21.8	**#22.3**
	WBT/R	A	0.59	9.7	142.5	A	0.38	5.2	64.7
	NBL	A	0.57	60.6	36.3	A	0.38	49.0	22.6
	NBT/R	A	0.08	0.3	0.0	A	0.14	14.1	7.5
	SB	A	0.02	0.2	0.0	A	0.07	4.5	2.2
	Overall	**A**	**0.59**	**9.9**	-	**C**	**0.72**	**11.7**	-
Innes Road at Viseneau Drive *Signalized*	EBL	A	0.05	6.7	1.4	A	0.15	18.8	14.6
	EBT	A	0.23	5.1	20.4	D	0.90	33.4	**#302.0**
	EBR	A	0.04	0.1	0.0	A	0.10	2.4	6.1
	WBL	A	0.10	5.2	9.6	C	0.75	50.7	56.5
	WBT/R	A	0.58	8.3	130.7	A	0.40	7.5	68.1
	NBL	A	0.13	44.5	9.8	B	0.66	69.3	42.5
	NBT	A	0.02	40.6	4.2	A	0.15	45.0	18.2
	NBR	A	0.14	1.1	0.0	A	0.48	10.2	18.6
	SB	A	0.51	42.3	28.9	B	0.62	58.1	49.7
	Overall	**B**	**0.62**	**9.1**	-	**D**	**0.85**	**27.1**	-

Notes:
Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

In general, the study area intersections will operate similar to the 2025 conditions, with decreasing operations due to the background growth and background development.

The westbound through movement at the intersection of Innes Road and Orleans Boulevard will become over theoretical capacity and may be subject to high delays and extended queues during AM peak hour.

At the intersection of Innes Road at Lamarche Avenue during PM peak hour, with the 3484 Innes Road, 240 & 270 Lamarche Avenue background development volumes, the eastbound through movement will become over theoretical capacity and may be subject to high delays and extended queues. The operations are influenced by the expected protection for the cycling and pedestrian crossings, as it reduces the available green time for the auto movements.

The westbound left-turn movement at the intersection of Innes Road at Access 3615 Innes Road/3636 Innes Road may be subject to extended queues during PM peak hour.

7.2.1 2030 Future Background Operations - Unsignalized Innes and Lamarche Intersection

As an additional sensitivity was requested by City of Ottawa staff, the intersection of Innes Road and Lamarche Avenue has been assessed for the 2030 future background conditions assuming it remains as an unsignalized intersection. Table 16 summarizes the intersection operations and the synchro worksheets are provided in Appendix I.

Table 16: 2030 Future Background Operations- Unsignalized Intersection of Innes Road and Lamarche Avenue

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.04	8.9	0.8	C	0.25	22.5	7.5
	WBT	-	-	-	-	-	-	-	-
	NB	D	0.61	31.7	28.5	**F**	**1.41**	**326.6**	**70.5**
	Overall	**A**	**-**	**0.8**	**-**	**B**	**-**	**13.0**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The northbound movement may be subject to high delays during PM peak when the intersection is unsignalized. Compared to the existing condition, the delay will increase from 57.8 seconds to 326.6 seconds during the PM peak hour. The intersection is recommended to be signalized by 2025 to provide acceptable operations for the northbound approach.

7.3 Modal Share Sensitivity and Demand Rationalization Conclusions

Capacity constraints have been noted along Innes Road during the existing and background horizons, which are subject to regional travel not associated with the development traffic. Given the forecasted auto trips are low, they are not anticipated to be contributing factors to the area operations. No further demand rationalization is required for this development.

8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a residential subdivision where each dwelling will include a driveway and the typical townhomes will include a garage. Bicycle parking is assumed to be within the individual units. On-street parking will be provided along all new subdivision roadways. The existing Lamarche Avenue is expected to provide additional on-street parking opportunities. Figure 15 illustrates the pedestrian concept network with connections to adjacent pedestrian facilities, and Figure 16 illustrates the on-street parking plan.

Figure 15: Concept Pedestrian Network

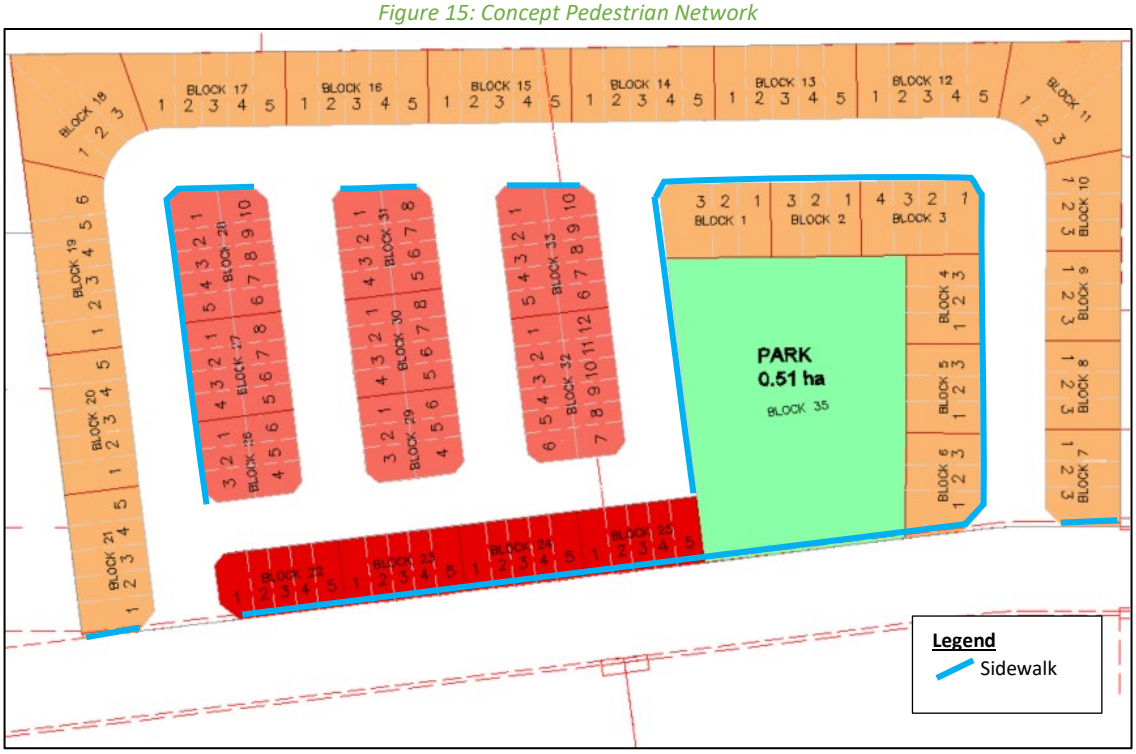
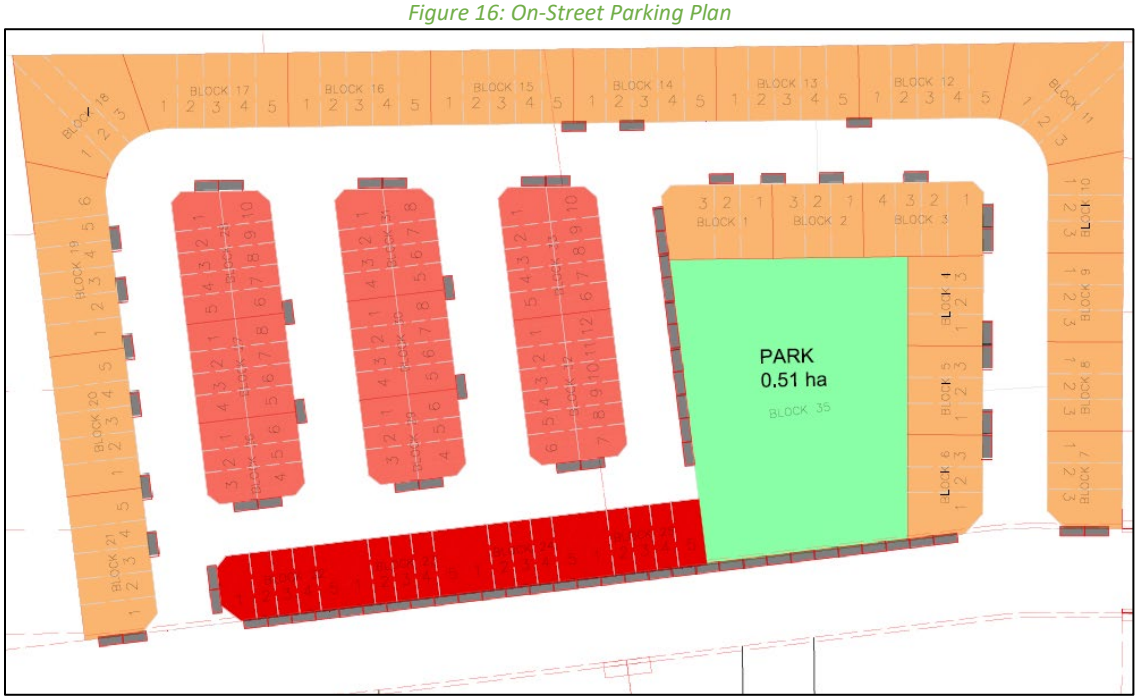


Figure 16: On-Street Parking Plan



8.2 New Street Networks

The planned street network will include 18-metre local roadways and a 14.75-metre laneway. The local roads will accommodate on-street parking. The local roads are proposed to be posted as 30 km/h.

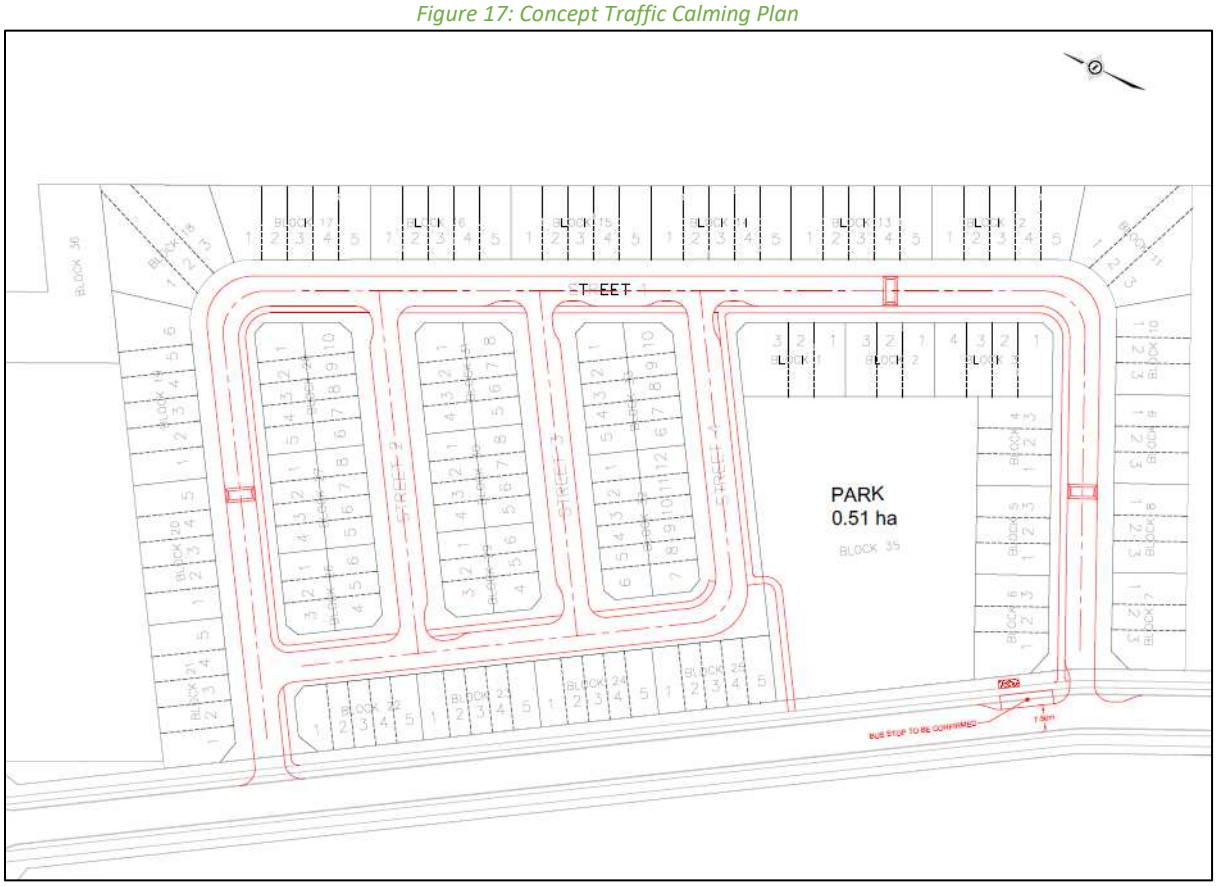
The new local intersections with Lamarche Avenue are proposed are the north and south ends of the subdivision limits. The north intersection is located approximately 50 metres south of Innes Road and over 30 metres north

of the proposed access from the 3484 Innes Road, 240 & 270 Lamarche Avenue site on the west side of Lamarche Avenue. Similarly, the south intersection is located beyond the 30 metre offset requirements from the west side development and previously approved roadways within the community. The proposed signalization of the Innes Road and Lamarche Avenue intersection will need to consider the storage length and taper requirements for this turn lane to avoid undue impacts to both the subject property roadways and the west side development access.

The internal road intersections are recommended to be stop-controlled on the minor approaches of all intersections.

To support the pedestrian and cycling connectivity within the subdivision, Figure 17 illustrates the concept traffic calming plan. Traffic calming elements are recommended at the internal intersections, including bulb-outs to narrow each approach to the intersection (e.g. reduced crossing distance). The location of speed humps is subject to minor changes and will need to be refined as part of the detailed engineering submission once the locations of the driveway, stormwater flows, surface ponding, and servicing elements, such as utilities and fire hydrants, have been established.

Figure 17: Concept Traffic Calming Plan



9 Boundary Street Design

Table 17 summarizes the MMLOS analysis for the boundary streets of Lamarche Avenue. The boundary street analysis is based on the land use of general urban area. The MMLOS worksheets has been provided in Appendix J.

Table 17: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Lamarche Avenue (Existing/ Future)	A	C	A	D	N/A	N/A	N/A	N/A

Lamarche Avenue meets MMLOS targets for the area and no mitigation or additional elements are required.

10 Access Intersections Design

10.1 Location and Design of Access

The residential accesses will connect to the adjacent road network via local roads connection to Lamarche Avenue. Within the subdivision, no turn lanes are proposed for the internal intersections which will be controlled by minor stop control.

10.2 Intersection Control

Based upon the projected volumes, the site accesses will have stop-control on the minor approach. No further traffic control is necessary to address operational issues.

10.3 Access Intersection Design

10.3.1 2025 Future Total Access Intersection Operations

The 2025 future total intersection volumes are illustrated in Figure 18 and the access intersection operations are summarized below in Table 18. Synchro 11 has been used to model the unsignalized intersections and HCM 2010 methodology was used for unsignalized intersection operations. The synchro worksheets have been provided in Appendix K.

Figure 18: 2025 Future Total Volumes

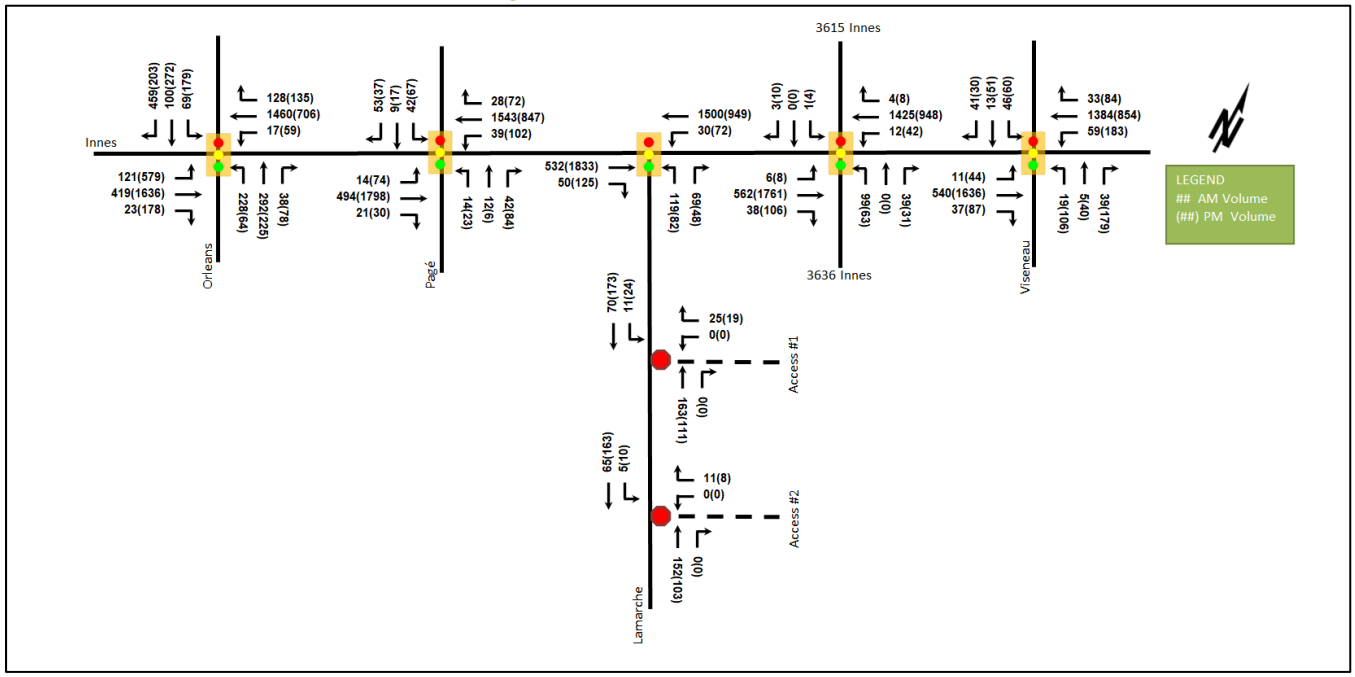


Table 18: 2025 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Access #1 at Lamarche Avenue *Unsignalized*	WB	A	0.03	9.5	0.8	A	0.02	8.9	0.8
	NB	-	-	-	-	-	-	-	-
	SB	A	0.01	7.7	0.0	A	0.02	7.5	0.0
	Overall	**A**	**-**	**0.9**	**-**	**A**	**-**	**1.1**	**-**
Access #2 at Lamarche Avenue *Unsignalized*	WB	A	0.01	9.3	0.0	A	0.01	8.8	0.0
	NB	-	-	-	-	-	-	-	-
	SB	A	0.00	7.6	0.0	A	0.01	7.4	0.0
	Overall	**A**	**-**	**0.5**	**-**	**A**	**-**	**0.5**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The 2025 future total access intersections operate satisfactorily.

10.3.2 2030 Future Total Access Intersection Operations

The 2030 future total intersection volumes are illustrated in Figure 19 and the access intersection operations are summarized below in Table 19. Synchro 11 has been used to model the unsignalized intersections and HCM 2010 methodology was used for unsignalized intersection operations. The synchro worksheets have been provided in Appendix L.

Figure 19: 2030 Future Total Volumes

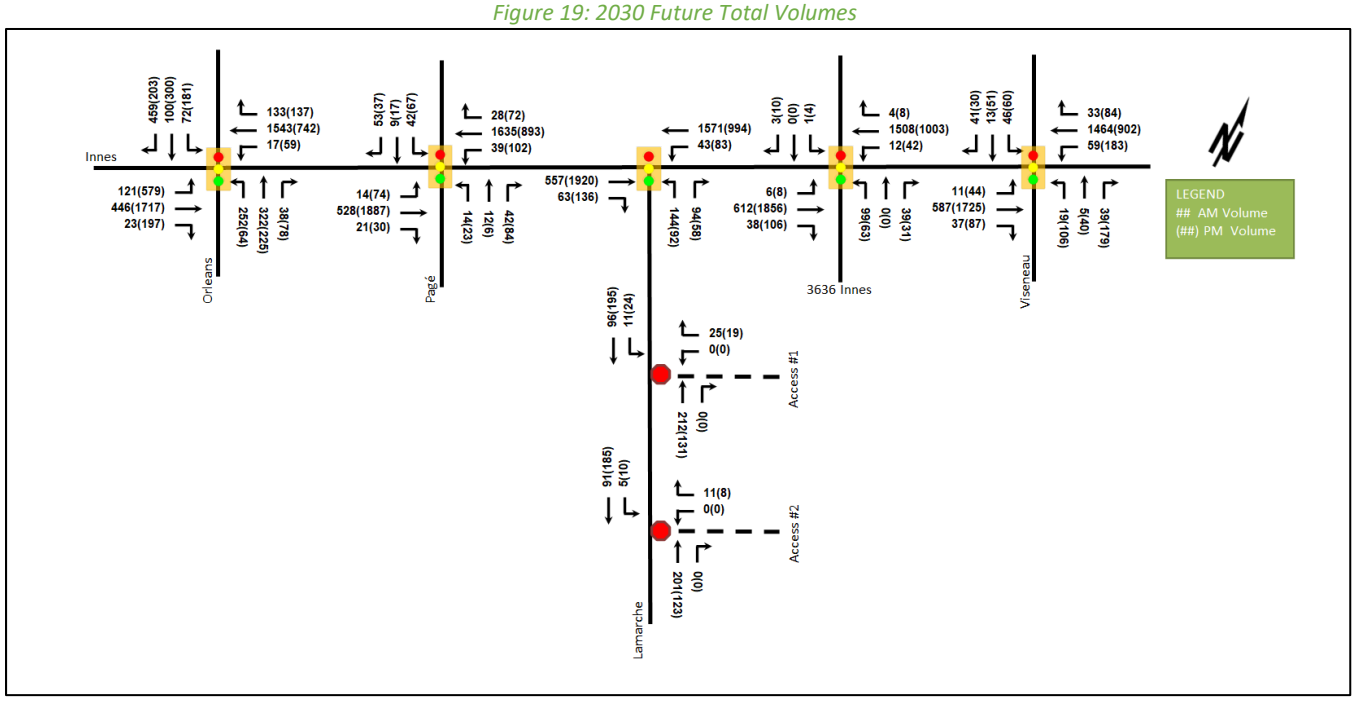


Table 19: 2030 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Access #1 at Lamarche Avenue *Unsignalized*	WB	A	0.03	9.5	0.8	A	0.02	9.0	0.8
	NB	-	-	-	-	-	-	-	-
	SB	A	0.01	7.7	0.0	A	0.02	7.5	0.8
	Overall	**A**	**-**	**0.9**	**-**	**A**	**-**	**0.9**	**-**
Access #2 at Lamarche Avenue *Unsignalized*	WB	A	0.01	9.3	0.0	A	0.01	8.9	0.0
	NB	-	-	-	-	-	-	-	-
	SB	A	0.00	7.6	0.0	A	0.01	7.5	0.0
	Overall	**A**	**-**	**0.5**	**-**	**A**	**-**	**0.5**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The 2030 future total access intersections operate satisfactorily.

10.3.3 Access Intersection MMLOS

The access intersections are proposed to as minor stop-controlled intersections, therefore no access intersection MMLOS analysis has been conducted.

10.3.4 Recommended Design Elements

No changes to the site accesses are proposed.

11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA represent the unmodified district mode shares. Overall, the modal shares are likely to be achieved and supporting TDM measures should be provided to encourage shifts towards sustainable modes.

The subject site is not within a design priority area. The total bedroom count within the development is subject to the final unit breakdown and layout selections by purchasers. No age restrictions are noted.

11.2 Need and Opportunity

The subject site has been assumed to rely predominantly on auto travel and those assumptions have been carried through the analysis. As the unmodified district mode shares have been applied, risks to other network users from failing to meet mode share targets are low.

11.3 TDM Program

The “suite of post occupancy TDM measures” has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix M. The key TDM measures recommended include:

- Inclusion of a 1-year Presto card for first time new townhome purchase, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
- Provide a multimodal travel option information package to new residents

12 Transit

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 20 summarizes the transit trip generation.

Table 20: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	Varies	11	26	37	17	14	31

The proposed development is anticipated to generate an additional 37 AM peak hour transit trips and 31 PM peak hour transit trips. Of these trips, 26 outbound AM trips and 17 inbound PM trips are anticipated. From the trip distribution found in Section 5.2, these values can be further broken down. Site-generated outbound AM trips break down to 16 trips west from the site and ten trips east from the site.

All trips are assumed to be served by bus route #25, which provides four buses in the peak hour/ direction. Overall, the forecasted new transit trips would result in an averaged increase of under three additional riders per bus. Therefore, no service changes are anticipated as being required to accommodate site-generated transit trips.

12.1 Transit Priority

Examining the study area intersection delays, negligible impacts are noted on most of transit movements at the study area intersections as a result of the development site traffic except for the eastbound through movement at Innes Road at Lamarche Avenue intersection. Ultimately, the transit delay at this intersection will be subject to the cycling and pedestrian crossing locations and types.

13 Network Intersection Design

13.1 Network Intersection Control

The intersection of Innes Road at Lamarche Avenue is not expected to meet signalization warrants by 2030 despite the expected front ending in 2025. Operationally, the existing intersection would benefit from the improvement to signal control and is still recommended to be carried forward by the City by 2025. The signal warrants for the 2025 and 2030 future total horizons are provided in Appendix D.

13.2 Network Intersection Design

13.2.1 2025 Future Total Network Intersection Operations

The 2025 future total network intersection operations are summarized below in Table 21. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets have been provided in Appendix L.

Table 21: 2025 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Orleans Boulevard *Signalized*	EBL	C	0.77	**90.3**	**#31.4**	D	0.86	55.6	**#82.8**
	EBT	A	0.26	19.3	49.4	**F**	**1.17**	**114.5**	**#275.6**
	EBR	A	0.03	0.1	0.0	A	0.26	5.3	15.3
	WBL	A	0.21	65.5	12.2	A	0.46	51.3	27.1
	WBT	**F**	**1.03**	**66.4**	**#264.7**	C	0.80	64.7	**#107.6**
	WBR	A	0.18	3.3	9.7	A	0.24	12.6	26.2
	NBL	B	0.63	41.4	73.7	A	0.20	26.1	18.8
	NBT	A	0.28	31.4	43.0	A	0.19	25.7	26.6
	NBR	A	0.07	0.3	0.0	A	0.13	0.4	0.0
	SBL	A	0.38	51.6	31.4	B	0.66	50.7	**#67.0**
	SBT	A	0.15	43.4	19.2	A	0.31	35.0	37.4
	SBR	**F**	**1.13**	**116.7**	**#170.7**	A	0.38	5.4	13.5
	Overall	**F**	**1.02**	**58.3**	**-**	**E**	**1.00**	**69.1**	**-**
Innes Road at Page Road *Signalized*	EBL	A	0.10	9.9	4.5	A	0.21	2.3	m1.9
	EBT/R	A	0.23	6.5	36.1	C	0.78	9.7	m22.3
	WBL	A	0.07	7.1	m5.7	**F**	**1.12**	**151.5**	**m#57.6**
	WBT/R	B	0.68	19.6	242.0	A	0.40	3.8	m22.6
	NB	A	0.26	20.2	16.0	A	0.43	36.0	30.8
	SB	A	0.43	33.7	28.2	A	0.51	39.0	33.3
	Overall	**B**	**0.63**	**17.0**	**-**	**E**	**0.98**	**14.5**	**-**
Innes Road at Lamarche Avenue *Signalized*	EBT	A	0.28	11.7	35.3	**F**	**1.04**	**65.3**	**#262.7**
	EBR	A	0.07	10.9	11.2	A	0.16	15.0	m15.0
	WBL	A	0.45	70.0	m17.9	E	0.96	**142.7**	**#44.4**
	WBT	B	0.69	13.0	90.6	A	0.45	12.8	96.5
	NBL	D	0.85	**91.5**	**#68.6**	**F**	**1.09**	**181.4**	**#50.3**
	NBR	A	0.30	43.0	34.2	A	0.13	33.6	17.8
	Overall	**C**	**0.72**	**19.4**	**-**	**D**	**0.84**	**51.6**	**-**
Innes Road at Access 3615 Innes Road/3636 Innes Road *Signalized*	EBL	A	0.03	3.8	m0.8	A	0.02	2.4	m0.5
	EBT/R	A	0.26	3.2	16.6	C	0.71	11.8	m219.3
	WBL	A	0.02	7.4	m2.3	A	0.34	16.7	16.4
	WBT/R	A	0.60	9.8	143.4	A	0.36	5.1	61.1
	NBL	A	0.57	60.6	36.3	A	0.38	49.0	22.6
	NBT/R	A	0.08	0.3	0.0	A	0.14	14.1	7.5
	SB	A	0.02	0.2	0.0	A	0.07	4.5	2.2
	Overall	**A**	**0.59**	**9.9**	**-**	**B**	**0.69**	**10.5**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Viseneau Drive *Signalized*	EBL	A	0.06	7.0	1.5	A	0.14	18.7	14.5
	EBT	A	0.26	5.1	30.2	D	0.85	30.7	**#280.1**
	EBR	A	0.04	0.1	0.0	A	0.10	2.4	6.1
	WBL	A	0.10	5.3	9.6	C	0.72	44.3	53.9
	WBT/R	A	0.59	8.5	135.6	A	0.39	7.4	64.9
	NBL	A	0.13	44.5	9.8	B	0.66	69.3	42.5
	NBT	A	0.02	40.6	4.2	A	0.15	45.0	18.2
	NBR	A	0.14	1.1	0.0	A	0.48	10.2	18.6
	SB	A	0.51	42.3	28.9	B	0.62	58.1	49.7
	Overall	**B**	**0.62**	**9.1**	**-**	**E**	**0.82**	**25.5**	**-**

Notes:
Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

Overall, the study area intersections operate similar to the existing and background conditions.

The peak operations in the eastbound direction along Innes Road will be at or over capacity at a number of locations and is a result on the background conditions for the corridor. The site traffic will contribute less than 2% of the total eastbound volumes and should be an acceptable increase for any roadway. The volumes along Innes Road may be reduced once the LRT is active and could be further reduced once Brian Coburn Boulevard is extended west to Blair Road. No mitigation is required for the subject site.

13.2.2 2025 Future Total Operations - Unsignalized Innes and Lamarche Intersection

As an additional sensitivity was requested by City of Ottawa staff, the intersection of Innes Road and Lamarche Avenue has been assessed for the 2025 future total conditions assuming it remains as an unsignalized intersection. Table 22 summarizes the intersection operations and the synchro worksheets are provided in Appendix L.

Table 22: 2025 Future Total Operations- Unsignalized Intersection of Innes Road and Lamarche Avenue

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.03	8.8	0.8	C	0.25	21.2	6.8
	WBT	-	-	-	-	-	-	-	-
	NB	D	0.55	27.5	23.3	**F**	**1.37**	**299.6**	**71.3**
	Overall	**A**	**-**	**2.4**	**-**	**B**	**-**	**13.0**	**-**

Notes:
Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The northbound movement may be subject to high delays during PM peak when the intersection is unsignalized. Compared to the 2025 future background condition, the delay will increase from 169.2 seconds to 299.6 seconds during the PM peak hour.

13.2.3 2030 Future Total Network Intersection Operations

The 2030 future total network intersection operations are summarized below in Table 23. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets have been provided in Appendix M.

Table 23: 2030 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Orleans Boulevard ***Signalized***	EBL	C	0.77	**90.3**	**#31.4**	D	0.86	55.6	**#82.8**
	EBT	A	0.26	19.3	49.4	**F**	**1.23**	**138.3**	**#294.7**
	EBR	A	0.03	0.1	0.0	A	0.29	6.5	18.8
	WBL	A	0.21	65.5	12.2	A	0.46	50.9	27.4
	WBT	**F**	**1.03**	**66.4**	**#264.7**	D	0.84	66.6	**#117.0**
	WBR	A	0.18	3.3	9.7	A	0.25	12.7	26.4
	NBL	B	0.63	41.4	73.7	A	0.21	26.2	18.8
	NBT	A	0.28	31.4	43.0	A	0.19	25.7	26.6
	NBR	A	0.07	0.3	0.0	A	0.13	0.4	0.0
	SBL	A	0.38	51.6	31.4	B	0.66	51.2	**#68.0**
	SBT	A	0.15	43.4	19.2	A	0.35	35.4	41.1
	SBR	**F**	**1.13**	**116.6**	**#170.3**	A	0.38	5.4	13.5
	Overall	**F**	**1.02**	**58.3**	**-**	**F**	**1.04**	**78.9**	**-**
Innes Road at Page Road ***Signalized***	EBL	A	0.10	9.9	4.5	A	0.22	2.3	m1.8
	EBT/R	A	0.23	6.5	36.1	D	0.82	14.0	m21.8
	WBL	A	0.07	6.4	m5.7	**F**	**1.34**	**238.4**	**m#60.4**
	WBT/R	B	0.68	17.7	236.0	A	0.42	3.8	m23.0
	NB	A	0.26	20.2	16.0	A	0.43	37.7	31.5
	SB	A	0.43	33.7	28.2	A	0.51	39.0	33.3
	Overall	**B**	**0.63**	**15.7**	**-**	**F**	**1.17**	**19.4**	**-**
Innes Road at Lamarche Avenue ***Signalized***	EBT	A	0.28	11.4	36.2	**F**	**1.09**	**73.2**	**#283.9**
	EBR	A	0.07	11.0	11.4	A	0.17	15.2	m15.5
	WBL	A	0.41	65.7	m17.8	**F**	**1.11**	**180.4**	**#52.6**
	WBT	B	0.67	12.3	90.4	A	0.47	13.4	106.1
	NBL	C	0.72	71.0	54.0	**F**	**1.18**	**204.4**	**#55.9**
	NBR	A	0.33	44.4	34.2	A	0.16	34.1	20.5
	Overall	**C**	**0.71**	**17.6**	**-**	**D**	**0.89**	**58.4**	**-**
Innes Road at Access 3615 Innes Road/3636 Innes Road ***Signalized***	EBL	A	0.03	3.7	m0.8	A	0.02	2.4	m0.5
	EBT/R	A	0.26	3.2	15.9	C	0.74	13.5	m219.5
	WBL	A	0.02	7.4	m2.3	A	0.41	23.3	#22.8
	WBT/R	A	0.60	9.8	143.4	A	0.38	5.3	65.9
	NBL	A	0.57	60.6	36.3	A	0.38	49.0	22.6
	NBT/R	A	0.08	0.3	0.0	A	0.14	14.1	7.5
	SB	A	0.02	0.2	0.0	A	0.07	4.5	2.2
	Overall	**B**	**0.59**	**9.9**	**-**	**C**	**0.73**	**11.6**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Viseneau Drive *Signalized*	EBL	A	0.06	7.0	1.5	A	0.15	18.9	14.6
	EBT	A	0.26	5.1	29.6	D	0.90	33.8	**#305.3**
	EBR	A	0.04	0.1	0.0	A	0.10	2.4	6.1
	WBL	A	0.10	5.3	9.6	C	0.75	50.7	56.5
	WBT/R	A	0.59	8.5	135.6	A	0.41	7.6	69.5
	NBL	A	0.13	44.5	9.8	B	0.66	69.3	42.5
	NBT	A	0.02	40.6	4.2	A	0.15	45.0	18.2
	NBR	A	0.14	1.1	0.0	A	0.48	10.2	18.6
	SB	A	0.51	42.3	28.9	B	0.62	58.1	49.7
	Overall	**B**	**0.62**	**9.1**	**-**	**D**	**0.85**	**27.3**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The 2030 future total conditions are expected to operate similar to the background conditions.

At the intersection of Innes Road at Lamarche Avenue during the PM peak hour, the westbound and northbound left-turn movements will become over theoretical capacity and may be subject to high delays and extended queues. The site traffic will contribute less than 2% of the total eastbound and westbound volumes and should be an acceptable increase for any roadway. As discussed in Section 13.2.1, the PM peak eastbound volumes are near capacity on Innes Road and would require a regional solution, such as the LRT or Brian Coburn Boulevard to address potential capacity constraints.

13.2.4 2030 Future Total Operations - Unsignalized Innes and Lamarche Intersection

As an additional sensitivity was requested by City of Ottawa staff, the intersection of Innes Road and Lamarche Avenue has been assessed for the 2030 future total conditions assuming it remains as an unsignalized intersection. Table 24 summarizes the intersection operations and the synchro worksheets are provided in Appendix M.

Table 24: 2030 Future Total Operations- Unsignalized Intersection of Innes Road and Lamarche Avenue

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Innes Road at Lamarche Avenue *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.05	8.9	0.8	C	0.31	24.2	9.8
	WBT	-	-	-	-	-	-	-	-
	NB	E	0.74	41.5	41.3	**F**	**1.95**	**559.2**	**99.8**
	Overall	**A**	**-**	**4.1**	**-**	**F**	**-**	**26.2**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The northbound movement may be subject to high delays during PM peak when the intersection is unsignalized. Compared to the 2030 future background condition, the delay will be increased from 326.6 seconds to 559.2 seconds during the PM peak hour. The intersection is recommended to be signalized by 2025 to provide acceptable operations for the northbound approach.

13.2.5 Network Intersection MMLOS

Table 25 summarizes the MMLOS analysis for the network intersections within the study area. The existing and future conditions for both intersections will be the same and are considered in one row. The intersection analysis

of Innes Road at Orleans Boulevard is based on the land use of general urban area, and other intersections analysis are based on the land use of arterial main street. The MMLOS worksheets has been provided in Appendix J.

Table 25: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Innes Road at Orleans Boulevard	F	C	F	B	F	D	A	D	F	D
Innes Road at Page Road	F	C	F	B	C	D	N/A	N/A	F	D
Innes Road at Lamarche Avenue (Future)	E	C	A	B	F	D	N/A	N/A	D	D
Innes Road at Access 3615 Innes Road/3636 Innes Road	F	C	F	B	B	D	N/A	N/A	C	D
Innes Road at Viseneau Drive	F	C	F	B	F	D	N/A	N/A	D	D

The pedestrian LOS targets will not be met at the existing or future intersections within the study area. As typical for arterial roads, the crossing distance does not permit the targets to be met. To meet pedestrian LOS targets, the maximum crossing distance would need to be reduced to three lane-widths on all pedestrian crossings.

The bicycle LOS targets will not be met at the existing or future intersections within the study area expect for the future Innes Road at Lamarche Avenue intersection. To meet bicycle LOS targets, the left-turn configurations would need to be two-stage, turn boxes or protected facilities.

The transit LOS targets will not be met in the existing or future condition at the intersections of Innes Road at Orleans Boulevard and Innes Road at Viseneau Drive and in the future condition of Innes Road at Lamarche Avenue intersection. To meet transit LOS, the delay at the intersections would need to be reduced to below 30 seconds.

The auto LOS targets will not be met in the existing or future condition at the intersections of Innes Road at Orleans Boulevard and Innes Road at Page Road. To meet auto LOS, the volume to capacity ratio to less or equal to 0.90.

The improvements for these intersections are not the responsibility of the development and are provide for the City's planning. The intersection of Innes Road at Lamarche Avenue is currently being reviewed and the exact facilities will be subject to the approval of a roadway modification approval.

13.2.6 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

14 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The proposed site includes 103 townhomes and 68 back-to-backs dwellings
- Two accesses on Lamarche Avenue will be provided
- The development is proposed to be completed as a single phase by 2025
- The trip generation, location, and safety triggers were met for the TIA Screening

Existing Conditions

- Innes Road and Orleans Boulevard are arterial roads, and Viseneau Drive is a collector road in the study area
- Sidewalks are provided along both sides of Innes Road, on the west side of Page Road, and on east side of Page Road for 205 metres south of Innes Road
- A MUP is provided on the west side of Lamarche Avenue
- Bike lanes along both side of Innes Road
- Innes Road, Orleans Boulevard are spine route, Page Road north of Innes Road is suggested route, and Innes Road is a cross-town bikeway
- The segments of Innes Road between Page Road and the 3615 Innes Road/3636 Innes Road access intersection, which is the only location noted to have experienced collisions, had a total of 16 collisions
- Capacity issues are noted at the intersections of Innes Road at Orleans Boulevard, Innes Road at Page Road, and Innes Road at Lamarche Avenue
- The Innes Road at Page Road intersection requires the City to review the signal timing and explore a protected/permissive phasing for the eastbound and westbound left-turn movements

Development Generated Travel Demand

- The proposed development is forecasted produce 118 two-way people trips during the AM peak hour and 122 two-way people trips during the PM peak hour
- Of the forecasted people trips, 53 two-way trips will be vehicle trips during the AM peak hour and 62 two-way trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 15 % are anticipated to travel north, 40 % to the east, and 45 % to the west

Background Conditions

- It is assumed that a 1.00% growth rate will be applied to Innes Road and a 2.00% growth rate will be applied on Orleans Boulevard in peak directions
- The study area intersections are expected to operate similar to the existing conditions in the 2025 and 2030 background horizons
- No demand rationalization was required for the site generated trips as they are forecasted to be low and not anticipated to be a contributing factor to the network constraints
- The intersection of Innes Road at Lamarche Avenue does not meet signal warrants in the future background horizons
- The Innes Road at Lamarche Avenue intersection is recommended to be signalized prior to 2025 due to operations for existing and future northbound movements
- Should the Innes Road at Lamarche Avenue intersection remain unsignalized, it is anticipated the delays for the northbound approach will increase to 31.7s during the AM peak and 326.6s during the PM peak by 2030, predominantly due to increased traffic along Innes Road

Development Design

- On-street parking will be provided along Lamarche Avenue and the subdivision roadways
- Traffic calming elements are recommended at the future internal road intersections including bulb-outs to narrow each approach to the intersection and reduce pedestrian crossing distances and speed humps

Boundary Street Design

- Lamarche Avenue meets MMLOS targets for the area and no mitigation or additional elements are required

Access Intersections Design

- The residential accesses will connect to the adjacent road network via local roads connection to Lamarche Avenue
- Within the subdivision, no turn lanes are proposed for the internal intersections which will be controlled by minor stop control
- The 2025 and 2030 future total access intersections operate satisfactorily

TDM

- Supportive TDM measures recommended to be considered within the future development include:
    - Inclusion of a 1-year Presto card for first time new townhome purchase, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
    - Provide a multimodal travel option information package to new residents

Transit

- The proposed development is anticipated to generate an additional 37 AM peak hour transit trips and 31 PM peak hour transit trips
- All trips are assumed to be served by bus route #25, which provides four buses in the peak hour/ direction
- No service changes are anticipated as being required to accommodate site-generated transit trips
- Negligible impacts are noted on most of transit movements at the study area intersections except for the eastbound through movement at Innes Road at Lamarche Avenue intersection, which is subject to the signalized intersection design and cycling/pedestrian facilities

Network Intersection Design

- The study area intersections are expected to operate similarly during the existing, background and future total horizons, and experiencing capacity constraints due to the volumes along Innes Road
- The site traffic will contribute less than 2% of the total eastbound and westbound volumes and should be an acceptable increase for any roadway
- The PM peak eastbound volumes are near capacity on Innes Road and would require a regional solution, such as the LRT or Brian Coburn Boulevard to address potential capacity constraints
- The intersection of Innes Road at Lamarche Avenue does not meet signal warrants in the future total horizons
- If the Innes Road at Lamarche Avenue intersection remain unsignalized, it is anticipated the delays for the northbound approach will increase to 41.5s during the AM peak and 559.2s during the PM peak by 2030
- The pedestrian LOS targets will not be met at the existing or future intersections within the study area, and no mitigation is recommended as the crossing distances would need to be reduced to equal or less than three lane widths
- Except for the future Innes Road at Lamarche Avenue intersection, the bicycle LOS targets will not be met at the existing or future intersections within the study area, and it is limited by the lack of dedicated facilities and improved left-turn configurations

- The transit LOS targets will not be met in the existing or future condition at the intersections of Innes Road at Orleans Boulevard and Innes Road at Viseneau Drive and in the future condition of Innes Road at Lamarche Avenue intersection, and require the delay to be below 30 seconds
- The auto LOS targets will not be met in the existing or future condition at the intersections of Innes Road at Orleans Boulevard and Innes Road at Page Road, and require the volume to capacity ratio to be improved to less or equal to 0.90
- The cycling, transit and auto targets will require a regional solution by the City to implement addition cycling facilities at the area intersections and reduce Innes Road volumes to meet the capacity and delay targets

15 Conclusion

It is recommended that, from a transportation perspective, the proposed development applications proceed.

Prepared By:

Yu-Chu Chen, EIT
Transportation Engineering-Intern

Reviewed By:

Andrew Harte, P.Eng.
Senior Transportation Engineer

Appendix A

TIA Screening Form and PM Certification Form

6 Plaza Court
Ottawa, ON K2H 7W1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 25-Mar-22
Project Number: 2022-023

Project Reference: 245 and 275 Lamarche Avenue

1.1 Description of Proposed Development	
Municipal Address	245 and 275 Lamarche Avenue
Description of Location	Ward 2. South of Innes Road between 3615 Innes Road/3636 Innes Road Access and Lamarche Avenue
Land Use Classification	Development Reserve (DR)
Development Size	approximately 103 townhomes and 72 back-to-backs dwellings
Accesses	One access onto Innes Road
Phase of Development	Single
Buildout Year	2025
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	175	Units
Trip Generation Trigger	Yes	

1.3 Location Triggers	
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?	Yes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes
Location Trigger	Yes

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

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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at ___Ottawa_____ this __20__ day of _____September_____, 2018.
(City)

Name: _____Andrew Harte_____
(Please Print)

Professional Title: _____Professional Engineer_____

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

Office Contact Information (Please Print)
Address: 6 Plaza Court
City / Postal Code: Ottawa / K2H 7W1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

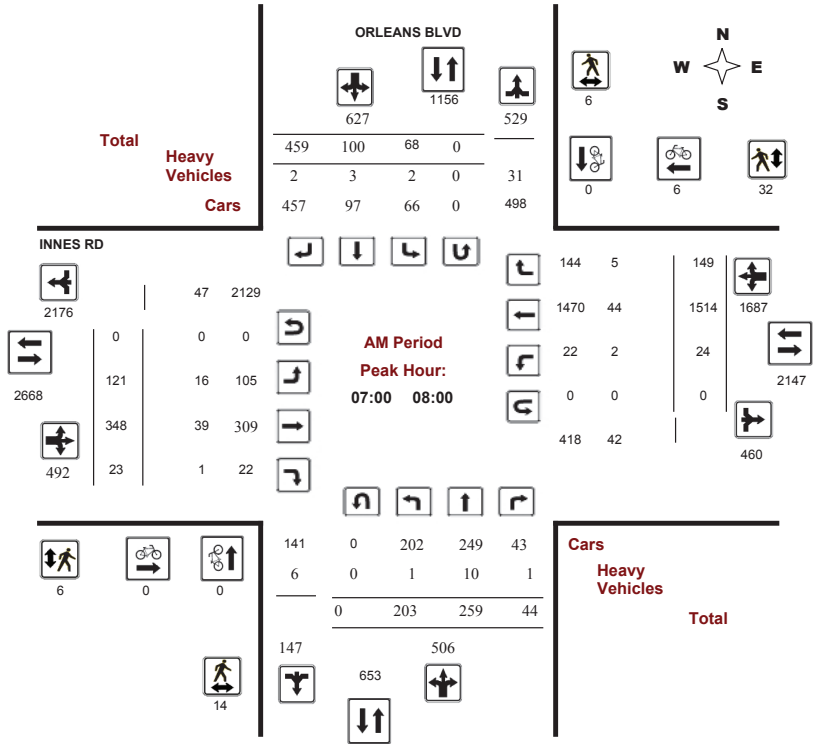
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ ORLEANS BLVD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36978

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



Comments

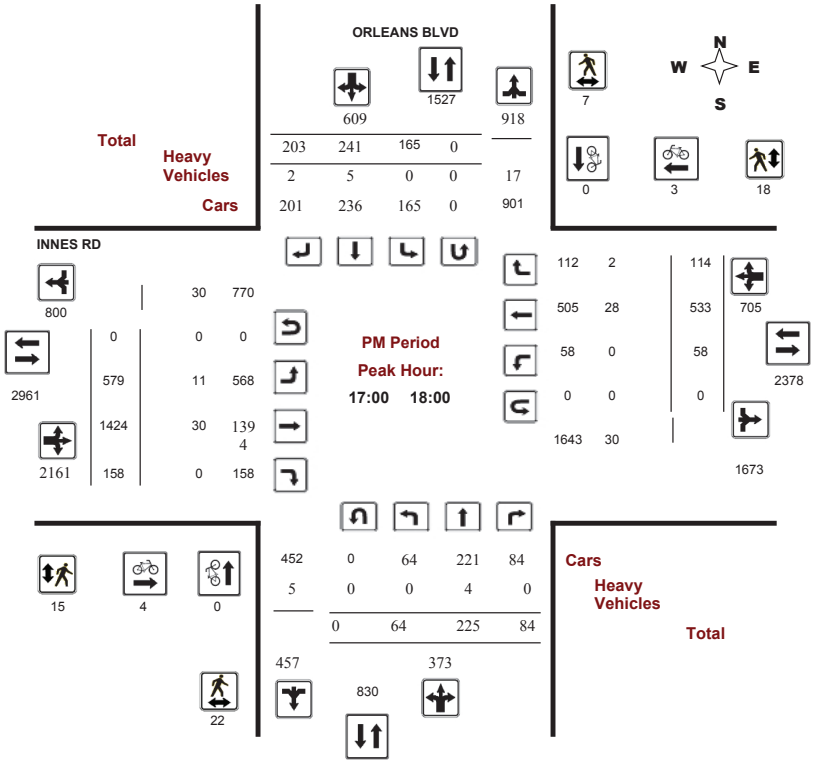
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ ORLEANS BLVD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36978

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



Comments

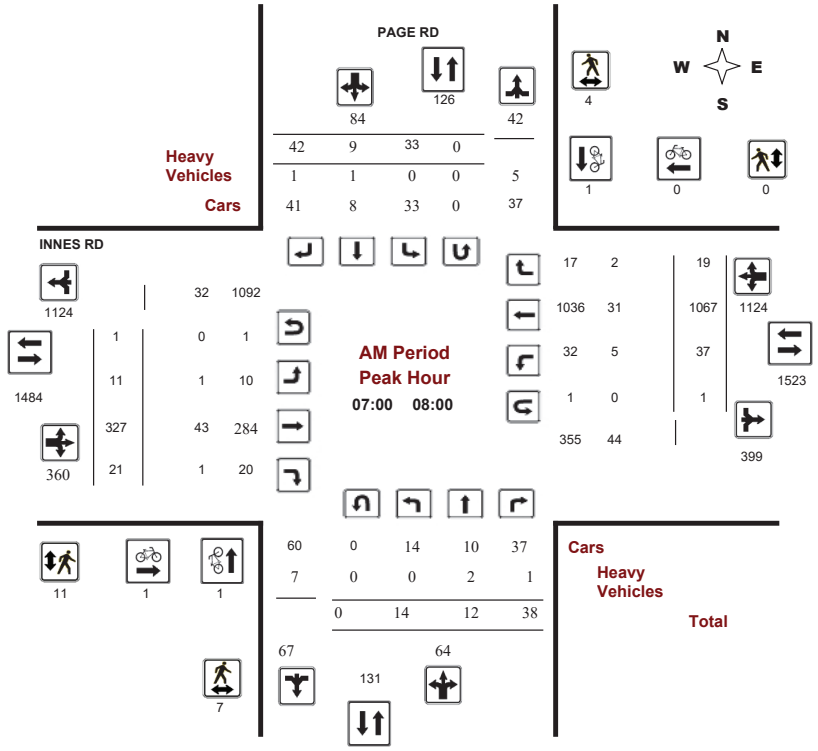
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

INNES RD @ PAGE RD

Survey Date: Tuesday, January 08, 2019 **WO No:** 38221

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



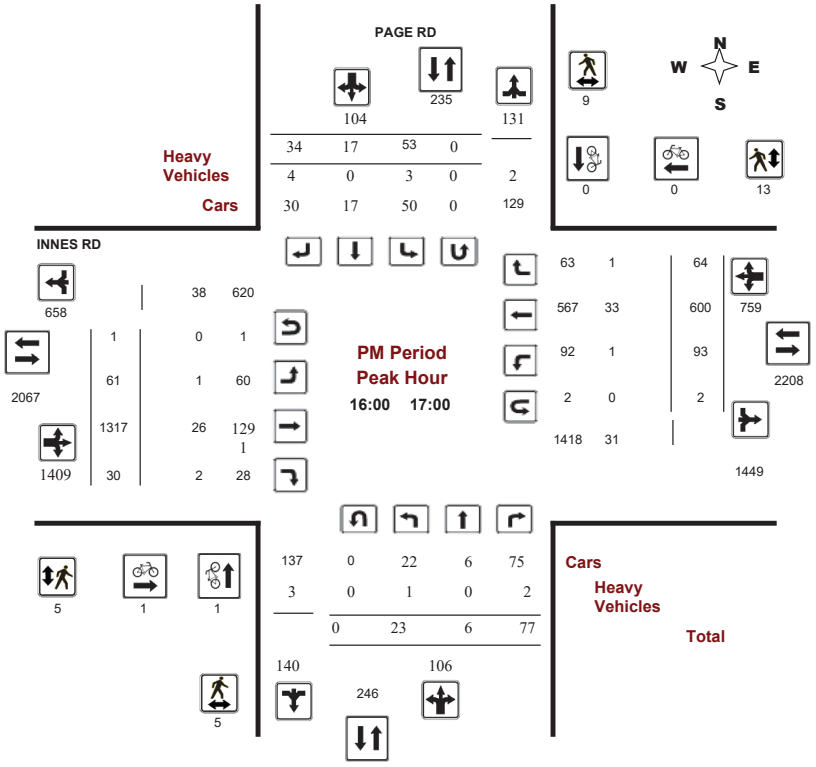
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

INNES RD @ PAGE RD

Survey Date: Tuesday, January 08, 2019 **WO No:** 38221

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



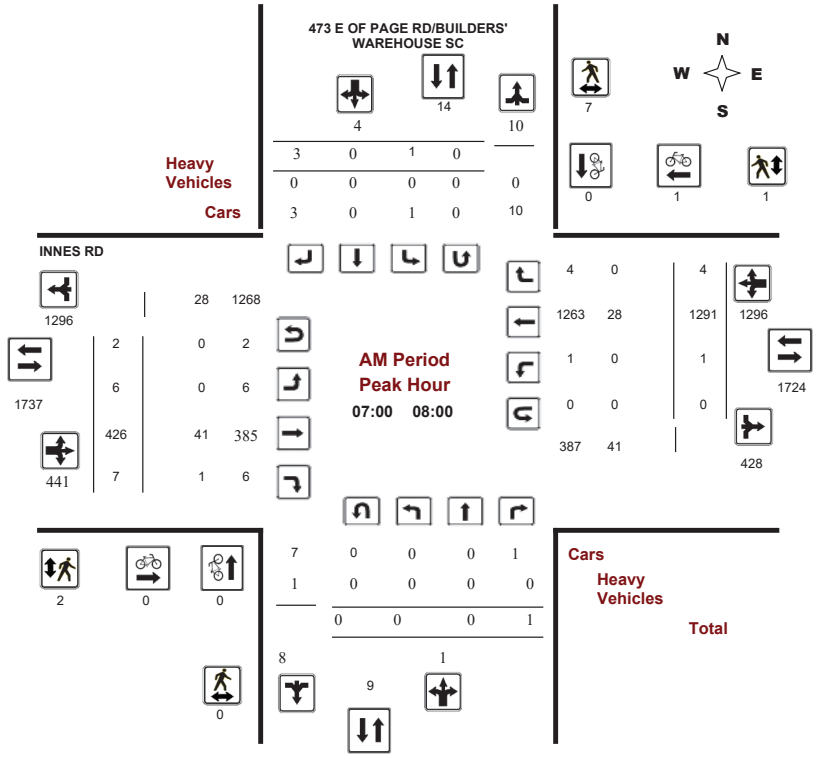
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

INNES RD @ 473 E OF PAGE RD/BUILDERS' WAREHOUS

Survey Date: Thursday, January 31, 2019 **WO No:** 38223

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



Comments

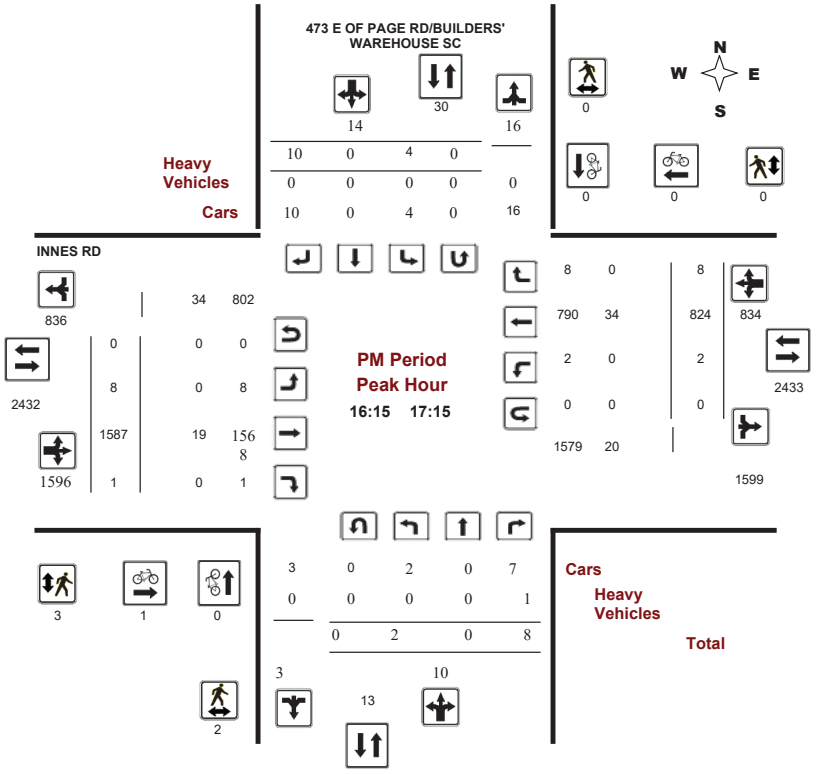
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

INNES RD @ 473 E OF PAGE RD/BUILDERS' WAREHOUS

Survey Date: Thursday, January 31, 2019 **WO No:** 38223

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



Comments

Transportation Services - Traffic Services

W.O. 36661

Turning Movement Count - 15 Minute Summary Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 12 Westbound: 4

		VISENEAU DR									INNES RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	17	4	6	**27**	12	2	12	**26**	**53**	4	64	5	**73**	6	368	4	**378**	**451**	**504**
07:15	07:30	5	1	9	**15**	11	1	12	**24**	**39**	2	82	3	**87**	10	385	9	**404**	**491**	**530**
07:30	07:45	5	1	13	**19**	15	3	13	**31**	**50**	4	108	9	**121**	8	358	5	**371**	**492**	**542**
07:45	08:00	7	0	9	**16**	9	6	7	**22**	**38**	4	109	12	**125**	11	350	14	**375**	**500**	**538**
08:00	08:15	5	3	8	**16**	11	3	15	**29**	**45**	1	99	13	**113**	30	333	5	**368**	**481**	**526**
08:15	08:30	16	1	7	**24**	10	7	12	**29**	**53**	2	108	12	**122**	26	299	11	**336**	**458**	**511**
08:30	08:45	11	5	8	**24**	11	8	4	**23**	**47**	2	106	20	**128**	42	277	10	**329**	**457**	**504**
08:45	09:00	8	3	8	**19**	16	6	11	**33**	**52**	2	114	19	**135**	43	191	8	**242**	**377**	**429**
09:00	09:15	8	4	12	**24**	11	10	7	**28**	**52**	7	111	11	**129**	30	216	8	**254**	**383**	**435**
09:15	09:30	22	1	16	**39**	10	11	5	**26**	**65**	3	131	14	**148**	38	163	12	**213**	**361**	**426**
09:30	09:45	23	2	18	**43**	9	6	8	**23**	**66**	1	141	6	**149**	22	159	6	**187**	**336**	**402**
09:45	10:00	21	0	18	**39**	10	8	5	**23**	**62**	3	135	17	**155**	34	124	9	**167**	**322**	**384**
11:30	11:45	35	5	51	**91**	14	7	6	**27**	**118**	4	160	21	**185**	27	138	14	**179**	**364**	**482**
11:45	12:00	26	5	35	**66**	9	8	3	**20**	**86**	2	199	22	**225**	48	171	16	**235**	**460**	**546**
12:00	12:15	36	13	36	**85**	8	6	3	**17**	**102**	3	163	13	**181**	36	161	10	**207**	**388**	**490**
12:15	12:30	29	7	35	**71**	13	6	3	**22**	**93**	4	212	18	**235**	36	183	12	**232**	**467**	**560**
12:30	12:45	36	4	34	**74**	13	2	7	**22**	**96**	4	126	14	**145**	37	185	7	**229**	**374**	**470**
12:45	13:00	22	10	34	**66**	15	8	3	**26**	**92**	2	147	18	**168**	36	165	15	**216**	**384**	**476**
13:00	13:15	34	22	34	**90**	9	12	10	**31**	**121**	8	145	16	**169**	31	169	10	**210**	**379**	**500**
13:15	13:30	27	9	46	**82**	15	9	4	**28**	**110**	7	167	23	**197**	39	147	22	**208**	**405**	**515**
15:00	15:15	35	5	37	**77**	13	8	3	**24**	**101**	7	278	17	**303**	34	207	22	**263**	**566**	**667**
15:15	15:30	28	6	47	**81**	14	6	3	**23**	**104**	15	296	23	**334**	32	176	24	**232**	**566**	**670**
15:30	15:45	19	10	40	**69**	9	7	8	**24**	**93**	10	311	16	**337**	38	193	20	**251**	**588**	**681**
15:45	16:00	26	7	38	**71**	15	13	8	**36**	**107**	12	332	22	**367**	45	166	21	**232**	**599**	**706**
16:00	16:15	31	12	37	**80**	18	23	6	**47**	**127**	11	343	16	**370**	54	134	26	**215**	**585**	**712**
16:15	16:30	19	13	52	**84**	21	8	8	**37**	**121**	13	365	22	**400**	42	173	23	**238**	**638**	**759**
16:30	16:45	36	11	38	**85**	19	13	6	**38**	**123**	9	374	21	**404**	40	170	20	**230**	**634**	**757**
16:45	17:00	24	10	45	**79**	11	12	7	**30**	**109**	10	348	25	**383**	41	163	25	**230**	**613**	**722**
17:00	17:15	27	6	44	**77**	9	18	9	**36**	**113**	12	369	19	**401**	60	167	16	**243**	**644**	**757**
17:15	17:30	32	8	37	**77**	16	9	6	**31**	**108**	13	328	21	**363**	60	147	20	**228**	**591**	**699**
17:30	17:45	26	5	37	**68**	23	6	10	**39**	**107**	8	319	18	**345**	55	183	19	**257**	**602**	**709**
17:45	18:00	28	13	42	**83**	14	12	6	**32**	**115**	8	302	16	**326**	57	158	17	**232**	**558**	**673**
TOTAL:		724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7323**	1148	6579	460	**8191**	**15514**	**18282**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 36661

INNES RD @ VISENEAU DR

Count Date: Wednesday, January 25, 2017 **Start Time:** 07:00

	VISENEAU DR			INNES RD			
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	1	**1**	**1**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	0	1	**1**	**1**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

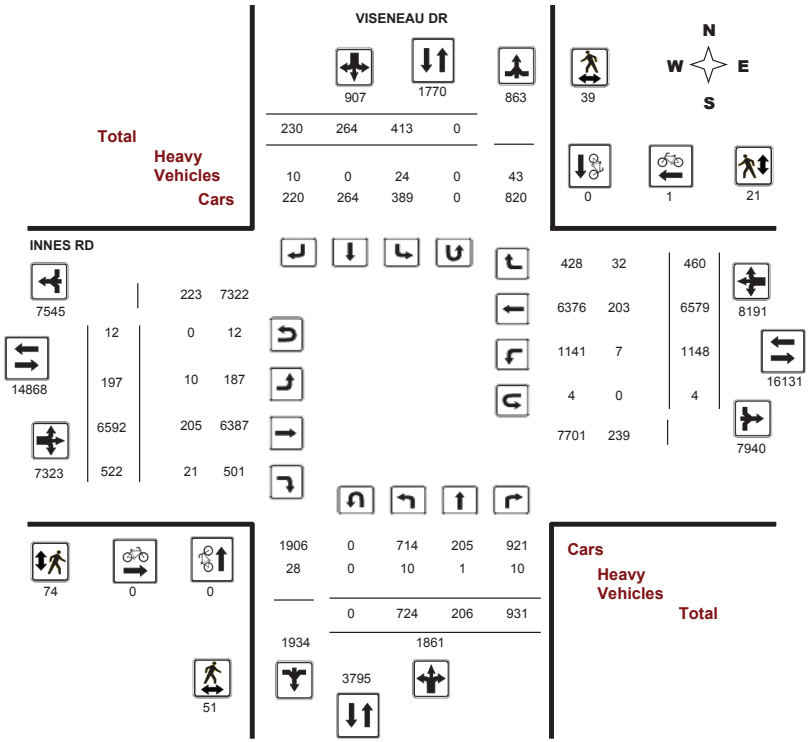
Turning Movement Count - Full Study Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

WO#: 36661

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 36661

Turning Movement Count - Heavy Vehicle Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

		VISENEAU DR									INNES RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	0	0	4	**4**	2	0	0	**2**	**6**	7	35	2	**44**	1	32	7	**40**	**84**	**90**
08:00	09:00	1	0	1	**2**	5	0	1	**6**	**8**	2	25	4	**31**	2	34	5	**41**	**72**	**80**
09:00	10:00	4	0	2	**6**	2	0	0	**2**	**8**	0	30	7	**37**	2	28	3	**33**	**70**	**78**
11:30	12:30	1	0	1	**2**	3	0	0	**3**	**5**	0	30	4	**34**	0	14	4	**18**	**52**	**57**
12:30	13:30	3	0	1	**4**	2	0	0	**2**	**6**	0	28	3	**31**	2	14	2	**18**	**49**	**55**
15:00	16:00	1	0	1	**2**	3	0	2	**5**	**7**	1	22	1	**24**	0	36	7	**43**	**67**	**74**
16:00	17:00	0	1	0	**1**	5	0	3	**8**	**9**	0	18	0	**18**	0	24	2	**26**	**44**	**53**
17:00	18:00	0	0	0	**0**	2	0	4	**6**	**6**	0	17	0	**17**	0	21	2	**23**	**40**	**46**
Sub Total		10	1	10	**21**	24	0	10	**34**	**55**	10	205	21	**236**	7	203	32	**242**	**478**	**533**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		10	1	10	**0**	24	0	10	**34**	**55**	10	205	21	**236**	7	203	32	**242**	**478**	**533**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order 36661

Turning Movement Count - Pedestrian Volume Report

INNES RD @ VISENEAU DR

Count Date: Wednesday, January 25, 2017 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	**0**	3	0	**3**	**3**
07:15 07:30	1	1	**2**	0	1	**1**	**3**
07:30 07:45	0	1	**1**	0	0	**0**	**1**
07:45 08:00	0	1	**1**	0	1	**1**	**2**
07:00 08:00	1	3	**4**	3	2	**5**	**9**
08:00 08:15	0	0	**0**	1	0	**1**	**1**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	1	1	**2**	1	1	**2**	**4**
08:45 09:00	2	1	**3**	2	1	**3**	**6**
08:00 09:00	3	2	**5**	4	2	**6**	**11**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	1	2	**3**	2	0	**2**	**5**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	1	0	**1**	4	0	**4**	**5**
09:00 10:00	2	2	**4**	6	0	**6**	**10**
11:30 11:45	2	0	**2**	2	0	**2**	**4**
11:45 12:00	1	0	**1**	2	0	**2**	**3**
12:00 12:15	0	5	**5**	3	3	**6**	**11**
12:15 12:30	0	7	**7**	5	0	**5**	**12**
11:30 12:30	3	12	**15**	12	3	**15**	**30**
12:30 12:45	0	0	**0**	4	0	**4**	**4**
12:45 13:00	1	1	**2**	2	0	**2**	**4**
13:00 13:15	2	0	**2**	0	0	**0**	**2**
13:15 13:30	6	1	**7**	2	3	**5**	**12**
12:30 13:30	9	2	**11**	8	3	**11**	**22**
15:00 15:15	0	0	**0**	0	2	**2**	**2**
15:15 15:30	2	5	**7**	4	1	**5**	**12**
15:30 15:45	3	2	**5**	1	1	**2**	**7**
15:45 16:00	1	1	**2**	2	0	**2**	**4**
15:00 16:00	6	8	**14**	7	4	**11**	**25**
16:00 16:15	4	0	**4**	5	0	**5**	**9**
16:15 16:30	5	0	**5**	6	1	**7**	**12**
16:30 16:45	3	2	**5**	3	1	**4**	**9**
16:45 17:00	3	3	**6**	4	1	**5**	**11**
16:00 17:00	15	5	**20**	18	3	**21**	**41**
17:00 17:15	4	0	**4**	5	0	**5**	**9**
17:15 17:30	1	1	**2**	3	1	**4**	**6**
17:30 17:45	6	2	**8**	4	1	**5**	**13**
17:45 18:00	1	2	**3**	4	2	**6**	**9**
17:00 18:00	12	5	**17**	16	4	**20**	**37**
Total	51	39	**90**	74	21	**95**	**185**

Comment:

Transportation Services - Traffic Services

Work Order 36661

Turning Movement Count - Full Study Summary Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 12 Westbound: 4

AADT Factor 1.00

Full Study

	VISENEAU DR									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	34	6	37	**77**	47	12	44	**103**	**180**	14	363	29	**406**	35	1461	32	**1528**	**1934**	**2114**
08:00 09:00	40	12	31	**83**	48	24	42	**114**	**197**	7	427	64	**498**	141	1100	34	**1275**	**1773**	**1970**
09:00 10:00	74	7	64	**145**	40	35	25	**100**	**245**	14	518	48	**580**	124	662	35	**821**	**1401**	**1646**
11:30 12:30	126	30	157	**313**	44	27	15	**86**	**399**	13	734	74	**821**	147	653	52	**852**	**1673**	**2072**
12:30 13:30	119	45	148	**312**	52	31	24	**107**	**419**	21	585	71	**677**	143	666	54	**863**	**1540**	**1959**
15:00 16:00	108	28	162	**298**	51	34	22	**107**	**405**	44	1217	78	**1339**	149	742	87	**978**	**2317**	**2722**
16:00 17:00	110	46	172	**328**	69	56	27	**152**	**480**	43	1430	84	**1557**	177	640	94	**911**	**2468**	**2948**
17:00 18:00	113	32	160	**305**	62	45	31	**138**	**443**	41	1318	74	**1433**	232	655	72	**959**	**2392**	**2835**
Sub Total	724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7311**	1148	6579	460	**8187**	**15498**	**18266**
U Turns				**0**				**0**	**0**				**12**				**4**	**16**	**16**
Total	724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7323**	1148	6579	460	**8191**	**15514**	**18282**
EQ 12Hr	1006	286	1294	**2587**	574	367	320	**1261**	**3848**	274	9163	726	**10179**	1596	9145	639	**11385**	**21564**	**25412**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	1006	286	1294	**2587**	574	367	320	**1261**	**3848**	274	9163	726	**10179**	1596	9145	639	**11385**	**21564**	**25412**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	1318	375	1695	**3389**	752	481	419	**1652**	**5041**	359	12003	951	**13334**	2090	11980	838	**14915**	**28249**	**33290**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

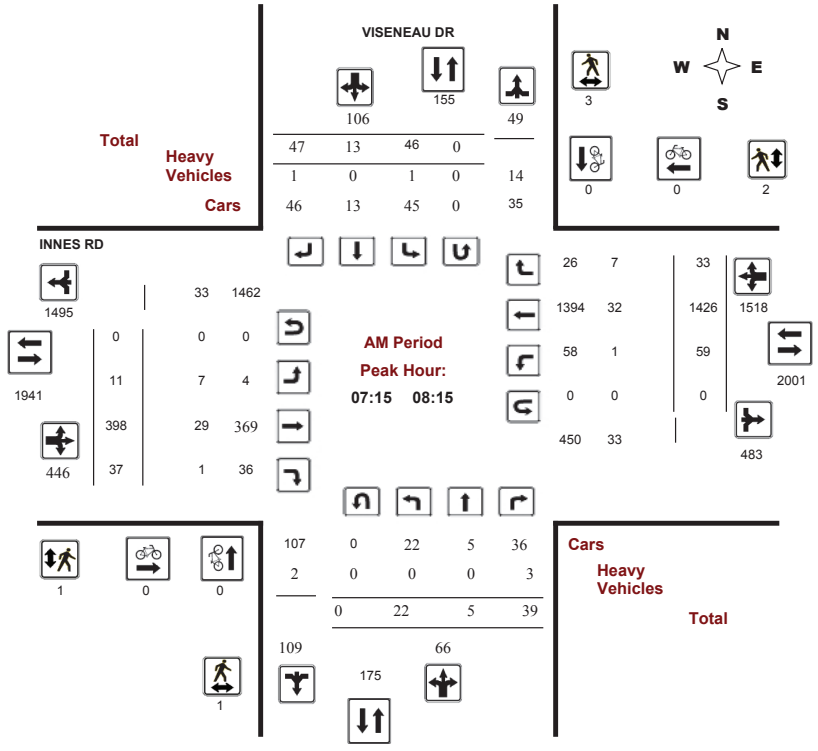
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

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



Comments

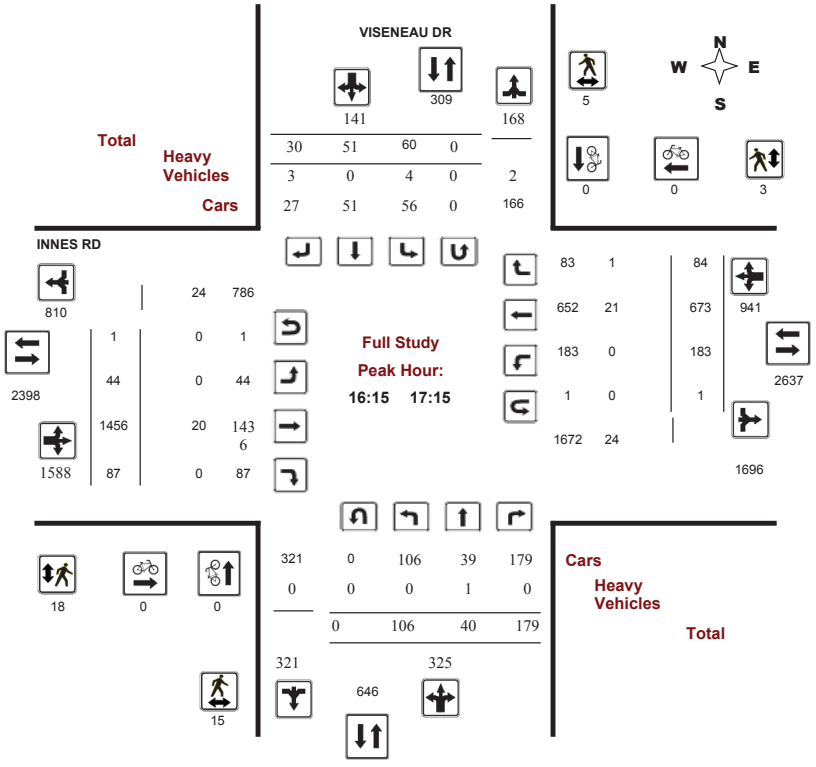
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

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



Comments

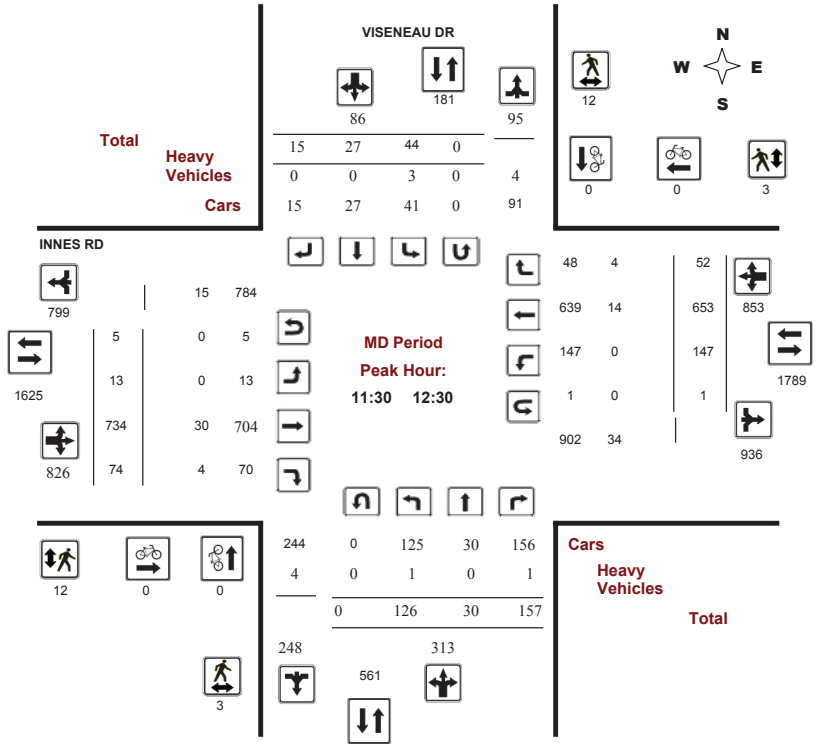
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

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



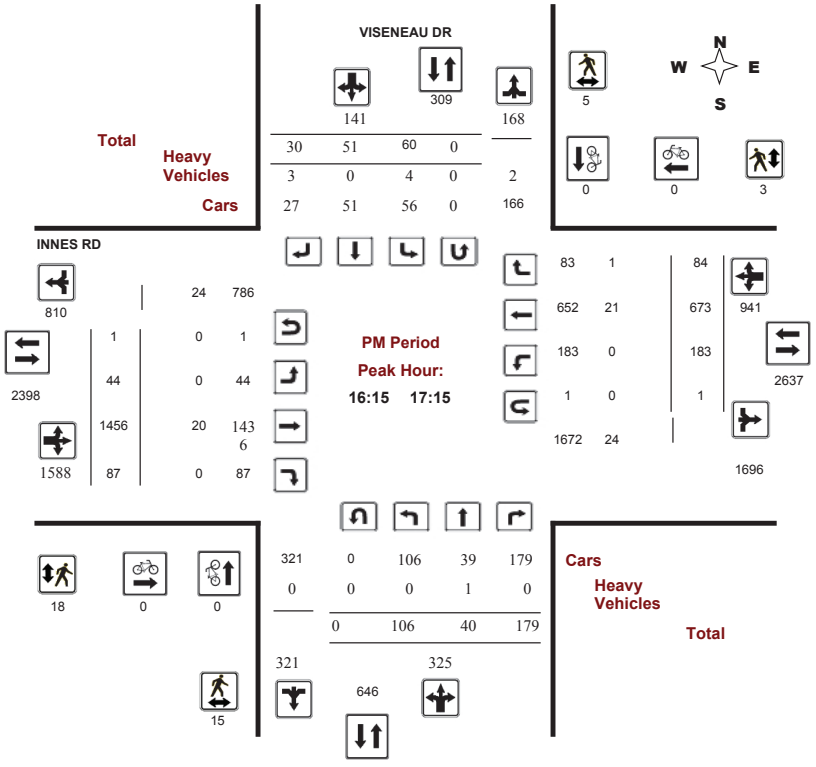
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

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



Transportation Services - Traffic Services

Work Order
36661

Turning Movement Count - 15 Min U-Turn Total Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	1	0	1
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	2	0	2
12:00	12:15	0	0	2	0	2
12:15	12:30	0	0	1	1	2
12:30	12:45	0	0	1	0	1
12:45	13:00	0	0	1	0	1
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	1	0	1
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	1	0	1
16:00	16:15	0	0	0	1	1
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	1	1
17:00	17:15	0	0	1	0	1
17:15	17:30	0	0	1	1	2
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	12	4	16

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	343	23	17	1231	112	215	275	38	62	100	459
Future Volume (vph)	121	343	23	17	1231	112	215	275	38	62	100	459
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.543			0.565		
Satd. Flow (perm)	3207	3316	1426	1631	3316	1444	941	3316	1396	955	3316	1452
Satd. Flow (RTOR)			143			143			82			150
Lane Group Flow (vph)	134	381	26	19	1368	124	239	306	42	69	111	510
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	13.0	65.0	65.0	13.0	65.0	65.0	19.0	52.0	52.0	33.0	33.0	33.0
Total Split (%)	10.0%	50.0%	50.0%	10.0%	50.0%	50.0%	14.6%	40.0%	40.0%	25.4%	25.4%	25.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.4	66.6	66.6	6.4	58.8	58.8	45.3	45.3	45.3	26.3	26.3	26.3
Actuated g/C Ratio	0.05	0.51	0.51	0.05	0.45	0.45	0.35	0.35	0.35	0.20	0.20	0.20
v/c Ratio	0.85	0.22	0.03	0.23	0.91	0.17	0.61	0.26	0.08	0.36	0.17	1.23
Control Delay	101.3	18.9	0.1	66.4	43.6	2.7	40.2	31.2	0.8	50.8	43.6	155.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.3	18.9	0.1	66.4	43.6	2.7	40.2	31.2	0.8	50.8	43.6	155.9
LOS	F	B	A	E	D	A	D	C	A	D	D	F
Approach Delay		38.4			40.6			32.7			127.3	
Approach LOS		D			D			C			F	
Queue Length 50th (m)	17.8	24.9	0.0	4.8	168.7	0.0	46.4	29.4	0.0	15.3	12.4	~129.4
Queue Length 95th (m)	#36.1	42.1	0.0	13.0	#207.8	7.9	70.1	41.0	1.0	30.2	20.9	#197.0
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	158	1698	800	86	1499	731	395	1155	539	193	670	413
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.22	0.03	0.22	0.91	0.17	0.61	0.26	0.08	0.36	0.17	1.23

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 99 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

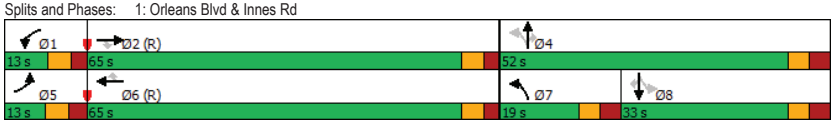
Maximum v/c Ratio: 1.23

Intersection Signal Delay: 56.8	Intersection LOS: E
Intersection Capacity Utilization 95.5%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Orleans Blvd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	413	21	39	1307	24	14	12	42	36	9	42
Future Volume (vph)	11	413	21	39	1307	24	14	12	42	36	9	42
Satd. Flow (prot)	1658	3287	0	1658	3304	0	0	1572	0	0	1579	0
Flt Permitted	0.141			0.477				0.920			0.853	
Satd. Flow (perm)	246	3287	0	827	3304	0	0	1457	0	0	1375	0
Satd. Flow (RTOR)		8			3			47			38	
Lane Group Flow (vph)	12	482	0	43	1479	0	0	76	0	0	97	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	82.0	82.0		82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%		68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.5	88.5		88.5	88.5			18.5			18.5	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.15			0.15	
v/c Ratio	0.07	0.20		0.07	0.61			0.29			0.40	
Control Delay	8.6	6.2		5.4	8.0			20.4			30.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	8.6	6.2		5.4	8.0			20.4			30.4	
LOS	A	A		A	A			C			C	
Approach Delay		6.3			7.9			20.4			30.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	0.5	10.8		1.6	48.9			6.5			13.5	
Queue Length 95th (m)	3.7	31.3		m2.8	27.3			17.4			25.2	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			106.0								
Base Capacity (vph)	181	2425		609	2436			413			385	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.07	0.20		0.07	0.61			0.18			0.25	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 65.0%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

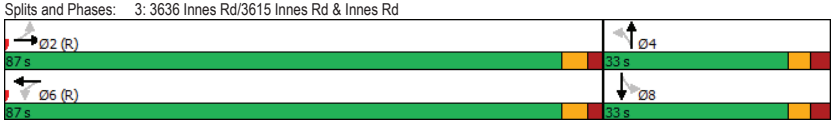
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	495	7	1	1342	4	0	0	1	1	0	3
Future Volume (vph)	6	495	7	1	1342	4	0	0	1	1	0	3
Satd. Flow (prot)	1658	3309	0	1658	3315	0	1745	1464	0	0	1533	0
Flt Permitted	0.161			0.443							0.914	
Satd. Flow (perm)	281	3309	0	773	3315	0	1745	1464	0	0	1418	0
Satd. Flow (RTOR)		3						380			28	
Lane Group Flow (vph)	7	558	0	1	1495	0	0	1	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.1	32.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	87.0	87.0		87.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	72.5%	72.5%		72.5%	72.5%		27.5%	27.5%		27.5%	27.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	112.3	112.3		112.3	112.3			13.2			13.2	
Actuated g/C Ratio	0.94	0.94		0.94	0.94			0.11			0.11	
v/c Ratio	0.03	0.18		0.00	0.48			0.00			0.02	
Control Delay	3.5	1.9		7.0	5.5			0.0			0.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	3.5	1.9		7.0	5.5			0.0			0.2	
LOS	A	A		A	A			A			A	
Approach Delay		1.9			5.5						0.3	
Approach LOS		A			A						A	
Queue Length 50th (m)	0.0	0.0		0.0	0.0			0.0			0.0	
Queue Length 95th (m)	m1.9	27.4		m0.2	140.4			0.0			0.0	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	85.0			40.0								
Base Capacity (vph)	263	3097		723	3103			621			337	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.03	0.18		0.00	0.48			0.00			0.01	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48
Intersection Signal Delay: 4.5 — Intersection LOS: A
Intersection Capacity Utilization 58.8% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	437	37	59	1291	33	19	5	39	46	13	41
Future Volume (vph)	11	437	37	59	1291	33	19	5	39	46	13	41
Satd. Flow (prot)	1658	3316	1483	1658	3300	0	1658	1745	1483	0	1602	0
Flt Permitted	0.170			0.437			0.669				0.850	
Satd. Flow (perm)	296	3316	1450	762	3300	0	1166	1745	1462	0	1391	0
Satd. Flow (RTOR)			115		4				105		28	
Lane Group Flow (vph)	12	486	41	66	1471	0	21	6	43	0	111	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	66.0	66.0	66.0	12.0	78.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	55.0%	55.0%	55.0%	10.0%	65.0%		30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	80.3	80.3	80.3	91.0	91.0		15.4	15.4	15.4		15.4	
Actuated g/C Ratio	0.67	0.67	0.67	0.76	0.76		0.13	0.13	0.13		0.13	
v/c Ratio	0.06	0.22	0.04	0.10	0.59		0.14	0.03	0.15		0.55	
Control Delay	8.1	7.1	0.1	5.3	8.6		44.6	40.6	1.2		45.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	8.1	7.1	0.1	5.3	8.6		44.6	40.6	1.2		45.0	
LOS	A	A	A	A	A		D	D	A		D	
Approach Delay		6.6			8.4			17.6			45.0	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	0.8	19.2	0.0	2.9	59.4		4.6	1.3	0.0		18.9	
Queue Length 95th (m)	1.3	11.7	0.0	10.4	131.6		10.6	4.6	0.0		32.1	
Internal Link Dist (m)		561.5			183.4			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	197	2218	1008	629	2504		288	431	440		365	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.06	0.22	0.04	0.10	0.59		0.07	0.01	0.10		0.30	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	4.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Innes Rd & Viseneau Dr

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	476	17	12	1336	41	27
Future Vol, veh/h	476	17	12	1336	41	27
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	529	19	13	1484	46	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	548	0	1307	274
Stage 1	-	-	-	-	539	-
Stage 2	-	-	-	-	768	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1018	-	151	724
Stage 1	-	-	-	-	549	-
Stage 2	-	-	-	-	418	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1018	-	149	724
Mov Cap-2 Maneuver	-	-	-	-	281	-
Stage 1	-	-	-	-	549	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	371	-	-	1018	-
HCM Lane V/C Ratio	0.204	-	-	0.013	-
HCM Control Delay (s)	17.2	-	-	8.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	579	1391	168	59	568	124	64	225	78	163	256	203
Future Volume (vph)	579	1391	168	59	568	124	64	225	78	163	256	203
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.457			0.597		
Satd. Flow (perm)	3190	3316	1410	1651	3316	1445	789	3316	1432	1025	3316	1438
Satd. Flow (RTOR)			165			230			159			226
Lane Group Flow (vph)	643	1546	187	66	631	138	71	250	87	181	284	226
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	31.0	49.0	49.0	16.0	34.0	34.0	12.0	45.0	45.0	33.0	33.0	33.0
Total Split (%)	28.2%	44.5%	44.5%	14.5%	30.9%	30.9%	10.9%	40.9%	40.9%	30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	23.9	46.3	46.3	8.7	28.3	28.3	38.3	38.3	38.3	28.7	28.7	28.7
Actuated g/C Ratio	0.22	0.42	0.42	0.08	0.26	0.26	0.35	0.35	0.35	0.26	0.26	0.26
v/c Ratio	0.92	1.11	0.27	0.51	0.74	0.25	0.22	0.22	0.14	0.68	0.33	0.42
Control Delay	61.7	91.0	5.9	56.0	52.8	11.9	26.5	25.9	0.5	52.3	35.1	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.7	91.0	5.9	56.0	52.8	11.9	26.5	25.9	0.5	52.3	35.1	7.1
LOS	E	F	A	E	D	B	C	C	A	D	D	A
Approach Delay		76.4			46.3			20.6			30.5	
Approach LOS		E			D			C			C	
Queue Length 50th (m)	69.5	~211.9	2.9	13.6	50.9	0.0	10.3	19.7	0.0	36.1	26.7	0.0
Queue Length 95th (m)	#100.9	#254.2	16.8	29.7	94.8	27.3	20.4	29.4	0.0	#69.2	39.1	18.4
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	713	1397	689	147	852	542	316	1154	602	267	864	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	1.11	0.27	0.45	0.74	0.25	0.22	0.22	0.14	0.68	0.33	0.42

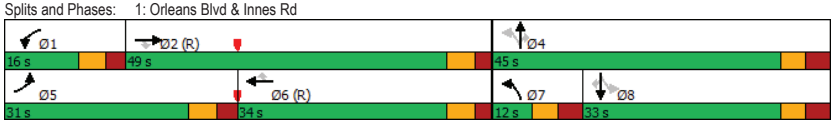
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 57.9	Intersection LOS: E
Intersection Capacity Utilization 97.5%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd



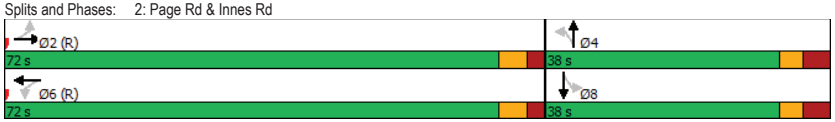
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	1544	30	102	698	69	23	6	84	59	17	34
Future Volume (vph)	61	1544	30	102	698	69	23	6	84	59	17	34
Satd. Flow (prot)	1658	3304	0	1658	3259	0	0	1525	0	0	1620	0
Flt Permitted	0.312			0.086				0.919			0.742	
Satd. Flow (perm)	542	3304	0	150	3259	0	0	1414	0	0	1227	0
Satd. Flow (RTOR)		3			17			22			20	
Lane Group Flow (vph)	68	1749	0	113	853	0	0	126	0	0	123	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	72.0	72.0		72.0	72.0		38.0	38.0		38.0	38.0	
Total Split (%)	65.5%	65.5%		65.5%	65.5%		34.5%	34.5%		34.5%	34.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	77.5	77.5		77.5	77.5			19.5			19.5	
Actuated g/C Ratio	0.70	0.70		0.70	0.70			0.18			0.18	
v/c Ratio	0.18	0.75		1.08	0.37			0.47			0.53	
Control Delay	2.4	7.3		136.7	12.4			36.6			40.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	2.4	7.3		136.7	12.4			36.6			40.0	
LOS	A	A		F	B			D			D	
Approach Delay		7.1			27.0			36.6			40.0	
Approach LOS		A			C			D			D	
Queue Length 50th (m)	1.4	29.1		20.5	26.4			21.4			21.5	
Queue Length 95th (m)	m1.8	m23.7		#56.7	109.1			33.5			33.7	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			106.0								
Base Capacity (vph)	382	2329		105	2301			416			362	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.18	0.75		1.08	0.37			0.30			0.34	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 85.7% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd



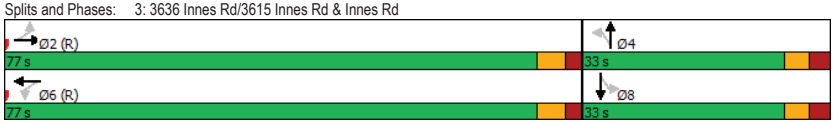
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1654	1	2	862	8	2	0	8	4	0	10
Future Volume (vph)	8	1654	1	2	862	8	2	0	8	4	0	10
Satd. Flow (prot)	1658	3316	0	1658	3312	0	1658	1483	0	0	1534	0
Flt Permitted	0.291			0.100			0.748				0.906	
Satd. Flow (perm)	508	3316	0	175	3312	0	1300	1483	0	0	1408	0
Satd. Flow (RTOR)					2			31			31	
Lane Group Flow (vph)	9	1839	0	2	967	0	2	9	0	0	15	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.1	34.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	77.0	77.0		77.0	77.0		33.0	33.0		33.0	33.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	97.8	97.8		97.8	97.8		13.2	13.2			13.2	
Actuated g/C Ratio	0.89	0.89		0.89	0.89		0.12	0.12			0.12	
v/c Ratio	0.02	0.62		0.01	0.33		0.01	0.04			0.08	
Control Delay	1.5	3.3		5.0	3.6		38.0	0.4			5.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	1.5	3.3		5.0	3.6		38.0	0.4			5.1	
LOS	A	A		A	A		D	A			A	
Approach Delay		3.3			3.6			7.2			5.1	
Approach LOS		A			A			A			A	
Queue Length 50th (m)	0.0	0.0		0.0	0.0		0.4	0.0			0.0	
Queue Length 95th (m)	m0.2	162.7		1.0	61.9		2.3	0.3			2.5	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	85.0			40.0								
Base Capacity (vph)	452	2949		155	2946		315	383			365	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.02	0.62		0.01	0.33		0.01	0.02			0.04	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62
Intersection Signal Delay: 3.4 — Intersection LOS: A
Intersection Capacity Utilization 68.2% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1511	87	183	732	84	106	40	179	60	51	30
Future Volume (vph)	44	1511	87	183	732	84	106	40	179	60	51	30
Satd. Flow (prot)	1658	3316	1483	1658	3255	0	1658	1745	1483	0	1648	0
Flt Permitted	0.315			0.051			0.588				0.841	
Satd. Flow (perm)	548	3316	1399	89	3255	0	1008	1745	1460	0	1414	0
Satd. Flow (RTOR)			106		18				199		10	
Lane Group Flow (vph)	49	1679	97	203	906	0	118	44	199	0	157	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	68.0	68.0	68.0	20.0	88.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	52.3%	52.3%	52.3%	15.4%	67.7%		28.5%	28.5%	28.5%	28.5%	28.5%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	72.5	72.5	72.5	95.4	95.4		21.0	21.0	21.0		21.0	
Actuated g/C Ratio	0.56	0.56	0.56	0.73	0.73		0.16	0.16	0.16		0.16	
v/c Ratio	0.16	0.91	0.12	0.77	0.38		0.73	0.16	0.50		0.67	
Control Delay	19.5	35.9	3.2	51.9	7.5		75.1	44.8	9.9		60.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	19.5	35.9	3.2	51.9	7.5		75.1	44.8	9.9		60.3	
LOS	B	D	A	D	A		E	D	A		E	
Approach Delay		33.7			15.6			35.5			60.3	
Approach LOS		C			B			D			E	
Queue Length 50th (m)	5.9	195.7	0.0	34.9	37.1		29.4	9.9	0.0		36.3	
Queue Length 95th (m)	15.9	#292.4	8.0	63.1	61.8		47.3	19.3	19.3		55.1	
Internal Link Dist (m)		561.5			183.0			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	305	1849	827	272	2394		230	398	487		330	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.16	0.91	0.12	0.75	0.38		0.51	0.11	0.41		0.48	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 105 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	3.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

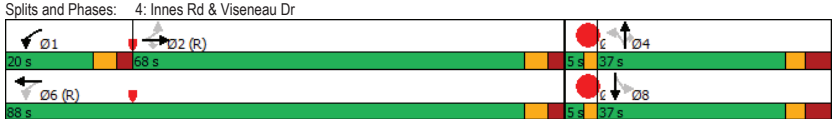
Intersection Summary

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 29.3	Intersection LOS: C
Intersection Capacity Utilization 90.7%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 4: Innes Rd & Viseneau Dr



Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1650	42	28	841	28	19
Future Vol, veh/h	1650	42	28	841	28	19
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	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1833	47	31	934	31	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1880	0	2386	940
Stage 1	-	-	-	-	1857	-
Stage 2	-	-	-	-	529	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	315	-	~ 28	265
Stage 1	-	-	-	-	109	-
Stage 2	-	-	-	-	555	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	315	-	~ 22	265
Mov Cap-2 Maneuver	-	-	-	-	86	-
Stage 1	-	-	-	-	109	-
Stage 2	-	-	-	-	441	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	57.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	118	-	-	315	-
HCM Lane V/C Ratio	0.443	-	-	0.099	-
HCM Control Delay (s)	57.8	-	-	17.7	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	1.9	-	-	0.3	-

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

Appendix D

Signal Warrant

Innes Rd /Lamarche
Existing

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1129	125%	25%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	43	25%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1101	122%	23%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	17	23%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Innes Rd /Lamarche
FB2025

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1324	147%	56%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	96	56%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1261	140%	54%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	41	54%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Innes Rd /Lamarche
FT2025

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1352	150%	70%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	119	70%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1273	141%	67%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	50	67%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Innes Rd /Lamarche
FB2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1411	157%	72%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	122	72%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1330	148%	66%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	50	66%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Innes Rd /Lamarche
FT2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1439	160%	86%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	146	86%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1342	149%	79%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	59	79%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Appendix E

Collision Data

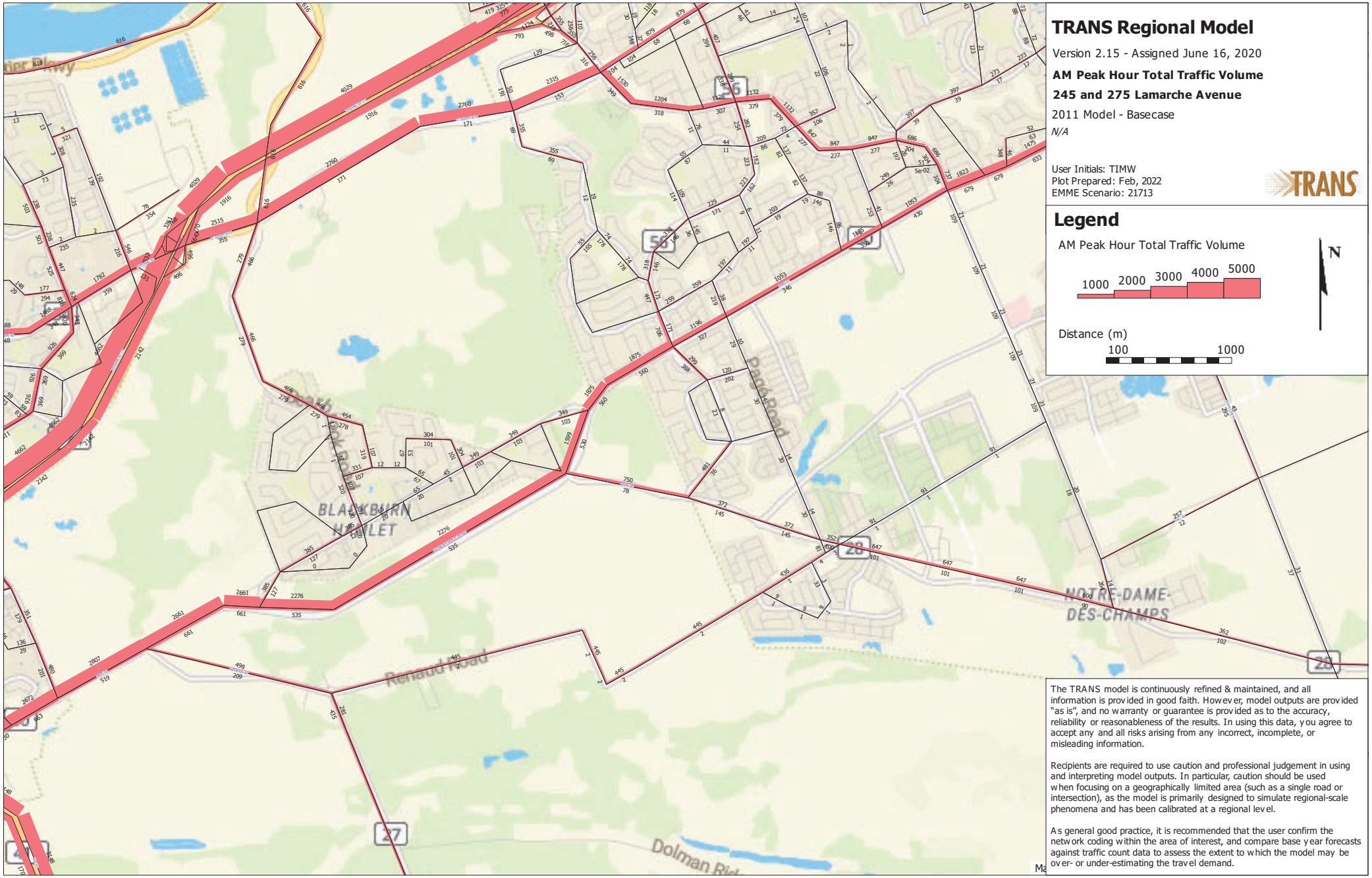
CGH TRANSPORTATION

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition	# Vehicles	# Motorcycles	# Bicycles	# Pedestrians
9/30/2016	2016	18:25	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
10/19/2016	2016	17:00	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2/17/2016	2016	20:46	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	02 - Angle	05 - Packed snow	2	0	0	0
4/20/2016	2016	16:58	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
11/14/2017	2017	16:12	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
1/31/2017	2017	16:38	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2/1/2017	2017	6:49	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	03 - Dawn	10 - No control	0	03 - P.D. only	03 - Rear end	03 - Loose snow	2	0	0	0
6/1/2017	2017	1:16	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
11/22/2018	2018	14:37	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
12/31/2018	2018	21:30	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	03 - Snow	07 - Dark	10 - No control	0	03 - P.D. only	02 - Angle	05 - Packed snow	2	0	0	0
4/26/2018	2018	18:06	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
4/21/2019	2019	19:26	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
7/10/2019	2019	7:15	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
1/25/2020	2020	17:00	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	03 - Snow	05 - Dusk	10 - No control	0	03 - P.D. only	07 - SMV other	04 - Slush	1	0	0	0
4/20/2020	2020	19:59	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	05 - Dusk	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
7/6/2020	2020	7:05	INNES RD btwn PAGE RD & 473 E OF PAGE RD/BUILDERS' WAREHOUSE SC (__3ZAYFDA)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	1	0	0

Appendix F

City TRANS Forecasts – Background Growth

CGH TRANSPORTATION



TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

245 and 275 Lamarche Avenue

2011 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: Feb, 2022
EMME Scenario: 21713

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

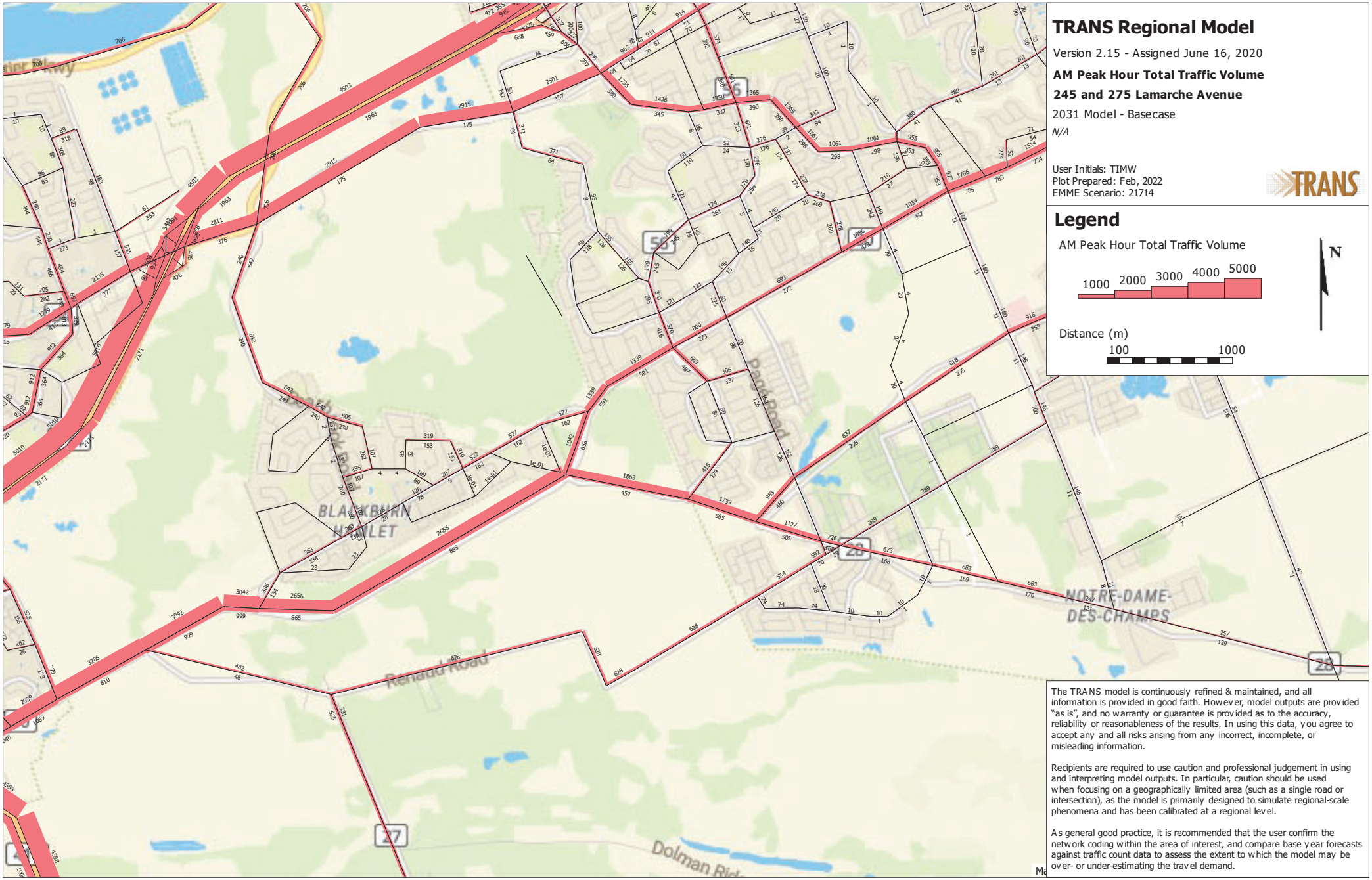
Distance (m)

100 1000

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.



TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

245 and 275 Lamarche Avenue

2031 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: Feb, 2022
EMME Scenario: 21714

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

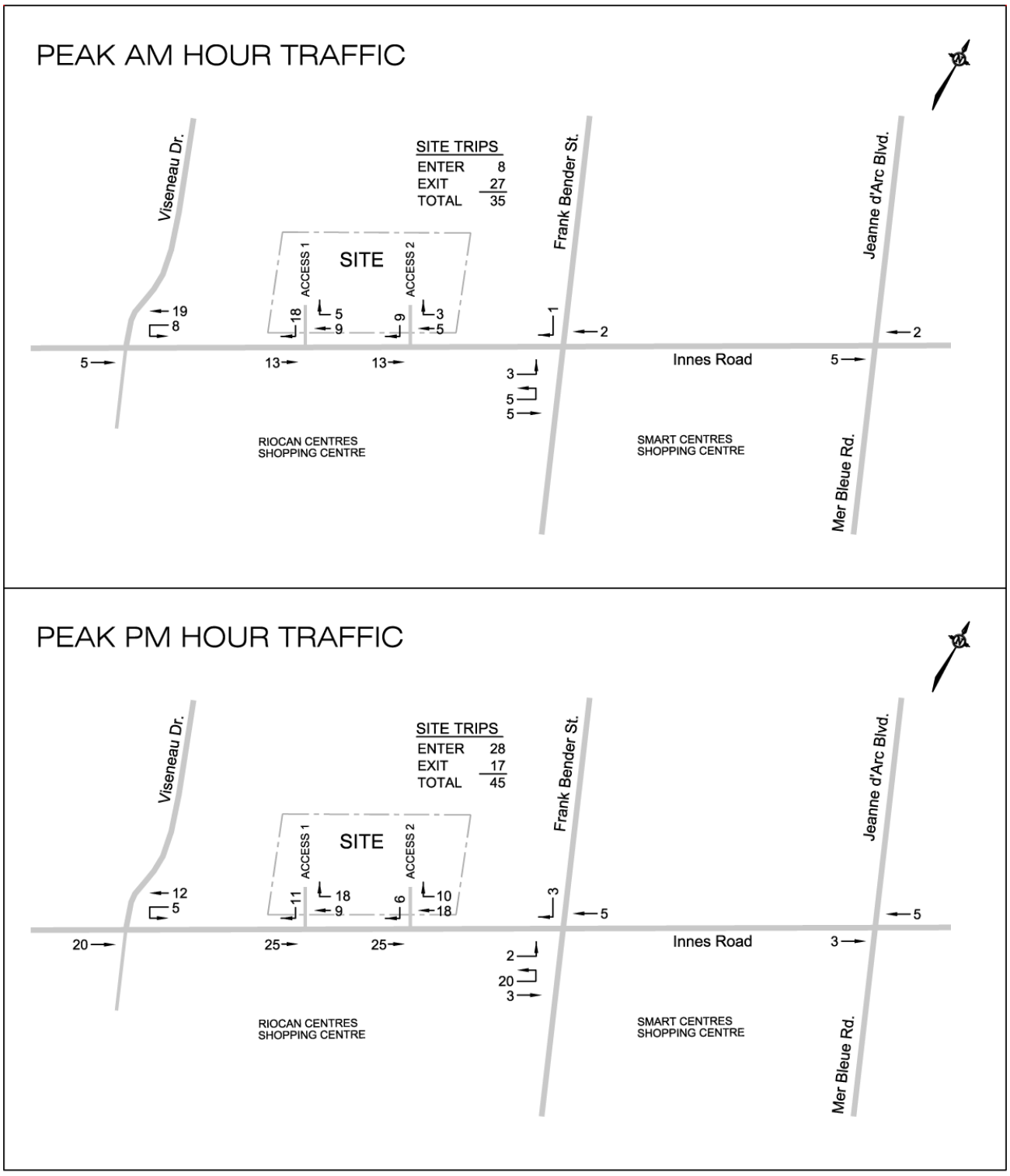
100 1000

Appendix G

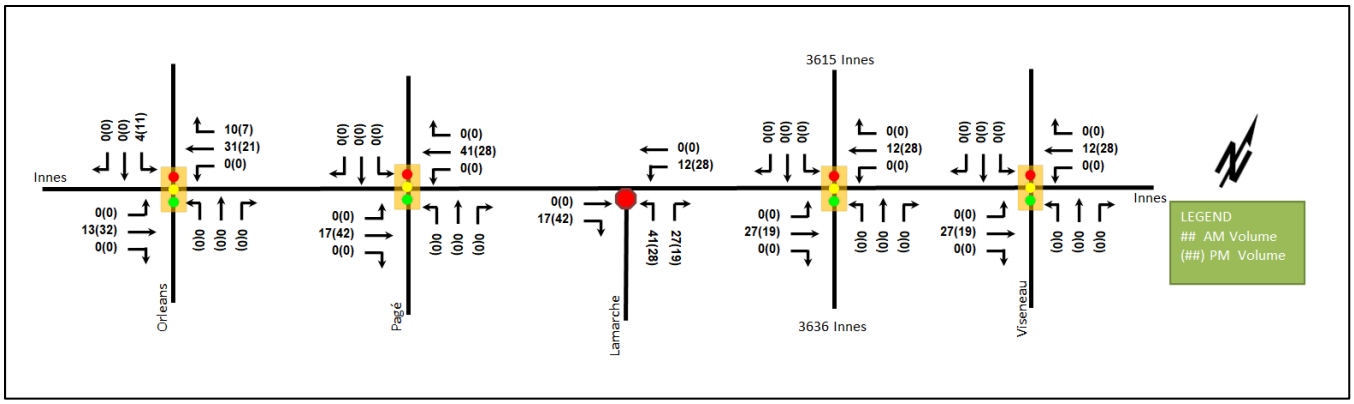
Background Development Volumes

CGH TRANSPORTATION

FIGURE 3.1
PEAK AM AND PM HOUR SITE GENERATED TRIPS



3490 Innes Road - Phase 1-3 (Phase 1)



3490 Innes Road - Phase 1-3 (Phase 1+2)

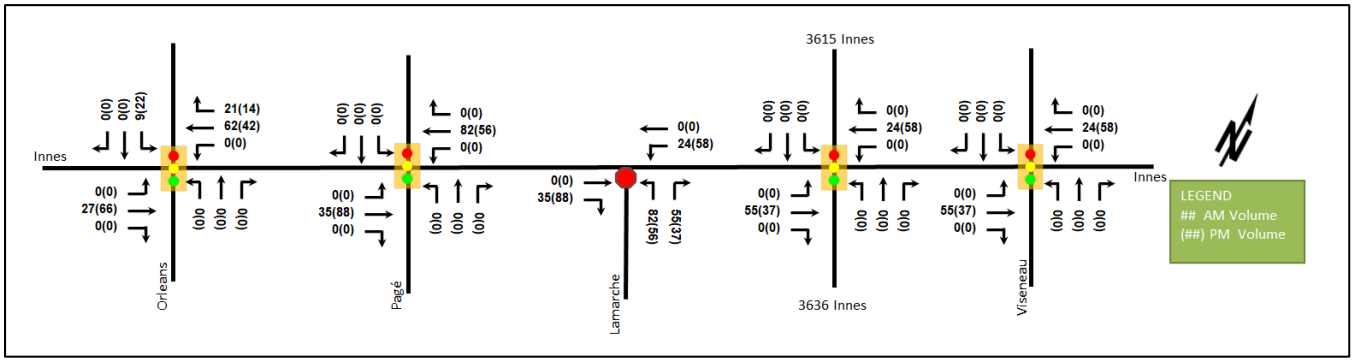


Figure 2: 2024 Background Traffic Volumes

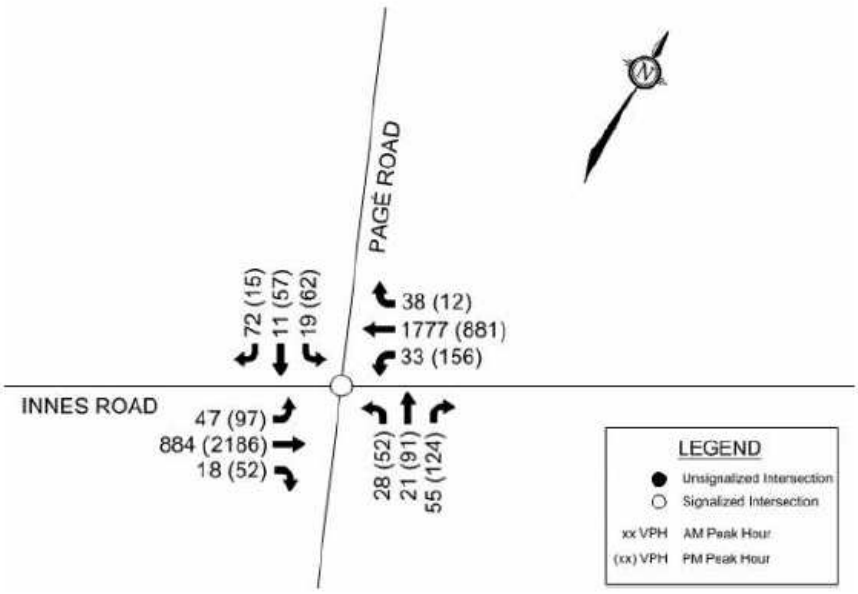
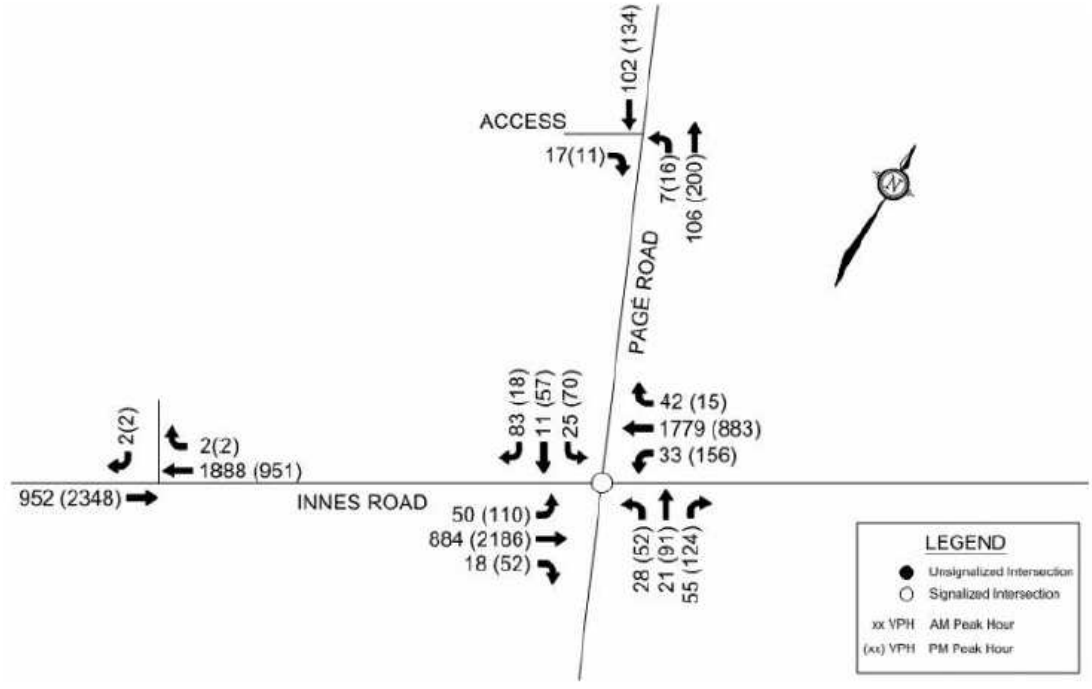


Figure 4: 2024 Total Traffic Volumes



Option 2 – Mixed Use: Residential and Commercial Uses

Option 2 proposes 525 residential units housed within 5 buildings varying between 6 and 7-storeys, a 26,905 ft^2 grocery store, 10,631 ft^2 retail store (treated as a small shopping center), a 2,217 ft^2 drive-thru (assumed a coffee shop with drive-thru facilities as envisioned by developer) and a 1,550 ft^2 gas bar.

Table 3 projects approximately 420 and 475 new residential trips during the AM and PM peak periods. Using the mode shares from **Table 5**, the person trips can be divided into trips per travel modes based on TRANS mode shares for Orléans in **Table 11** and based on target mode shares in **Table 12**.

Table 11: Option 2 Residential Peak Period Trips using TRANS 2020 Mode Shares

Travel Mode	AM Peak Period		PM Peak Period	
	Mode Share	Person Trip	Mode Share	Person Trips
Auto Driver	54%	227	61%	289
Auto Passenger	7%	29	12%	57
Transit	29%	122	21%	99
Cycling	0%	0	0%	0
Walking	10%	42	6%	28
Total Person Trips	100%	420	100%	473

Table 12: Option 2 Residential Peak Period Trips using Target Mode Shares

Travel Mode	AM Peak Period		PM Peak Period	
	Mode Share	Person Trip	Mode Share	Person Trips
Auto Driver	45%	189	45%	213
Auto Passenger	8%	34	8%	38
Transit	35%	147	35%	166
Cycling	2%	8	2%	9
Walking	10%	42	10%	47
Total Person Trips	100%	420	100%	473

Given the mixture of land uses, an internal reduction rate was applied based on mixed-use parameters described in Section 6.5 of the ITE Trip Generation Manual 3rd Edition, to account for multi-purpose trips such as local resident stopping at the gas station or coffee shop prior to travelling to work. These trips may be reduced to reflect double counted trips, which has been incorporated in the trip generation tables that follow. The base calculation for determining the quantity of internal reductions has been provided in **Appendix E.** Note that there were no studies available for mixed-use interactions with a gas station.

Using the conversion rates from **Table 4**, and the derived peak period trips by mode shares in **Table 11** and **Table 12**, the peak hour trip generation rates can be calculated. Table 9 within the TRANS 2020 Manual was also used to determine the inbound and outbound splits from the site during their respective peak hour. The residential

Table 20: Total Option 2 Peak Hour Trips Generated using TRANS 2020 Mode Shares

Travel Mode	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
	In	Out	Total	In	Out	Total
Auto Driver	238	243	481	266	241	507
Pre-Internal Reduction	*265*	*257*	*607*	*315*	*313*	*854*
Vehicles Reduced	*-30*	*-30*	*-92*	*-91*	*-91*	*-224*
Auto Passenger	36	40	76	57	53	111
Transit	34	59	93	46	38	84
Cycling	7	7	14	10	10	20
Walking	16	24	39	19	16	35
Total Person Trips	361	403	763	489	449	938
Less Pass-by	-104	-104	-208	-108	-108	-216
Total 'New' Combined Auto Trips	**134**	**139**	**273**	**158**	**133**	**291**

Table 21: Total Option 2 Peak Hour Trips Generated using Target Mode Shares

Travel Mode	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
	In	Out	Total	In	Out	Total
Auto Driver	235	234	469	256	236	492
Pre-Internal Reduction	*262*	*261*	*523*	*338*	*318*	*656*
Vehicles Reduced	*-27*	*-27*	*-54*	*-82*	*-82*	*-164*
Auto Passenger	37	41	78	53	50	103
Transit	38	69	107	64	51	115
Cycling	9	10	19	13	12	25
Walking	16	24	39	24	20	45
Total Person Trips	362	405	766	491	451	942
Less Pass-by	-104	-104	-208	-108	-108	-216
Total 'New' Combined Auto Trips	**131**	**130**	**261**	**148**	**128**	**276**

If the target mode shares are achieved, Option 2 is expected to generate approximately 765 and 940 new person trips during the morning and afternoon peak hours respectively. Among these, approximately 260 to 275 new vehicle trips, approximately 110 to 115 new transit trips, and approximately 60 to 70 new active mode trips.

Trip Generation Comparison – Option 1 vs Option 2

Overall, Option 2 is expected to generate more peak hour vehicle trips than Option 1. For this reason, **only Option 2 will be analyzed in the upcoming analysis**, as it represents the most conservative Option.

3.1.2. TRIP DISTRIBUTION

The estimated traffic distribution was based on a variation of the August 2021 turning movement count at Lamarche/Innes and the 2011 OD-Survey for Orléans as discussed in **Section 2.1.2: Peak Hour Travel Demands**. A more balanced distribution was developed that reflects these two sources, as outlined below:

Inbound vehicles to Lamarche Avenue

- 50% from Innes Road West;
- 50% from Innes Road East;

Outbound vehicles from Lamarche Avenue

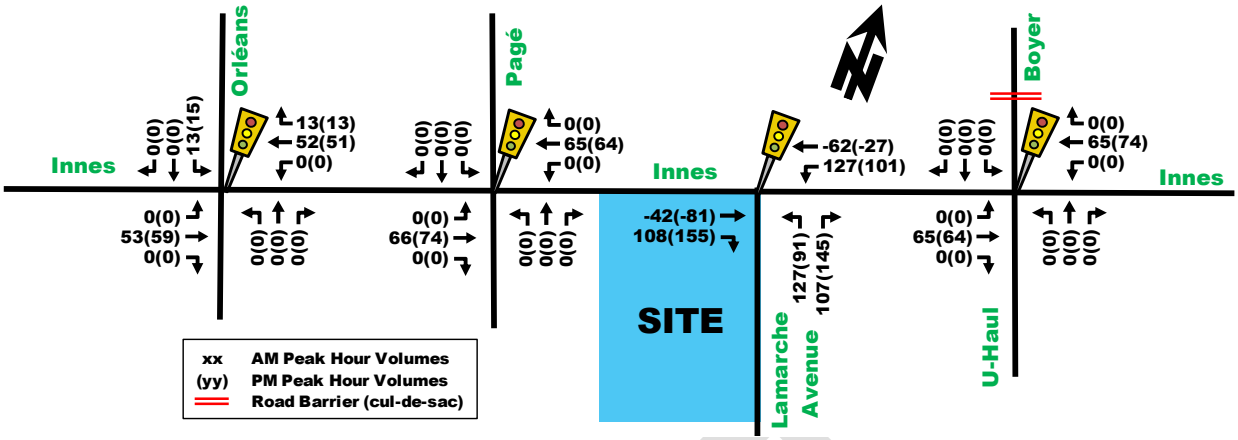
- 60% to Innes Road West;
- 40% to Innes Road East;

Pass-by trips were assumed to be more likely to originate from the west on Innes Road compared to the east, as the former consists mostly of right-turn movements, while the latter requires two separate left turns to/from Innes Road, making it less desirable.

3.1.3. TRIP ASSIGNMENT

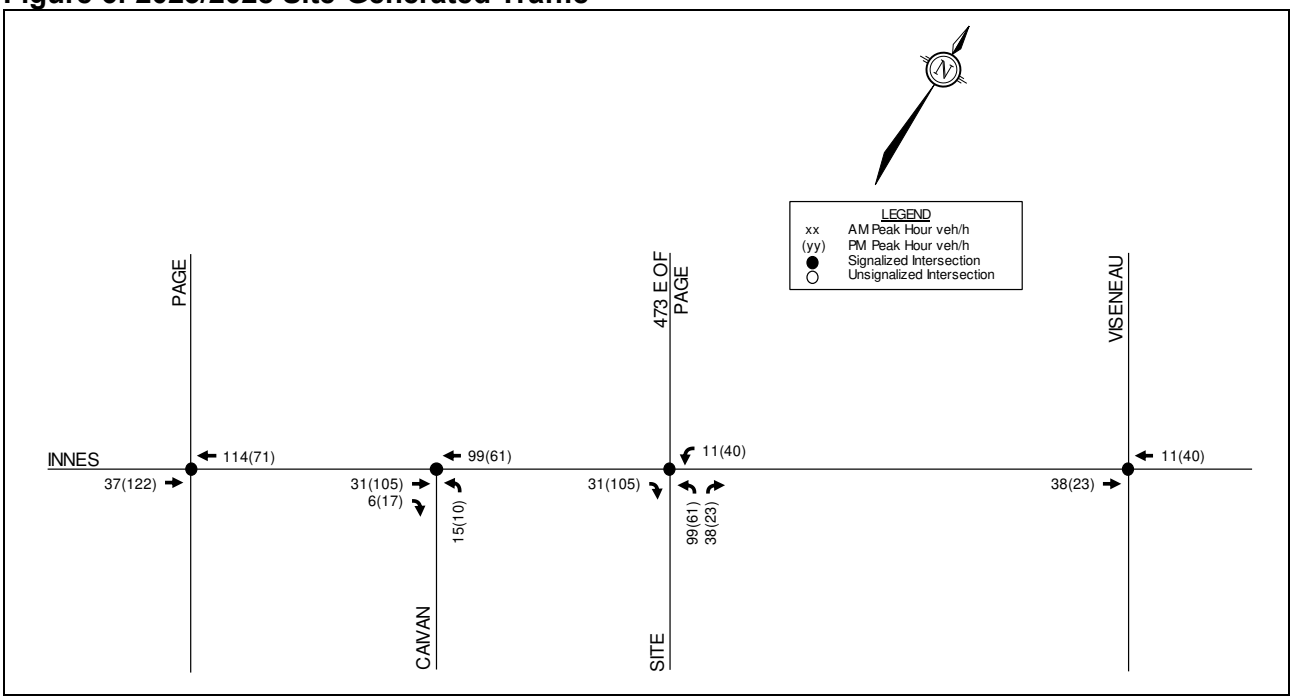
The 'new' site-generated vehicle trips outlined in **Table 21** were assigned to the study area network based on the trip distribution discussed above and are illustrated as **Figure 15**.

Figure 15: 'New' Site-Generated Peak Hour Traffic



Note that negative trips reflect pass-by deviated trips

Figure 6: 2023/2028 Site-Generated Traffic



Appendix H

Synchro Intersection Worksheets – 2025 Future Background Conditions

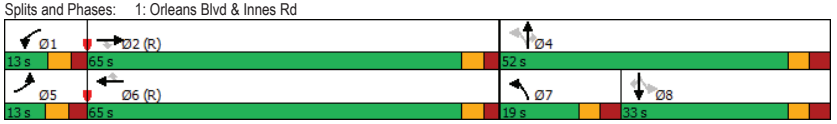
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	412	23	17	1444	123	228	292	38	67	100	459
Future Volume (vph)	121	412	23	17	1444	123	228	292	38	67	100	459
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.549			0.573		
Satd. Flow (perm)	3207	3316	1426	1632	3316	1444	952	3316	1396	968	3316	1452
Satd. Flow (RTOR)			143			143			82			151
Lane Group Flow (vph)	121	412	23	17	1444	123	228	292	38	67	100	459
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	13.0	65.0	65.0	13.0	65.0	65.0	19.0	52.0	52.0	33.0	33.0	33.0
Total Split (%)	10.0%	50.0%	50.0%	10.0%	50.0%	50.0%	14.6%	40.0%	40.0%	25.4%	25.4%	25.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.4	66.6	66.6	6.4	58.8	58.8	45.3	45.3	45.3	26.3	26.3	26.3
Actuated g/C Ratio	0.05	0.51	0.51	0.05	0.45	0.45	0.35	0.35	0.35	0.20	0.20	0.20
v/c Ratio	0.77	0.24	0.03	0.21	0.96	0.17	0.57	0.25	0.07	0.34	0.15	1.11
Control Delay	90.3	19.1	0.1	65.5	50.8	2.7	38.9	31.0	0.3	50.3	43.4	109.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	19.1	0.1	65.5	50.8	2.7	38.9	31.0	0.3	50.3	43.4	109.2
LOS	F	B	A	E	D	A	D	C	A	D	D	F
Approach Delay		33.8			47.2			32.1			92.3	
Approach LOS		C			D			C			F	
Queue Length 50th (m)	16.0	27.3	0.0	4.3	185.4	0.0	44.0	28.0	0.0	14.9	11.2	~101.4
Queue Length 95th (m)	#31.4	45.6	0.0	12.2	#237.0	7.7	66.7	39.3	0.0	29.3	19.2	#166.8
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	158	1698	800	86	1499	731	398	1155	539	195	670	414
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.24	0.03	0.20	0.96	0.17	0.57	0.25	0.07	0.34	0.15	1.11

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 99 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11
Intersection Signal Delay: 51.0 — Intersection LOS: D
Intersection Capacity Utilization 102.4% — ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	485	21	39	1521	28	14	12	42	42	9	53
Future Volume (vph)	14	485	21	39	1521	28	14	12	42	42	9	53
Satd. Flow (prot)	1658	3291	0	1658	3304	0	0	1572	0	0	1572	0
Flt Permitted	0.128			0.466				0.923			0.859	
Satd. Flow (perm)	223	3291	0	808	3304	0	0	1462	0	0	1378	0
Satd. Flow (RTOR)		7			3			42			42	
Lane Group Flow (vph)	14	506	0	39	1549	0	0	68	0	0	104	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	82.0	82.0		82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%		68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.4	88.4		88.4	88.4			18.6			18.6	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.16			0.16	
v/c Ratio	0.09	0.21		0.07	0.64			0.26			0.42	
Control Delay	9.1	6.3		6.4	15.9			20.2			30.2	
Queue Delay	0.0	0.0		0.0	0.8			0.0			0.0	
Total Delay	9.1	6.3		6.4	16.6			20.2			30.2	
LOS	A	A		A	B			C			C	
Approach Delay		6.4			16.4			20.3			30.2	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	0.6	11.7		0.6	145.7			5.8			14.2	
Queue Length 95th (m)	4.3	33.0		m5.9	228.4			16.0			26.3	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	164	2426		595	2435			411			389	
Starvation Cap Reductn	0	0		0	516			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.09	0.21		0.07	0.81			0.17			0.27	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 14.8	Intersection LOS: B
Intersection Capacity Utilization 72.6%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	548	38	12	1419	4	99	0	39	1	0	3
Future Volume (vph)	6	548	38	12	1419	4	99	0	39	1	0	3
Satd. Flow (prot)	1658	3283	0	1658	3315	0	1658	1464	0	0	1533	0
Flt Permitted	0.159			0.431			0.755				0.952	
Satd. Flow (perm)	277	3283	0	752	3315	0	1314	1464	0	0	1477	0
Satd. Flow (RTOR)								382			28	
Lane Group Flow (vph)	6	586	0	12	1423	0	99	39	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.1	32.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	87.0	87.0		87.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	72.5%	72.5%		72.5%	72.5%		27.5%	27.5%		27.5%	27.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	91.8	91.8		91.8	91.8		15.8	15.8			15.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13			0.13	
v/c Ratio	0.03	0.23		0.02	0.56		0.57	0.07			0.02	
Control Delay	3.0	2.6		7.4	9.2		60.6	0.3			0.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	3.0	2.6		7.4	9.2		60.6	0.3			0.2	
LOS	A	A		A	A		E	A			A	
Approach Delay		2.6			9.1			43.5			0.3	
Approach LOS		A			A			D			A	
Queue Length 50th (m)	0.2	8.3		0.5	54.2		22.6	0.0			0.0	
Queue Length 95th (m)	m0.7	11.1		m2.5	130.4		36.3	0.0			0.0	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	212	2511		575	2536		292	622			350	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.03	0.23		0.02	0.56		0.34	0.06			0.01	

Intersection Summary

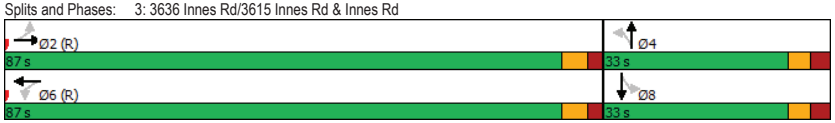
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 64.6%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	526	37	59	1378	33	19	5	39	46	13	41
Future Volume (vph)	11	526	37	59	1378	33	19	5	39	46	13	41
Satd. Flow (prot)	1658	3316	1483	1658	3300	0	1658	1745	1483	0	1604	0
Flt Permitted	0.185			0.418			0.695				0.850	
Satd. Flow (perm)	323	3316	1450	729	3300	0	1212	1745	1462	0	1393	0
Satd. Flow (RTOR)			115		3				105		28	
Lane Group Flow (vph)	11	526	37	59	1411	0	19	5	39	0	100	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	66.0	66.0	66.0	12.0	78.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	55.0%	55.0%	55.0%	10.0%	65.0%		30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	80.8	80.8	80.8	91.5	91.5		14.9	14.9	14.9		14.9	
Actuated g/C Ratio	0.67	0.67	0.67	0.76	0.76		0.12	0.12	0.12		0.12	
v/c Ratio	0.05	0.24	0.04	0.10	0.56		0.13	0.02	0.14		0.51	
Control Delay	6.5	4.9	0.1	5.2	8.0		44.5	40.6	1.1		42.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	6.5	4.9	0.1	5.2	8.0		44.5	40.6	1.1		42.3	
LOS	A	A	A	A	A		D	D	A		D	
Approach Delay		4.6			7.9			17.3			42.3	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	0.4	8.8	0.0	2.5	52.5		4.2	1.1	0.0		16.4	
Queue Length 95th (m)	1.3	21.2	0.0	9.6	122.2		9.8	4.2	0.0		28.9	
Internal Link Dist (m)		561.5			188.9			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	217	2233	1014	607	2515		299	431	440		365	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.05	0.24	0.04	0.10	0.56		0.06	0.01	0.09		0.27	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	4.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 8.9	Intersection LOS: A
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	532	41	24	1500	97	55	
Future Volume (vph)	532	41	24	1500	97	55	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	532	41	24	1500	97	55	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	24.0	24.0	11.7	24.0	11.3	30.5	4.0
Total Split (s)	75.0	75.0	13.0	88.0	16.2	32.0	15.8
Total Split (%)	62.5%	62.5%	10.8%	73.3%	13.5%	26.7%	13%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	74.6	74.6	6.1	82.4	9.5	25.1	
Actuated g/C Ratio	0.62	0.62	0.05	0.69	0.08	0.21	
v/c Ratio	0.26	0.04	0.29	0.66	0.74	0.18	
Control Delay	10.3	9.9	65.4	11.6	85.6	40.5	
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	
Total Delay	10.3	9.9	65.4	11.9	85.6	40.5	
LOS	B	A	E	B	F	D	
Approach Delay	10.2			12.7	69.3		
Approach LOS	B			B	E		
Queue Length 50th (m)	26.0	3.7	5.7	62.5	22.6	10.7	
Queue Length 95th (m)	32.4	8.0	m10.7	91.3	#48.3	22.2	
Internal Link Dist (m)	206.5			221.9	310.2		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	2060	921	87	2276	136	315	
Starvation Cap Reductn	0	0	0	9	0	0	
Spillback Cap Reductn	0	0	0	223	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.26	0.04	0.28	0.73	0.71	0.17	

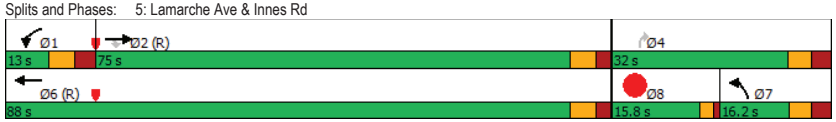
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 15.9	Intersection LOS: B
Intersection Capacity Utilization 59.7%	ICU Level of Service B
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	579	1621	178	59	694	131	64	225	78	174	272	203
Future Volume (vph)	579	1621	178	59	694	131	64	225	78	174	272	203
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.468			0.611		
Satd. Flow (perm)	3192	3316	1410	1652	3316	1445	808	3316	1432	1048	3316	1438
Satd. Flow (RTOR)			165			230			159			225
Lane Group Flow (vph)	579	1621	178	59	694	131	64	225	78	174	272	203
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	31.0	49.0	49.0	16.0	34.0	34.0	12.0	45.0	45.0	33.0	33.0	33.0
Total Split (%)	28.2%	44.5%	44.5%	14.5%	30.9%	30.9%	10.9%	40.9%	40.9%	30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	23.0	46.5	46.5	8.5	29.2	29.2	38.3	38.3	38.3	28.7	28.7	28.7
Actuated g/C Ratio	0.21	0.42	0.42	0.08	0.27	0.27	0.35	0.35	0.35	0.26	0.26	0.26
v/c Ratio	0.86	1.16	0.26	0.46	0.79	0.24	0.20	0.19	0.13	0.64	0.31	0.38
Control Delay	55.6	110.2	5.3	51.3	64.5	12.1	26.1	25.7	0.4	49.7	35.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	110.2	5.3	51.3	64.5	12.1	26.1	25.7	0.4	49.7	35.0	5.4
LOS	E	F	A	D	E	B	C	C	A	D	C	A
Approach Delay		89.1			55.8			20.4			29.7	
Approach LOS		F			E			C			C	
Queue Length 50th (m)	61.1	~228.2	1.7	10.2	79.6	3.5	9.2	17.6	0.0	34.2	25.5	0.0
Queue Length 95th (m)	#82.8	#272.1	15.3	27.2	#104.9	25.3	18.8	26.6	0.0	#63.9	37.4	13.5
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	713	1401	691	147	879	552	322	1154	602	273	864	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.16	0.26	0.40	0.79	0.24	0.20	0.19	0.13	0.64	0.31	0.38

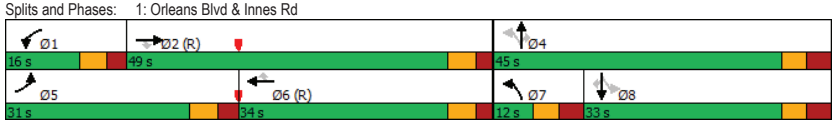
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.16

Intersection Signal Delay: 67.3	Intersection LOS: E
Intersection Capacity Utilization 104.8%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1778	30	102	831	72	23	6	84	67	17	37
Future Volume (vph)	74	1778	30	102	831	72	23	6	84	67	17	37
Satd. Flow (prot)	1658	3307	0	1658	3267	0	0	1524	0	0	1620	0
Flt Permitted	0.294			0.077				0.923			0.762	
Satd. Flow (perm)	511	3307	0	134	3267	0	0	1420	0	0	1261	0
Satd. Flow (RTOR)		3			15			19			20	
Lane Group Flow (vph)	74	1808	0	102	903	0	0	113	0	0	121	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	72.0	72.0		72.0	72.0		38.0	38.0		38.0	38.0	
Total Split (%)	65.5%	65.5%		65.5%	65.5%		34.5%	34.5%		34.5%	34.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	77.6	77.6		77.6	77.6			19.4			19.4	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.18			0.18	
v/c Ratio	0.21	0.77		1.09	0.39			0.42			0.51	
Control Delay	2.3	8.5		137.7	3.6			35.6			39.0	
Queue Delay	0.0	0.8		0.0	0.0			0.0			0.0	
Total Delay	2.3	9.3		137.7	3.6			35.6			39.0	
LOS	A	A		F	A			D			D	
Approach Delay		9.0			17.2			35.6			39.0	
Approach LOS		A			B			D			D	
Queue Length 50th (m)	1.4	36.0		~18.2	0.0			19.2			21.0	
Queue Length 95th (m)	m1.8	m21.8		m#58.3	m0.0			30.6			33.3	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	360	2334		94	2309			416			371	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	234		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.21	0.86		1.09	0.39			0.27			0.33	

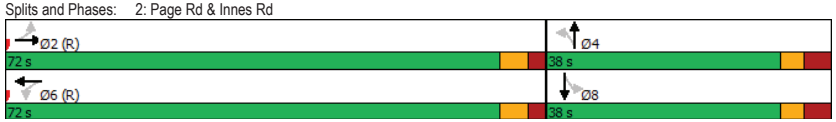
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 13.8	Intersection LOS: B
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1750	106	42	934	8	63	0	31	4	0	10
Future Volume (vph)	8	1750	106	42	934	8	63	0	31	4	0	10
Satd. Flow (prot)	1658	3281	0	1658	3312	0	1658	1483	0	0	1538	0
Flt Permitted	0.292			0.088			0.748				0.921	
Satd. Flow (perm)	510	3281	0	154	3312	0	1300	1483	0	0	1437	0
Satd. Flow (RTOR)		11			2			31			31	
Lane Group Flow (vph)	8	1856	0	42	942	0	63	31	0	0	14	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.1	34.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	77.0	77.0		77.0	77.0		33.0	33.0		33.0	33.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.2	88.2		88.2	88.2		13.9	13.9			13.9	
Actuated g/C Ratio	0.80	0.80		0.80	0.80		0.13	0.13			0.13	
v/c Ratio	0.02	0.70		0.34	0.35		0.38	0.14			0.07	
Control Delay	2.4	10.9		16.4	5.1		49.0	14.1			4.5	
Queue Delay	0.0	1.2		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.4	12.1		16.4	5.1		49.0	14.1			4.5	
LOS	A	B		B	A		D	B			A	
Approach Delay		12.1			5.5			37.5			4.5	
Approach LOS		B			A			D			A	
Queue Length 50th (m)	0.0	222.3		2.1	25.0		13.0	0.0			0.0	
Queue Length 95th (m)	m0.5	m226.5		16.1	59.7		22.6	7.5			2.2	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	408	2633		123	2655		315	383			372	
Starvation Cap Reductn	0	500		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.02	0.87		0.34	0.35		0.20	0.08			0.04	

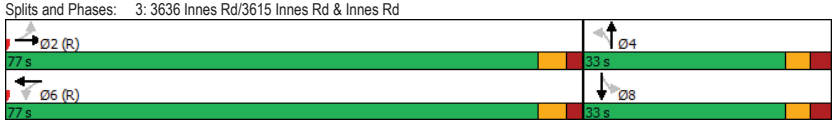
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 75.3%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1625	87	183	840	84	106	40	179	60	51	30
Future Volume (vph)	44	1625	87	183	840	84	106	40	179	60	51	30
Satd. Flow (prot)	1658	3316	1483	1658	3260	0	1658	1745	1483	0	1646	0
Flt Permitted	0.309			0.059			0.608				0.844	
Satd. Flow (perm)	537	3316	1399	103	3260	0	1042	1745	1460	0	1417	0
Satd. Flow (RTOR)			106		16				179		10	
Lane Group Flow (vph)	44	1625	87	183	924	0	106	40	179	0	141	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	68.0	68.0	68.0	20.0	88.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	52.3%	52.3%	52.3%	15.4%	67.7%		28.5%	28.5%	28.5%	28.5%	28.5%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	75.1	75.1	75.1	96.3	96.3		20.1	20.1	20.1		20.1	
Actuated g/C Ratio	0.58	0.58	0.58	0.74	0.74		0.15	0.15	0.15		0.15	
v/c Ratio	0.14	0.85	0.10	0.72	0.38		0.66	0.15	0.48		0.62	
Control Delay	18.6	30.4	2.4	43.6	7.4		69.3	45.0	10.2		58.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	18.6	30.4	2.4	43.6	7.4		69.3	45.0	10.2		58.1	
LOS	B	C	A	D	A		E	D	B		E	
Approach Delay		28.7			13.3			33.7			58.1	
Approach LOS		C			B			C			E	
Queue Length 50th (m)	4.8	166.9	0.0	26.9	35.7		26.5	9.2	0.0		32.5	
Queue Length 95th (m)	14.4	#277.3	6.1	53.6	63.5		42.5	18.2	18.6		49.7	
Internal Link Dist (m)		561.5			192.3			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	310	1915	852	270	2419		238	398	471		331	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.14	0.85	0.10	0.68	0.38		0.45	0.10	0.38		0.43	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 105 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	3.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

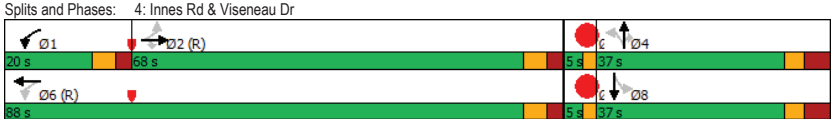
Intersection Summary

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 25.3	Intersection LOS: C
Intersection Capacity Utilization 94.0%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 4: Innes Rd & Viseneau Dr



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	1833	105	58	949	66	37	
Future Volume (vph)	1833	105	58	949	66	37	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1833	105	58	949	66	37	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	22.5	22.5	11.7	22.5	11.3	22.5	22.5
Total Split (s)	64.5	64.5	11.7	76.2	11.3	33.8	22.5
Total Split (%)	58.6%	58.6%	10.6%	69.3%	10.3%	30.7%	20%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	60.8	60.8	5.0	70.2	5.0	27.3	
Actuated g/C Ratio	0.55	0.55	0.05	0.64	0.05	0.25	
v/c Ratio	1.00	0.13	0.77	0.45	0.88	0.10	
Control Delay	38.5	14.8	102.4	12.8	127.9	32.9	
Queue Delay	10.8	0.0	0.0	0.0	0.0	0.1	
Total Delay	49.3	14.8	102.4	12.8	127.9	33.1	
LOS	D	B	F	B	F	C	
Approach Delay	47.4			17.9	93.8		
Approach LOS	D			B	F		
Queue Length 50th (m)	~219.1	10.1	12.8	45.7	14.4	6.2	
Queue Length 95th (m)	#262.8	m12.6	#36.0	95.7	#40.4	14.6	
Internal Link Dist (m)	206.5			221.9	256.5		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	1834	820	75	2116	75	368	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	63	0	0	0	0	88	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	1.04	0.13	0.77	0.45	0.88	0.13	

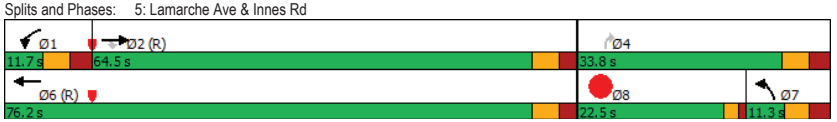
Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00
Intersection Signal Delay: 39.3 — Intersection LOS: D
Intersection Capacity Utilization 68.1% — ICU Level of Service C
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd



Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	532	41	24	1500	97	55
Future Vol, veh/h	532	41	24	1500	97	55
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	532	41	24	1500	97	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	573	0	1351	287
Stage 1	-	-	-	-	553	-
Stage 2	-	-	-	-	798	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	996	-	141	710
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	404	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	996	-	138	710
Mov Cap-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	394	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	23.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	347	-	-	996	-
HCM Lane V/C Ratio	0.438	-	-	0.024	-
HCM Control Delay (s)	23.2	-	-	8.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	2.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1833	105	58	949	66	37
Future Vol, veh/h	1833	105	58	949	66	37
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, %	2	2	2	2	2	2
Mvmt Flow	1833	105	58	949	66	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1938	0	2477	969
Stage 1	-	-	-	-	1886	-
Stage 2	-	-	-	-	591	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	299	-	~ 25	253
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	299	-	~ 15	253
Mov Cap-2 Maneuver	-	-	-	-	76	-
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	304	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	169.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	102	-	-	299	-
HCM Lane V/C Ratio	1.01	-	-	0.194	-
HCM Control Delay (s)	169.2	-	-	19.9	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	6.3	-	-	0.7	-

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

Appendix I

Synchro Intersection Worksheets – 2030 Future Background Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	439	23	17	1527	128	252	322	38	70	100	459
Future Volume (vph)	121	439	23	17	1527	128	252	322	38	70	100	459
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.549			0.557		
Satd. Flow (perm)	3208	3316	1426	1633	3316	1444	952	3316	1396	942	3316	1452
Satd. Flow (RTOR)			143			143			82			142
Lane Group Flow (vph)	121	439	23	17	1527	128	252	322	38	70	100	459
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	13.0	65.0	65.0	13.0	65.0	65.0	19.0	52.0	52.0	33.0	33.0	33.0
Total Split (%)	10.0%	50.0%	50.0%	10.0%	50.0%	50.0%	14.6%	40.0%	40.0%	25.4%	25.4%	25.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.4	66.6	66.6	6.4	58.8	58.8	45.3	45.3	45.3	26.3	26.3	26.3
Actuated g/C Ratio	0.05	0.51	0.51	0.05	0.45	0.45	0.35	0.35	0.35	0.20	0.20	0.20
v/c Ratio	0.77	0.26	0.03	0.21	1.02	0.18	0.63	0.28	0.07	0.37	0.15	1.13
Control Delay	90.3	19.3	0.1	65.5	63.5	3.0	41.4	31.4	0.3	51.3	43.4	116.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	19.3	0.1	65.5	63.5	3.0	41.4	31.4	0.3	51.3	43.4	116.7
LOS	F	B	A	E	E	A	D	C	A	D	D	F
Approach Delay		33.3			58.8			33.6			97.8	
Approach LOS		C			E			C			F	
Queue Length 50th (m)	16.0	29.3	0.0	4.3	~217.6	0.0	49.4	31.2	0.0	15.6	11.2	~105.3
Queue Length 95th (m)	#31.4	48.6	0.0	12.2	#260.2	8.6	73.7	43.0	0.0	30.6	19.2	#170.7
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	158	1698	800	86	1499	731	398	1155	539	190	670	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.26	0.03	0.20	1.02	0.18	0.63	0.28	0.07	0.37	0.15	1.13

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 99 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 57.2	Intersection LOS: E
Intersection Capacity Utilization 106.3%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Orleans Blvd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	519	21	39	1613	28	14	12	42	42	9	53
Future Volume (vph)	14	519	21	39	1613	28	14	12	42	42	9	53
Satd. Flow (prot)	1658	3292	0	1658	3304	0	0	1572	0	0	1572	0
Flt Permitted	0.111			0.451				0.923			0.859	
Satd. Flow (perm)	194	3292	0	782	3304	0	0	1462	0	0	1378	0
Satd. Flow (RTOR)		7			3			42			34	
Lane Group Flow (vph)	14	540	0	39	1641	0	0	68	0	0	104	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	82.0	82.0		82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%		68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.3	88.3		88.3	88.3			18.7			18.7	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.16			0.16	
v/c Ratio	0.10	0.22		0.07	0.68			0.26			0.43	
Control Delay	9.7	6.4		6.2	16.3			20.2			33.3	
Queue Delay	0.0	0.0		0.0	1.0			0.0			0.0	
Total Delay	9.7	6.4		6.2	17.3			20.2			33.3	
LOS	A	A		A	B			C			C	
Approach Delay		6.5			17.0			20.2			33.3	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	0.6	13.1		1.0	159.9			5.7			15.9	
Queue Length 95th (m)	4.5	35.4		m5.7	233.2			16.0			28.0	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	142	2423		575	2431			411			383	
Starvation Cap Reductn	0	0		0	477			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.10	0.22		0.07	0.84			0.17			0.27	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 75.3%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	598	38	12	1502	4	99	0	39	1	0	3
Future Volume (vph)	6	598	38	12	1502	4	99	0	39	1	0	3
Satd. Flow (prot)	1658	3286	0	1658	3315	0	1658	1464	0	0	1533	0
Flt Permitted	0.142			0.409			0.755				0.952	
Satd. Flow (perm)	248	3286	0	714	3315	0	1314	1464	0	0	1477	0
Satd. Flow (RTOR)								346			28	
Lane Group Flow (vph)	6	636	0	12	1506	0	99	39	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.1	32.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	87.0	87.0		87.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	72.5%	72.5%		72.5%	72.5%		27.5%	27.5%		27.5%	27.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	91.8	91.8		91.8	91.8		15.8	15.8			15.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13			0.13	
v/c Ratio	0.03	0.25		0.02	0.59		0.57	0.08			0.02	
Control Delay	3.3	2.9		7.5	9.7		60.6	0.3			0.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	3.3	2.9		7.5	9.7		60.6	0.3			0.2	
LOS	A	A		A	A		E	A			A	
Approach Delay		2.9			9.7			43.6			0.3	
Approach LOS		A			A			D			A	
Queue Length 50th (m)	0.2	10.7		0.5	60.1		22.6	0.0			0.0	
Queue Length 95th (m)	m0.8	13.7		m2.3	142.5		36.3	0.0			0.0	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	189	2513		546	2536		292	594			350	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.03	0.25		0.02	0.59		0.34	0.07			0.01	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	573	37	59	1458	33	19	5	39	46	13	41
Future Volume (vph)	11	573	37	59	1458	33	19	5	39	46	13	41
Satd. Flow (prot)	1658	3316	1483	1658	3304	0	1658	1745	1483	0	1604	0
Flt Permitted	0.167			0.395			0.695				0.850	
Satd. Flow (perm)	291	3316	1450	689	3304	0	1212	1745	1462	0	1393	0
Satd. Flow (RTOR)			115		3				105		28	
Lane Group Flow (vph)	11	573	37	59	1491	0	19	5	39	0	100	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	66.0	66.0	66.0	12.0	78.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	55.0%	55.0%	55.0%	10.0%	65.0%		30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	80.8	80.8	80.8	91.5	91.5		14.9	14.9	14.9		14.9	
Actuated g/C Ratio	0.67	0.67	0.67	0.76	0.76		0.12	0.12	0.12		0.12	
v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.13	0.02	0.14		0.51	
Control Delay	6.9	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	6.9	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
LOS	A	A	A	A	A		D	D	A		D	
Approach Delay		4.9			8.3			17.3			42.3	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	0.4	9.3	0.0	2.5	58.0		4.2	1.1	0.0		16.4	
Queue Length 95th (m)	1.5	27.3	0.0	9.6	134.7		9.8	4.2	0.0		28.9	
Internal Link Dist (m)		561.5			188.9			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	195	2233	1014	579	2518		299	431	440		365	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.06	0.01	0.09		0.27	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	4.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	557	54	37	1571	122	80	
Future Volume (vph)	557	54	37	1571	122	80	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	557	54	37	1571	122	80	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	24.0	24.0	11.7	24.0	11.3	30.5	4.0
Total Split (s)	73.0	73.0	15.0	88.0	23.1	32.0	8.9
Total Split (%)	60.8%	60.8%	12.5%	73.3%	19.3%	26.7%	7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	76.2	76.2	7.5	85.3	13.5	22.2	
Actuated g/C Ratio	0.64	0.64	0.06	0.71	0.11	0.18	
v/c Ratio	0.26	0.06	0.36	0.67	0.66	0.29	
Control Delay	10.1	10.2	62.9	11.6	67.1	44.1	
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	
Total Delay	10.1	10.2	62.9	11.8	67.1	44.1	
LOS	B	B	E	B	E	D	
Approach Delay	10.1			13.0	58.0		
Approach LOS	B			B	E		
Queue Length 50th (m)	28.2	4.8	8.7	74.7	27.8	16.3	
Queue Length 95th (m)	36.1	9.8	m15.2	91.0	46.7	30.1	
Internal Link Dist (m)	206.5			221.9	310.2		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	2106	942	115	2356	232	315	
Starvation Cap Reductn	0	0	0	14	0	0	
Spillback Cap Reductn	0	0	0	191	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.26	0.06	0.32	0.73	0.53	0.25	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 63.2%	ICU Level of Service B
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	579	1702	197	59	730	133	64	225	78	176	300	203
Future Volume (vph)	579	1702	197	59	730	133	64	225	78	176	300	203
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.443			0.611		
Satd. Flow (perm)	3193	3316	1410	1652	3316	1445	765	3316	1432	1048	3316	1438
Satd. Flow (RTOR)			165			230			159			225
Lane Group Flow (vph)	579	1702	197	59	730	133	64	225	78	176	300	203
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	31.0	49.0	49.0	16.0	34.0	34.0	12.0	45.0	45.0	33.0	33.0	33.0
Total Split (%)	28.2%	44.5%	44.5%	14.5%	30.9%	30.9%	10.9%	40.9%	40.9%	30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	23.0	46.5	46.5	8.5	29.2	29.2	38.3	38.3	38.3	28.7	28.7	28.7
Actuated g/C Ratio	0.21	0.42	0.42	0.08	0.27	0.27	0.35	0.35	0.35	0.26	0.26	0.26
v/c Ratio	0.86	1.21	0.29	0.46	0.83	0.24	0.21	0.19	0.13	0.64	0.35	0.38
Control Delay	55.6	133.8	6.5	51.1	66.3	12.2	26.2	25.7	0.4	50.1	35.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	133.8	6.5	51.1	66.3	12.2	26.2	25.7	0.4	50.1	35.4	5.4
LOS	E	F	A	D	E	B	C	C	A	D	D	A
Approach Delay		105.4			57.5			20.4			30.2	
Approach LOS		F			E			C			C	
Queue Length 50th (m)	61.1	~247.3	4.2	10.2	83.2	3.7	9.2	17.6	0.0	34.7	28.4	0.0
Queue Length 95th (m)	#82.8	#291.2	18.8	27.2	#114.1	25.6	18.8	26.6	0.0	#65.2	41.1	13.5
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	713	1401	691	147	879	552	309	1154	602	273	864	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.21	0.29	0.40	0.83	0.24	0.21	0.19	0.13	0.64	0.35	0.38

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.21

Intersection Signal Delay: 77.0	Intersection LOS: E
Intersection Capacity Utilization 107.3%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1867	30	102	877	72	23	6	84	67	17	37
Future Volume (vph)	74	1867	30	102	877	72	23	6	84	67	17	37
Satd. Flow (prot)	1658	3308	0	1658	3271	0	0	1524	0	0	1620	0
Flt Permitted	0.277			0.065				0.923			0.762	
Satd. Flow (perm)	482	3308	0	113	3271	0	0	1420	0	0	1261	0
Satd. Flow (RTOR)		3			14			15			20	
Lane Group Flow (vph)	74	1897	0	102	949	0	0	113	0	0	121	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	72.0	72.0		72.0	72.0		38.0	38.0		38.0	38.0	
Total Split (%)	65.5%	65.5%		65.5%	65.5%		34.5%	34.5%		34.5%	34.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	77.6	77.6		77.6	77.6			19.4			19.4	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.18			0.18	
v/c Ratio	0.22	0.81		1.29	0.41			0.43			0.51	
Control Delay	2.3	10.3		214.3	3.6			37.3			39.0	
Queue Delay	0.0	2.8		0.0	0.0			0.0			0.0	
Total Delay	2.3	13.1		214.3	3.6			37.3			39.0	
LOS	A	B		F	A			D			D	
Approach Delay		12.7			24.0			37.3			39.0	
Approach LOS		B			C			D			D	
Queue Length 50th (m)	1.4	46.4		~26.8	0.0			20.1			21.0	
Queue Length 95th (m)	m1.8	m21.4		m#60.4	m21.4			31.3			33.3	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	340	2334		79	2311			413			371	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	321		0	0			1			1	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.22	0.94		1.29	0.41			0.27			0.33	

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.29

Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 95.7%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1845	106	42	989	8	63	0	31	4	0	10
Future Volume (vph)	8	1845	106	42	989	8	63	0	31	4	0	10
Satd. Flow (prot)	1658	3285	0	1658	3312	0	1658	1483	0	0	1538	0
Flt Permitted	0.274			0.076			0.748				0.921	
Satd. Flow (perm)	478	3285	0	133	3312	0	1300	1483	0	0	1437	0
Satd. Flow (RTOR)		11			1			31			31	
Lane Group Flow (vph)	8	1951	0	42	997	0	63	31	0	0	14	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.1	34.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	77.0	77.0		77.0	77.0		33.0	33.0		33.0	33.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.2	88.2		88.2	88.2		13.9	13.9			13.9	
Actuated g/C Ratio	0.80	0.80		0.80	0.80		0.13	0.13			0.13	
v/c Ratio	0.02	0.74		0.40	0.38		0.38	0.14			0.07	
Control Delay	2.4	11.8		21.8	5.2		49.0	14.1			4.5	
Queue Delay	0.0	1.8		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.4	13.6		21.8	5.2		49.0	14.1			4.5	
LOS	A	B		C	A		D	B			A	
Approach Delay		13.6			5.9			37.5			4.5	
Approach LOS		B			A			D			A	
Queue Length 50th (m)	0.0	232.6		2.2	27.1		13.0	0.0			0.0	
Queue Length 95th (m)	m0.5	m218.2		#22.3	64.7		22.6	7.5			2.2	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	383	2636		106	2655		315	383			372	
Starvation Cap Reductn	0	488		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.02	0.91		0.40	0.38		0.20	0.08			0.04	

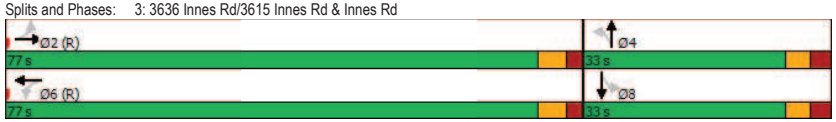
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 78.1%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1714	87	183	888	84	106	40	179	60	51	30
Future Volume (vph)	44	1714	87	183	888	84	106	40	179	60	51	30
Satd. Flow (prot)	1658	3316	1483	1658	3263	0	1658	1745	1483	0	1646	0
Flt Permitted	0.295			0.049			0.608				0.844	
Satd. Flow (perm)	513	3316	1399	86	3263	0	1042	1745	1460	0	1417	0
Satd. Flow (RTOR)			106		15				179		10	
Lane Group Flow (vph)	44	1714	87	183	972	0	106	40	179	0	141	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	68.0	68.0	68.0	20.0	88.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	52.3%	52.3%	52.3%	15.4%	67.7%		28.5%	28.5%	28.5%	28.5%	28.5%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	75.1	75.1	75.1	96.3	96.3		20.1	20.1	20.1		20.1	
Actuated g/C Ratio	0.58	0.58	0.58	0.74	0.74		0.15	0.15	0.15		0.15	
v/c Ratio	0.15	0.90	0.10	0.75	0.40		0.66	0.15	0.48		0.62	
Control Delay	18.8	33.4	2.4	50.7	7.5		69.3	45.0	10.2		58.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	18.8	33.4	2.4	50.7	7.5		69.3	45.0	10.2		58.1	
LOS	B	C	A	D	A		E	D	B		E	
Approach Delay		31.5			14.4			33.7			58.1	
Approach LOS		C			B			C			E	
Queue Length 50th (m)	4.8	186.0	0.0	30.2	38.4		26.5	9.2	0.0		32.5	
Queue Length 95th (m)	14.6	#302.0	6.1	56.5	68.1		42.5	18.2	18.6		49.7	
Internal Link Dist (m)		561.5			192.3			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	296	1915	852	259	2421		238	398	471		331	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.15	0.90	0.10	0.71	0.40		0.45	0.10	0.38		0.43	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 105 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	3.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 27.1	Intersection LOS: C
Intersection Capacity Utilization 96.6%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	1920	116	69	994	76	47	
Future Volume (vph)	1920	116	69	994	76	47	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1920	116	69	994	76	47	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	22.5	22.5	11.7	22.5	11.3	22.5	22.5
Total Split (s)	64.3	64.3	11.7	76.0	11.5	34.0	22.5
Total Split (%)	58.5%	58.5%	10.6%	69.1%	10.5%	30.9%	20%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	58.3	58.3	5.0	70.0	5.2	27.5	
Actuated g/C Ratio	0.53	0.53	0.05	0.64	0.05	0.25	
v/c Ratio	1.09	0.15	0.92	0.47	0.97	0.13	
Control Delay	70.1	15.1	132.1	13.4	148.9	33.2	
Queue Delay	3.2	0.0	0.0	0.0	0.0	0.3	
Total Delay	73.3	15.1	132.1	13.4	148.9	33.5	
LOS	E	B	F	B	F	C	
Approach Delay	70.0			21.1	104.8		
Approach LOS	E			C	F		
Queue Length 50th (m)	~241.6	11.2	15.1	49.3	16.6	7.9	
Queue Length 95th (m)	#284.1	m13.3	#42.7	105.6	#46.0	17.5	
Internal Link Dist (m)	206.5			221.9	256.5		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	1757	785	75	2110	78	370	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	88	0	0	0	0	128	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	1.15	0.15	0.92	0.47	0.97	0.19	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09
Intersection Signal Delay: 55.2 — Intersection LOS: E
Intersection Capacity Utilization 75.2% — ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	557	63	43	1571	144	94
Future Vol, veh/h	557	63	43	1571	144	94
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	557	63	43	1571	144	94

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	620	0	1461	310
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	872	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	956	-	~ 120	686
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	369	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	~ 115	686
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	352	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	41.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	956	-
HCM Lane V/C Ratio	0.735	-	-	0.045	-
HCM Control Delay (s)	41.5	-	-	8.9	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	5.5	-	-	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	13

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1920	116	69	994	76	47
Future Vol, veh/h	1920	116	69	994	76	47
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, %	2	2	2	2	2	2
Mvmt Flow	1920	116	69	994	76	47

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2036	0	2613	1018
Stage 1	-	-	-	-	1978	-
Stage 2	-	-	-	-	635	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	274	-	~ 20	235
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	274	-	~ 9	235
Mov Cap-2 Maneuver	-	-	-	-	~ 63	-
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	215	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	$ 326.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	87	-	-	274	-
HCM Lane V/C Ratio	1.414	-	-	0.252	-
HCM Control Delay (s)	$ 326.6	-	-	22.5	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	9.4	-	-	1	-

Notes

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

Appendix J

MMLOS Analysis

CGH TRANSPORTATION

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation Inc.	**Project**	245 and 275 Lamarche Avenue
Scenario	Existing/Future	**Date**	7/27/2022
Comments			

	INTERSECTIONS	Innes Road at Orleans Boulevard				Innes Road at Page Road				Innes Road at Lamarche Avenue (Future)				Innes Road at Access 3615 Innes Road/3636 Innes Road				Innes Road at Viseneau Drive			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	6	6	8	8	6	6	8	8		3		7	4	5	7	7	5	7	9	9
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected	Protected	Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive		Protected		Protected	Permissive	Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control		No right turn	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RTOR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR prohibited		RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No		No		No	No	No	No	No	No	No	Yes	Yes
	Right Turn Channel	Conventional with Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	Conv'tl without Receiving Lane	No Channel	No Channel	No Channel	No Channel		No Channel		No Right Turn	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	15-25m	15-25m	15-25m	10-15m	10-15m	10-15m	10-15m		3-5m		No Right Turn	3-5m	5-10m	10-15m	5-10m	5-10m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	27	27	-10	-7	20	20	-12	-12		83		30	55	38	4	11	38	4	-24	-24
	Ped. Exposure to Traffic LoS	F	F	F	F	F	F	F	F	-	B	-	E	D	E	F	F	E	F	#N/A	#N/A
	Cycle Length	110	110	110	110	110	110	110	110					110	110	110	110	120	120	120	120
	Effective Walk Time	7	26	26	26	7	7	48	48					8	8	57	57	8	8	53	41
	Average Pedestrian Delay	48	32	32	32	48	48	17	17					47	47	13	13	52	52	19	26
	Pedestrian Delay LoS	E	D	D	D	E	E	B	B	-	-	-	-	E	E	B	B	E	E	B	C
	Level of Service	F	F	F	F	F	F	F	F	-	B	-	E	E	E	F	F	E	F	#N/A	#N/A
		F				F				E				F				#N/A			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	≤ 50 m	> 50 m	Not Applicable						Not Applicable		Not Applicable					≤ 50 m			Not Applicable
	Right Turning Speed	>25 km/h	>25 km/h	>25 km/h	Not Applicable						Not Applicable		Not Applicable					≤ 25 km/h			Not Applicable
	Cyclist relative to RT motorists	F	E	F	Not Applicable	#N/A	#N/A	Not Applicable	Not Applicable	-	Not Applicable	Not Applicable	Not Applicable	#N/A	#N/A	Not Applicable	Not Applicable	D	#N/A	Not Applicable	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated	-	Separated	Separated	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed		2-stage, LT box	2-stage, LT box	2-stage, LT box	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed
	Operating Speed	≥ 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h		> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	F	F	F	F	B	B	F	F	-	A	A	A	C	C	F	F	B	E	F	F
	Level of Service	F	F	F	F	#N/A	#N/A	F	F	-	A	A	A	#N/A	#N/A	F	F	D	#N/A	F	F
		F				#N/A				A				#N/A				#N/A			
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec			≤ 10 sec	≤ 20 sec			> 40 sec	> 40 sec			≤ 10 sec	≤ 10 sec	> 40 sec		≤ 10 sec	≤ 40 sec
	Level of Service	F	F	F	F	-	-	B	C	-	-	F	F	-	-	B	B	F	-	B	E
		F				C				F				B				F			
Truck	Effective Corner Radius	> 15 m		> 15 m																	
	Number of Receiving Lanes on Departure from Intersection	≥ 2		≥ 2																	
	Level of Service	A	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		A				-				-				-				-			
Auto	Volume to Capacity Ratio	> 1.00				> 1.00				0.81 - 0.90				0.71 - 0.80				0.81 - 0.90			
	Level of Service	F				F				D				C				D			

Multi-Modal Level of Service - Segments Form

Consultant	**CGH Transportation Inc.**	**Project**	**245 and 275 Lamarche Avenue**
Scenario	**Existing/Future**	**Date**	**7/27/2022**
Comments			

SEGMENTS			Lamarche Ave Existing	Lamarche Ave Future	Section 3	Section 4
Pedestrian	Sidewalk Width Boulevard Width		≥ 2 m > 2 m	1.8 m > 2 m		
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000		
	Operating Speed On-Street Parking		> 50 to 60 km/h yes	> 50 to 60 km/h yes		
	Exposure to Traffic PLoS	**-**	**A**	**A**	-	-
	Effective Sidewalk Width					
	Pedestrian Volume					
	Crowding PLoS		-	-	-	-
	Level of Service		**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility		Physically Separated	Physically Separated		
	Number of Travel Lanes					
	Operating Speed					
	# of Lanes & Operating Speed LoS		-	-	-	-
	Bike Lane (+ Parking Lane) Width					
	Bike Lane Width LoS	**A**	-	-	-	-
	Bike Lane Blockages					
	Blockage LoS		-	-	-	-
	Median Refuge Width (no median = < 1.8 m)					
	No. of Lanes at Unsignalized Crossing					
	Sidestreet Operating Speed					
	Unsignalized Crossing - Lowest LoS		~~A~~	~~A~~	-	-
	Level of Service		**A**	**A**	**-**	**-**
Transit	Facility Type					
	Friction or Ratio Transit:Posted Speed	**-**				
	Level of Service		**-**	**-**	**-**	**-**
Truck	Truck Lane Width					
	Travel Lanes per Direction	**-**				
	Level of Service		**-**	**-**	**-**	**-**

Appendix K

Synchro Intersection Worksheets –2025 Future Total Conditions

CGH TRANSPORTATION

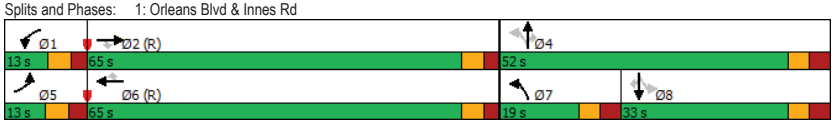
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Future Volume (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.549			0.557		
Satd. Flow (perm)	3209	3316	1426	1633	3316	1444	952	3316	1396	942	3316	1452
Satd. Flow (RTOR)			143			143			82			142
Lane Group Flow (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	13.0	65.0	65.0	13.0	65.0	65.0	19.0	52.0	52.0	33.0	33.0	33.0
Total Split (%)	10.0%	50.0%	50.0%	10.0%	50.0%	50.0%	14.6%	40.0%	40.0%	25.4%	25.4%	25.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.4	66.6	66.6	6.4	58.8	58.8	45.3	45.3	45.3	26.3	26.3	26.3
Actuated g/C Ratio	0.05	0.51	0.51	0.05	0.45	0.45	0.35	0.35	0.35	0.20	0.20	0.20
v/c Ratio	0.77	0.26	0.03	0.21	1.03	0.18	0.63	0.28	0.07	0.38	0.15	1.13
Control Delay	90.3	19.3	0.1	65.5	66.4	3.3	41.4	31.4	0.3	51.6	43.4	116.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	19.3	0.1	65.5	66.4	3.3	41.4	31.4	0.3	51.6	43.4	116.7
LOS	F	B	A	E	E	A	D	C	A	D	D	F
Approach Delay		33.1			61.4			33.6			97.7	
Approach LOS		C			E			C			F	
Queue Length 50th (m)	16.0	29.8	0.0	4.3	~222.1	0.0	49.4	31.2	0.0	16.1	11.2	~105.3
Queue Length 95th (m)	#31.4	49.4	0.0	12.2	#264.7	9.7	73.7	43.0	0.0	31.4	19.2	#170.7
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	158	1698	800	86	1499	731	398	1155	539	190	670	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.26	0.03	0.20	1.03	0.18	0.63	0.28	0.07	0.38	0.15	1.13

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 99 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13
Intersection Signal Delay: 58.3 — Intersection LOS: E
Intersection Capacity Utilization 106.7% — ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	528	21	39	1635	28	14	12	42	42	9	53
Future Volume (vph)	14	528	21	39	1635	28	14	12	42	42	9	53
Satd. Flow (prot)	1658	3292	0	1658	3304	0	0	1572	0	0	1572	0
Flt Permitted	0.107			0.447				0.923			0.859	
Satd. Flow (perm)	187	3292	0	776	3304	0	0	1462	0	0	1378	0
Satd. Flow (RTOR)		6			3			42			33	
Lane Group Flow (vph)	14	549	0	39	1663	0	0	68	0	0	104	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	82.0	82.0		82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%		68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.3	88.3		88.3	88.3			18.7			18.7	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.16			0.16	
v/c Ratio	0.10	0.23		0.07	0.68			0.26			0.43	
Control Delay	9.9	6.5		7.1	18.2			20.2			33.7	
Queue Delay	0.0	0.0		0.0	1.4			0.0			0.0	
Total Delay	9.9	6.5		7.1	19.6			20.2			33.7	
LOS	A	A		A	B			C			C	
Approach Delay		6.5			19.3			20.2			33.7	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	0.6	13.4		1.0	169.0			5.7			16.2	
Queue Length 95th (m)	4.5	36.1		m5.7	242.0			16.0			28.2	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	137	2423		570	2430			411			382	
Starvation Cap Reductn	0	0		0	522			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.10	0.23		0.07	0.87			0.17			0.27	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 75.9%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

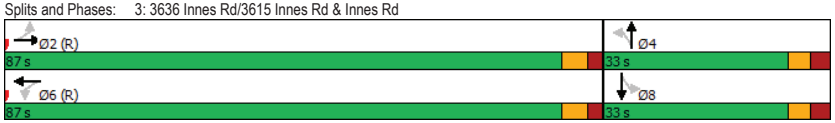
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	612	38	12	1508	4	99	0	39	1	0	3
Future Volume (vph)	6	612	38	12	1508	4	99	0	39	1	0	3
Satd. Flow (prot)	1658	3286	0	1658	3315	0	1658	1464	0	0	1533	0
Flt Permitted	0.141			0.403			0.755				0.952	
Satd. Flow (perm)	246	3286	0	703	3315	0	1314	1464	0	0	1477	0
Satd. Flow (RTOR)								336			28	
Lane Group Flow (vph)	6	650	0	12	1512	0	99	39	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.1	32.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	87.0	87.0		87.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	72.5%	72.5%		72.5%	72.5%		27.5%	27.5%		27.5%	27.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	91.8	91.8		91.8	91.8		15.8	15.8			15.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13			0.13	
v/c Ratio	0.03	0.26		0.02	0.60		0.57	0.08			0.02	
Control Delay	3.8	3.2		7.4	9.8		60.6	0.3			0.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	3.8	3.2		7.4	9.8		60.6	0.3			0.2	
LOS	A	A		A	A		E	A			A	
Approach Delay		3.2			9.8			43.6			0.3	
Approach LOS		A			A			D			A	
Queue Length 50th (m)	0.2	12.7		0.5	60.4		22.6	0.0			0.0	
Queue Length 95th (m)	m0.8	16.6		m2.3	143.4		36.3	0.0			0.0	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	188	2513		537	2536		292	586			350	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.03	0.26		0.02	0.60		0.34	0.07			0.01	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60
Intersection Signal Delay: 9.9 Intersection LOS: A
Intersection Capacity Utilization 67.2% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	587	37	59	1464	33	19	5	39	46	13	41
Future Volume (vph)	11	587	37	59	1464	33	19	5	39	46	13	41
Satd. Flow (prot)	1658	3316	1483	1658	3304	0	1658	1745	1483	0	1604	0
Flt Permitted	0.165			0.389			0.695				0.850	
Satd. Flow (perm)	288	3316	1450	678	3304	0	1212	1745	1462	0	1393	0
Satd. Flow (RTOR)			115		3				105		28	
Lane Group Flow (vph)	11	587	37	59	1497	0	19	5	39	0	100	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	66.0	66.0	66.0	12.0	78.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	55.0%	55.0%	55.0%	10.0%	65.0%		30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	80.8	80.8	80.8	91.5	91.5		14.9	14.9	14.9		14.9	
Actuated g/C Ratio	0.67	0.67	0.67	0.76	0.76		0.12	0.12	0.12		0.12	
v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.13	0.02	0.14		0.51	
Control Delay	7.0	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	7.0	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
LOS	A	A	A	A	A		D	D	A		D	
Approach Delay		4.9			8.4			17.3			42.3	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	0.4	9.4	0.0	2.5	58.3		4.2	1.1	0.0		16.4	
Queue Length 95th (m)	1.5	30.2	0.0	9.6	135.6		9.8	4.2	0.0		28.9	
Internal Link Dist (m)		561.5			188.9			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	194	2233	1014	571	2518		299	431	440		365	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.06	0.01	0.09		0.27	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	4.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	557	63	43	1571	144	94	
Future Volume (vph)	557	63	43	1571	144	94	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	557	63	43	1571	144	94	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	24.0	24.0	11.7	24.0	11.3	30.5	4.0
Total Split (s)	74.0	74.0	14.0	88.0	18.9	32.0	13.1
Total Split (%)	61.7%	61.7%	11.7%	73.3%	15.8%	26.7%	11%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	71.1	71.1	6.9	82.3	12.3	25.2	
Actuated g/C Ratio	0.59	0.59	0.06	0.69	0.10	0.21	
v/c Ratio	0.28	0.07	0.45	0.69	0.85	0.30	
Control Delay	11.7	10.9	70.0	12.7	91.5	43.0	
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	
Total Delay	11.7	10.9	70.0	13.0	91.5	43.0	
LOS	B	B	E	B	F	D	
Approach Delay	11.6			14.5	72.3		
Approach LOS	B			B	E		
Queue Length 50th (m)	27.8	6.0	10.3	71.4	33.8	18.8	
Queue Length 95th (m)	35.3	11.2	m17.9	90.6	#68.6	34.2	
Internal Link Dist (m)	206.5			221.9	65.1		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	1966	879	100	2273	174	315	
Starvation Cap Reductn	0	0	0	15	0	0	
Spillback Cap Reductn	0	0	0	223	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.07	0.43	0.77	0.83	0.30	

Intersection Summary

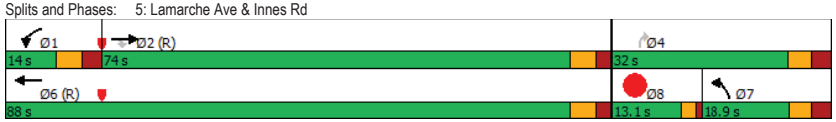
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd



Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	212	0	11	96
Future Vol, veh/h	0	25	212	0	11	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	25	212	0	11	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	330	212	0	0	212	0
Stage 1	212	-	-	-	-	-
Stage 2	118	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	828	-	-	1358	-
Stage 1	823	-	-	-	-	-
Stage 2	907	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	659	828	-	-	1358	-
Mov Cap-2 Maneuver	659	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	899	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	828	1358	-
HCM Lane V/C Ratio	-	-	0.03	0.008	-
HCM Control Delay (s)	-	-	9.5	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	11	201	0	5	91
Future Vol, veh/h	0	11	201	0	5	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	11	201	0	5	91

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	302	201	0	0	201	0
Stage 1	201	-	-	-	-	-
Stage 2	101	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	690	840	-	-	1371	-
Stage 1	833	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	687	840	-	-	1371	-
Mov Cap-2 Maneuver	687	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	919	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	840	1371	-
HCM Lane V/C Ratio	-	-	0.013	0.004	-
HCM Control Delay (s)	-	-	9.3	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	579	1636	178	59	706	135	64	225	78	179	272	203
Future Volume (vph)	579	1636	178	59	706	135	64	225	78	179	272	203
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.468			0.611		
Satd. Flow (perm)	3193	3316	1410	1652	3316	1445	808	3316	1432	1048	3316	1438
Satd. Flow (RTOR)			165			230			159			225
Lane Group Flow (vph)	579	1636	178	59	706	135	64	225	78	179	272	203
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	31.0	49.0	49.0	16.0	34.0	34.0	12.0	45.0	45.0	33.0	33.0	33.0
Total Split (%)	28.2%	44.5%	44.5%	14.5%	30.9%	30.9%	10.9%	40.9%	40.9%	30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	23.0	46.5	46.5	8.5	29.2	29.2	38.3	38.3	38.3	28.7	28.7	28.7
Actuated g/C Ratio	0.21	0.42	0.42	0.08	0.27	0.27	0.35	0.35	0.35	0.26	0.26	0.26
v/c Ratio	0.86	1.17	0.26	0.46	0.80	0.24	0.20	0.19	0.13	0.66	0.31	0.38
Control Delay	55.6	114.5	5.3	51.3	64.7	12.6	26.1	25.7	0.4	50.7	35.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	114.5	5.3	51.3	64.7	12.6	26.1	25.7	0.4	50.7	35.0	5.4
LOS	E	F	A	D	E	B	C	C	A	D	C	A
Approach Delay		92.1			56.0			20.4			30.1	
Approach LOS		F			E			C			C	
Queue Length 50th (m)	61.1	~231.7	1.7	10.3	79.7	3.7	9.2	17.6	0.0	35.4	25.5	0.0
Queue Length 95th (m)	#82.8	#275.6	15.3	27.1	#107.6	26.2	18.8	26.6	0.0	#67.0	37.4	13.5
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	713	1401	691	147	879	552	322	1154	602	273	864	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.17	0.26	0.40	0.80	0.24	0.20	0.19	0.13	0.66	0.31	0.38

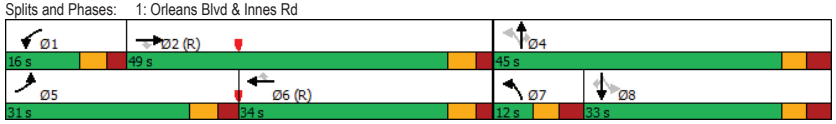
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 69.1	Intersection LOS: E
Intersection Capacity Utilization 105.5%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1798	30	102	847	72	23	6	84	67	17	37
Future Volume (vph)	74	1798	30	102	847	72	23	6	84	67	17	37
Satd. Flow (prot)	1658	3307	0	1658	3267	0	0	1524	0	0	1620	0
Flt Permitted	0.288			0.074				0.923			0.762	
Satd. Flow (perm)	501	3307	0	129	3267	0	0	1420	0	0	1261	0
Satd. Flow (RTOR)		3			14			18			20	
Lane Group Flow (vph)	74	1828	0	102	919	0	0	113	0	0	121	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	72.0	72.0		72.0	72.0		38.0	38.0		38.0	38.0	
Total Split (%)	65.5%	65.5%		65.5%	65.5%		34.5%	34.5%		34.5%	34.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	77.6	77.6		77.6	77.6			19.4			19.4	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.18			0.18	
v/c Ratio	0.21	0.78		1.12	0.40			0.43			0.51	
Control Delay	2.3	8.8		151.5	3.8			36.0			39.0	
Queue Delay	0.0	0.9		0.0	0.0			0.0			0.0	
Total Delay	2.3	9.7		151.5	3.8			36.0			39.0	
LOS	A	A		F	A			D			D	
Approach Delay		9.4			18.5			36.0			39.0	
Approach LOS		A			B			D			D	
Queue Length 50th (m)	1.4	37.9		~18.9	0.0			19.4			21.0	
Queue Length 95th (m)	m1.9	m22.3		m#57.6	m22.6			30.8			33.3	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	353	2334		91	2308			415			371	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	235		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.21	0.87		1.12	0.40			0.27			0.33	

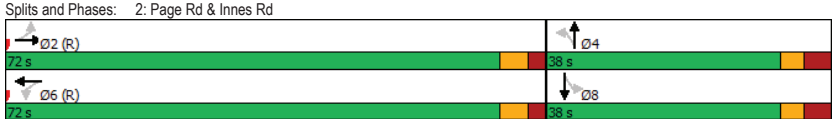
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 93.7%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1761	106	42	948	8	63	0	31	4	0	10
Future Volume (vph)	8	1761	106	42	948	8	63	0	31	4	0	10
Satd. Flow (prot)	1658	3281	0	1658	3312	0	1658	1483	0	0	1538	0
Flt Permitted	0.288			0.087			0.748				0.921	
Satd. Flow (perm)	503	3281	0	152	3312	0	1300	1483	0	0	1437	0
Satd. Flow (RTOR)		11			1			31			31	
Lane Group Flow (vph)	8	1867	0	42	956	0	63	31	0	0	14	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.1	34.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	77.0	77.0		77.0	77.0		33.0	33.0		33.0	33.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.2	88.2		88.2	88.2		13.9	13.9			13.9	
Actuated g/C Ratio	0.80	0.80		0.80	0.80		0.13	0.13			0.13	
v/c Ratio	0.02	0.71		0.34	0.36		0.38	0.14			0.07	
Control Delay	2.4	10.7		16.7	5.1		49.0	14.1			4.5	
Queue Delay	0.0	1.1		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.4	11.8		16.7	5.1		49.0	14.1			4.5	
LOS	A	B		B	A		D	B			A	
Approach Delay		11.8			5.6			37.5			4.5	
Approach LOS		B			A			D			A	
Queue Length 50th (m)	0.0	222.3		2.1	25.5		13.0	0.0			0.0	
Queue Length 95th (m)	m0.5	m219.3		16.4	61.1		22.6	7.5			2.2	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	403	2633		122	2655		315	383			372	
Starvation Cap Reductn	0	486		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.02	0.87		0.34	0.36		0.20	0.08			0.04	

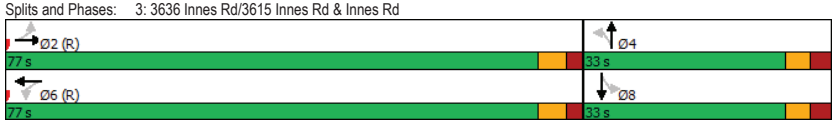
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 10.5	Intersection LOS: B
Intersection Capacity Utilization 75.6%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1636	87	183	854	84	106	40	179	60	51	30
Future Volume (vph)	44	1636	87	183	854	84	106	40	179	60	51	30
Satd. Flow (prot)	1658	3316	1483	1658	3263	0	1658	1745	1483	0	1646	0
Flt Permitted	0.305			0.058			0.608				0.844	
Satd. Flow (perm)	530	3316	1399	101	3263	0	1042	1745	1460	0	1417	0
Satd. Flow (RTOR)			106		15				179		10	
Lane Group Flow (vph)	44	1636	87	183	938	0	106	40	179	0	141	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	68.0	68.0	68.0	20.0	88.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	52.3%	52.3%	52.3%	15.4%	67.7%		28.5%	28.5%	28.5%	28.5%	28.5%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	75.1	75.1	75.1	96.3	96.3		20.1	20.1	20.1		20.1	
Actuated g/C Ratio	0.58	0.58	0.58	0.74	0.74		0.15	0.15	0.15		0.15	
v/c Ratio	0.14	0.85	0.10	0.72	0.39		0.66	0.15	0.48		0.62	
Control Delay	18.7	30.7	2.4	44.3	7.4		69.3	45.0	10.2		58.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	18.7	30.7	2.4	44.3	7.4		69.3	45.0	10.2		58.1	
LOS	B	C	A	D	A		E	D	B		E	
Approach Delay		29.0			13.4			33.7			58.1	
Approach LOS		C			B			C			E	
Queue Length 50th (m)	4.8	169.1	0.0	27.3	36.4		26.5	9.2	0.0		32.5	
Queue Length 95th (m)	14.5	#280.1	6.1	53.9	64.9		42.5	18.2	18.6		49.7	
Internal Link Dist (m)		561.5			192.3			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	306	1915	852	269	2421		238	398	471		331	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.14	0.85	0.10	0.68	0.39		0.45	0.10	0.38		0.43	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 105 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	3.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

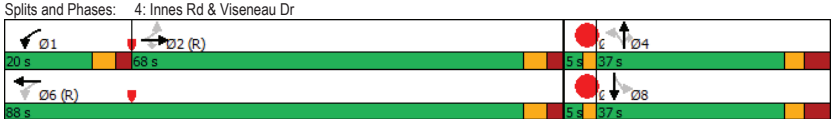
Intersection Summary

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 25.5	Intersection LOS: C
Intersection Capacity Utilization 94.3%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 4: Innes Rd & Viseneau Dr



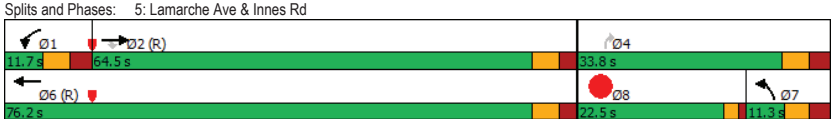
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	1833	125	72	949	82	48	
Future Volume (vph)	1833	125	72	949	82	48	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1833	125	72	949	82	48	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	22.5	22.5	11.7	22.5	11.3	22.5	22.5
Total Split (s)	64.5	64.5	11.7	76.2	11.3	33.8	22.5
Total Split (%)	58.6%	58.6%	10.6%	69.3%	10.3%	30.7%	20%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	58.5	58.5	5.0	70.2	5.0	27.3	
Actuated g/C Ratio	0.53	0.53	0.05	0.64	0.05	0.25	
v/c Ratio	1.04	0.16	0.96	0.45	1.09	0.13	
Control Delay	50.0	15.0	142.7	12.8	181.4	33.4	
Queue Delay	15.3	0.0	0.0	0.0	0.0	0.2	
Total Delay	65.3	15.0	142.7	12.8	181.4	33.6	
LOS	E	B	F	B	F	C	
Approach Delay	62.1			22.0	126.8		
Approach LOS	E			C	F		
Queue Length 50th (m)	~219.2	12.2	15.9	45.8	~19.8	8.0	
Queue Length 95th (m)	#262.7	m15.0	#44.4	96.5	#50.3	17.8	
Internal Link Dist (m)	206.5			221.9	61.3		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	1763	788	75	2116	75	368	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	63	0	0	0	0	88	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	1.08	0.16	0.96	0.45	1.09	0.17	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09
Intersection Signal Delay: 51.6 Intersection LOS: D
Intersection Capacity Utilization 78.2% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd



Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	19	111	0	24	173
Future Vol, veh/h	0	19	111	0	24	173
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	19	111	0	24	173

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	332	111	0	0	111	0
Stage 1	111	-	-	-	-	-
Stage 2	221	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	663	942	-	-	1479	-
Stage 1	914	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	651	942	-	-	1479	-
Mov Cap-2 Maneuver	651	-	-	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	942	1479	-
HCM Lane V/C Ratio	-	-	0.02	0.016	-
HCM Control Delay (s)	-	-	8.9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	103	0	10	163
Future Vol, veh/h	0	8	103	0	10	163
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	8	103	0	10	163

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	286	103	0	0	103	0
Stage 1	103	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	704	952	-	-	1489	-
Stage 1	921	-	-	-	-	-
Stage 2	848	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	699	952	-	-	1489	-
Mov Cap-2 Maneuver	699	-	-	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	842	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	952	1489	-
HCM Lane V/C Ratio	-	-	0.008	0.007	-
HCM Control Delay (s)	-	-	8.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	532	50	30	1500	119	69
Future Vol, veh/h	532	50	30	1500	119	69
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	532	50	30	1500	119	69

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	582	0	1367	291
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	810	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	988	-	138	706
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	398	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	988	-	134	706
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	386	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	27.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	343	-	-	988	-
HCM Lane V/C Ratio	0.548	-	-	0.03	-
HCM Control Delay (s)	27.5	-	-	8.8	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	13

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1833	125	72	949	82	48
Future Vol, veh/h	1833	125	72	949	82	48
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, %	2	2	2	2	2	2
Mvmt Flow	1833	125	72	949	82	48

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1958	0	2515	979
Stage 1	-	-	-	-	1896	-
Stage 2	-	-	-	-	619	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	294	-	~ 23	249
Stage 1	-	-	-	-	104	-
Stage 2	-	-	-	-	499	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	294	-	~ 11	249
Mov Cap-2 Maneuver	-	-	-	-	~ 70	-
Stage 1	-	-	-	-	104	-
Stage 2	-	-	-	-	241	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	299.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	95	-	-	294	-
HCM Lane V/C Ratio	1.368	-	-	0.245	-
HCM Control Delay (s)	299.6	-	-	21.2	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	9.5	-	-	0.9	-

Notes

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

Appendix L

Synchro Intersection Worksheets – 2030 Future Total Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Future Volume (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.549			0.557		
Satd. Flow (perm)	3209	3316	1426	1633	3316	1444	952	3316	1396	942	3316	1452
Satd. Flow (RTOR)			143			143			82			142
Lane Group Flow (vph)	121	446	23	17	1543	133	252	322	38	72	100	459
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	13.0	65.0	65.0	13.0	65.0	65.0	19.0	52.0	52.0	33.0	33.0	33.0
Total Split (%)	10.0%	50.0%	50.0%	10.0%	50.0%	50.0%	14.6%	40.0%	40.0%	25.4%	25.4%	25.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	6.4	66.6	66.6	6.4	58.8	58.8	45.3	45.3	45.3	26.3	26.3	26.3
Actuated g/C Ratio	0.05	0.51	0.51	0.05	0.45	0.45	0.35	0.35	0.35	0.20	0.20	0.20
v/c Ratio	0.77	0.26	0.03	0.21	1.03	0.18	0.63	0.28	0.07	0.38	0.15	1.13
Control Delay	90.3	19.3	0.1	65.5	66.4	3.3	41.4	31.4	0.3	51.6	43.4	116.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	19.3	0.1	65.5	66.4	3.3	41.4	31.4	0.3	51.6	43.4	116.7
LOS	F	B	A	E	E	A	D	C	A	D	D	F
Approach Delay		33.1			61.4			33.6			97.7	
Approach LOS		C			E			C			F	
Queue Length 50th (m)	16.0	29.8	0.0	4.3	~222.1	0.0	49.4	31.2	0.0	16.1	11.2	~105.3
Queue Length 95th (m)	#31.4	49.4	0.0	12.2	#264.7	9.7	73.7	43.0	0.0	31.4	19.2	#170.7
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	158	1698	800	86	1499	731	398	1155	539	190	670	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.26	0.03	0.20	1.03	0.18	0.63	0.28	0.07	0.38	0.15	1.13

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 99 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 58.3	Intersection LOS: E
Intersection Capacity Utilization 106.7%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Orleans Blvd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	528	21	39	1635	28	14	12	42	42	9	53
Future Volume (vph)	14	528	21	39	1635	28	14	12	42	42	9	53
Satd. Flow (prot)	1658	3292	0	1658	3304	0	0	1572	0	0	1572	0
Flt Permitted	0.107			0.447				0.923			0.859	
Satd. Flow (perm)	187	3292	0	776	3304	0	0	1462	0	0	1378	0
Satd. Flow (RTOR)		6			3			42			33	
Lane Group Flow (vph)	14	549	0	39	1663	0	0	68	0	0	104	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	82.0	82.0		82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%		68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.3	88.3		88.3	88.3			18.7			18.7	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.16			0.16	
v/c Ratio	0.10	0.23		0.07	0.68			0.26			0.43	
Control Delay	9.9	6.5		6.4	16.6			20.2			33.7	
Queue Delay	0.0	0.0		0.0	1.1			0.0			0.0	
Total Delay	9.9	6.5		6.4	17.7			20.2			33.7	
LOS	A	A		A	B			C			C	
Approach Delay		6.5			17.4			20.2			33.7	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	0.6	13.4		0.9	162.9			5.7			16.2	
Queue Length 95th (m)	4.5	36.1		m5.7	236.0			16.0			28.2	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	137	2423		570	2430			411			382	
Starvation Cap Reductn	0	0		0	476			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.10	0.23		0.07	0.85			0.17			0.27	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 75.9%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	612	38	12	1508	4	99	0	39	1	0	3
Future Volume (vph)	6	612	38	12	1508	4	99	0	39	1	0	3
Satd. Flow (prot)	1658	3286	0	1658	3315	0	1658	1464	0	0	1533	0
Flt Permitted	0.141			0.403			0.755				0.952	
Satd. Flow (perm)	246	3286	0	703	3315	0	1314	1464	0	0	1477	0
Satd. Flow (RTOR)								336			28	
Lane Group Flow (vph)	6	650	0	12	1512	0	99	39	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.1	32.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	87.0	87.0		87.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	72.5%	72.5%		72.5%	72.5%		27.5%	27.5%		27.5%	27.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	91.8	91.8		91.8	91.8		15.8	15.8			15.8	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13			0.13	
v/c Ratio	0.03	0.26		0.02	0.60		0.57	0.08			0.02	
Control Delay	3.7	3.2		7.4	9.8		60.6	0.3			0.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	3.7	3.2		7.4	9.8		60.6	0.3			0.2	
LOS	A	A		A	A		E	A			A	
Approach Delay		3.2			9.8			43.6			0.3	
Approach LOS		A			A			D			A	
Queue Length 50th (m)	0.2	12.3		0.5	60.4		22.6	0.0			0.0	
Queue Length 95th (m)	m0.8	15.9		m2.3	143.4		36.3	0.0			0.0	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	188	2513		537	2536		292	586			350	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.03	0.26		0.02	0.60		0.34	0.07			0.01	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 67.2%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	587	37	59	1464	33	19	5	39	46	13	41
Future Volume (vph)	11	587	37	59	1464	33	19	5	39	46	13	41
Satd. Flow (prot)	1658	3316	1483	1658	3304	0	1658	1745	1483	0	1604	0
Flt Permitted	0.165			0.389			0.695				0.850	
Satd. Flow (perm)	288	3316	1450	678	3304	0	1212	1745	1462	0	1393	0
Satd. Flow (RTOR)			115		3				105		28	
Lane Group Flow (vph)	11	587	37	59	1497	0	19	5	39	0	100	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	66.0	66.0	66.0	12.0	78.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	55.0%	55.0%	55.0%	10.0%	65.0%		30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	80.8	80.8	80.8	91.5	91.5		14.9	14.9	14.9		14.9	
Actuated g/C Ratio	0.67	0.67	0.67	0.76	0.76		0.12	0.12	0.12		0.12	
v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.13	0.02	0.14		0.51	
Control Delay	7.0	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	7.0	5.1	0.1	5.3	8.5		44.5	40.6	1.1		42.3	
LOS	A	A	A	A	A		D	D	A		D	
Approach Delay		4.9			8.4			17.3			42.3	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	0.4	9.4	0.0	2.5	58.3		4.2	1.1	0.0		16.4	
Queue Length 95th (m)	1.5	29.6	0.0	9.6	135.6		9.8	4.2	0.0		28.9	
Internal Link Dist (m)		561.5			188.9			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	194	2233	1014	571	2518		299	431	440		365	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.06	0.26	0.04	0.10	0.59		0.06	0.01	0.09		0.27	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	4.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	557	63	43	1571	144	94	
Future Volume (vph)	557	63	43	1571	144	94	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	557	63	43	1571	144	94	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	24.0	24.0	11.7	24.0	11.3	30.5	4.0
Total Split (s)	73.0	73.0	15.0	88.0	23.1	32.0	8.9
Total Split (%)	60.8%	60.8%	12.5%	73.3%	19.3%	26.7%	7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	72.6	72.6	7.5	84.4	14.4	23.1	
Actuated g/C Ratio	0.60	0.60	0.06	0.70	0.12	0.19	
v/c Ratio	0.28	0.07	0.41	0.67	0.72	0.33	
Control Delay	11.4	11.0	65.7	12.1	71.0	44.4	
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	
Total Delay	11.4	11.0	65.7	12.3	71.0	44.4	
LOS	B	B	E	B	E	D	
Approach Delay	11.4			13.7	60.5		
Approach LOS	B			B	E		
Queue Length 50th (m)	28.3	6.0	10.2	74.9	32.8	19.0	
Queue Length 95th (m)	36.2	11.4	m17.8	90.4	54.0	34.2	
Internal Link Dist (m)	206.5			221.9	65.1		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	2005	897	115	2331	232	315	
Starvation Cap Reductn	0	0	0	16	0	0	
Spillback Cap Reductn	0	0	0	197	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.07	0.37	0.74	0.62	0.30	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	25	212	0	11	96
Future Volume (vph)	0	25	212	0	11	96
Satd. Flow (prot)	1510	0	1745	0	0	1736
Flt Permitted						0.995
Satd. Flow (perm)	1510	0	1745	0	0	1736
Lane Group Flow (vph)	25	0	212	0	0	107
Sign Control	Stop		Free			Free

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization 25.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	212	0	11	96
Future Vol, veh/h	0	25	212	0	11	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	25	212	0	11	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	330	212	0	0	212	0
Stage 1	212	-	-	-	-	-
Stage 2	118	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	828	-	-	1358	-
Stage 1	823	-	-	-	-	-
Stage 2	907	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	659	828	-	-	1358	-
Mov Cap-2 Maneuver	659	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	899	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	828	1358	-
HCM Lane V/C Ratio	-	-	0.03	0.008	-
HCM Control Delay (s)	-	-	9.5	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	11	201	0	5	91
Future Volume (vph)	0	11	201	0	5	91
Satd. Flow (prot)	1510	0	1745	0	0	1740
Flt Permitted						0.997
Satd. Flow (perm)	1510	0	1745	0	0	1740
Lane Group Flow (vph)	11	0	201	0	0	96
Sign Control	Stop		Free			Free

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	11	201	0	5	91
Future Vol, veh/h	0	11	201	0	5	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	11	201	0	5	91

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	302	201	0	0	201	0
Stage 1	201	-	-	-	-	-
Stage 2	101	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	690	840	-	-	1371	-
Stage 1	833	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	687	840	-	-	1371	-
Mov Cap-2 Maneuver	687	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	919	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	840	1371	-
HCM Lane V/C Ratio	-	-	0.013	0.004	-
HCM Control Delay (s)	-	-	9.3	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	579	1717	197	59	742	137	64	225	78	181	300	203
Future Volume (vph)	579	1717	197	59	742	137	64	225	78	181	300	203
Satd. Flow (prot)	3216	3316	1483	1658	3316	1483	1658	3316	1483	1658	3316	1483
Flt Permitted	0.950			0.950			0.443			0.611		
Satd. Flow (perm)	3194	3316	1410	1652	3316	1445	765	3316	1432	1048	3316	1438
Satd. Flow (RTOR)			165			230			159			225
Lane Group Flow (vph)	579	1717	197	59	742	137	64	225	78	181	300	203
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.6	26.2	26.2	11.2	26.2	26.2	11.7	32.7	32.7	32.7	32.7	32.7
Total Split (s)	31.0	49.0	49.0	16.0	34.0	34.0	12.0	45.0	45.0	33.0	33.0	33.0
Total Split (%)	28.2%	44.5%	44.5%	14.5%	30.9%	30.9%	10.9%	40.9%	40.9%	30.0%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.9	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.2	6.2	6.2	6.2	6.2	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	Max	Max	Max	Max
Act Effct Green (s)	23.0	46.5	46.5	8.5	29.2	29.2	38.3	38.3	38.3	28.7	28.7	28.7
Actuated g/C Ratio	0.21	0.42	0.42	0.08	0.27	0.27	0.35	0.35	0.35	0.26	0.26	0.26
v/c Ratio	0.86	1.23	0.29	0.46	0.84	0.25	0.21	0.19	0.13	0.66	0.35	0.38
Control Delay	55.6	138.3	6.5	50.9	66.6	12.7	26.2	25.7	0.4	51.2	35.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	138.3	6.5	50.9	66.6	12.7	26.2	25.7	0.4	51.2	35.4	5.4
LOS	E	F	A	D	E	B	C	C	A	D	D	A
Approach Delay		108.7			57.8			20.4			30.7	
Approach LOS		F			E			C			C	
Queue Length 50th (m)	61.1	~250.8	4.2	10.3	83.3	3.8	9.2	17.6	0.0	35.9	28.4	0.0
Queue Length 95th (m)	#82.8	#294.7	18.8	27.4	#117.0	26.4	18.8	26.6	0.0	#68.0	41.1	13.5
Internal Link Dist (m)		265.9			463.6			69.4			101.9	
Turn Bay Length (m)	135.5		87.0	106.0		57.0	48.0		43.5	50.0		53.0
Base Capacity (vph)	713	1401	691	147	879	552	309	1154	602	273	864	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.23	0.29	0.40	0.84	0.25	0.21	0.19	0.13	0.66	0.35	0.38

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.23

Intersection Signal Delay: 78.9	Intersection LOS: E
Intersection Capacity Utilization 108.0%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Orleans Blvd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	1887	30	102	893	72	23	6	84	67	17	37
Future Volume (vph)	74	1887	30	102	893	72	23	6	84	67	17	37
Satd. Flow (prot)	1658	3308	0	1658	3271	0	0	1524	0	0	1620	0
Flt Permitted	0.272			0.062				0.923			0.762	
Satd. Flow (perm)	473	3308	0	108	3271	0	0	1420	0	0	1261	0
Satd. Flow (RTOR)		2			13			14			20	
Lane Group Flow (vph)	74	1917	0	102	965	0	0	113	0	0	121	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		37.8	37.8		37.8	37.8	
Total Split (s)	72.0	72.0		72.0	72.0		38.0	38.0		38.0	38.0	
Total Split (%)	65.5%	65.5%		65.5%	65.5%		34.5%	34.5%		34.5%	34.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		3.8	3.8		3.8	3.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2			6.8			6.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	77.6	77.6		77.6	77.6			19.4			19.4	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.18			0.18	
v/c Ratio	0.22	0.82		1.34	0.42			0.43			0.51	
Control Delay	2.3	10.6		238.4	3.8			37.7			39.0	
Queue Delay	0.0	3.4		0.0	0.0			0.0			0.0	
Total Delay	2.3	14.0		238.4	3.8			37.7			39.0	
LOS	A	B		F	A			D			D	
Approach Delay		13.6			26.2			37.7			39.0	
Approach LOS		B			C			D			D	
Queue Length 50th (m)	1.4	48.3		~27.8	0.0			20.3			21.0	
Queue Length 95th (m)	m1.8	m21.8		m#60.4	m23.0			31.5			33.3	
Internal Link Dist (m)		463.6			206.5			143.5			112.1	
Turn Bay Length (m)	104.5			120.0								
Base Capacity (vph)	333	2334		76	2311			412			371	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	321		0	0			0			1	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.22	0.95		1.34	0.42			0.27			0.33	

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.34

Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 96.3%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Page Rd & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1856	106	42	1003	8	63	0	31	4	0	10
Future Volume (vph)	8	1856	106	42	1003	8	63	0	31	4	0	10
Satd. Flow (prot)	1658	3285	0	1658	3312	0	1658	1483	0	0	1538	0
Flt Permitted	0.270			0.074			0.748				0.921	
Satd. Flow (perm)	471	3285	0	129	3312	0	1300	1483	0	0	1437	0
Satd. Flow (RTOR)		11			1			31			31	
Lane Group Flow (vph)	8	1962	0	42	1011	0	63	31	0	0	14	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.1	34.1		32.1	32.1		32.3	32.3		32.3	32.3	
Total Split (s)	77.0	77.0		77.0	77.0		33.0	33.0		33.0	33.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	88.2	88.2		88.2	88.2		13.9	13.9			13.9	
Actuated g/C Ratio	0.80	0.80		0.80	0.80		0.13	0.13			0.13	
v/c Ratio	0.02	0.74		0.41	0.38		0.38	0.14			0.07	
Control Delay	2.4	11.7		23.3	5.3		49.0	14.1			4.5	
Queue Delay	0.0	1.7		0.0	0.0		0.0	0.0			0.0	
Total Delay	2.4	13.5		23.3	5.3		49.0	14.1			4.5	
LOS	A	B		C	A		D	B			A	
Approach Delay		13.4			6.0			37.5			4.5	
Approach LOS		B			A			D			A	
Queue Length 50th (m)	0.0	232.7		2.3	27.6		13.0	0.0			0.0	
Queue Length 95th (m)	m0.5	m219.5		#22.8	65.9		22.6	7.5			2.2	
Internal Link Dist (m)		221.9			561.5			129.3			33.2	
Turn Bay Length (m)	80.0			40.0								
Base Capacity (vph)	377	2636		103	2655		315	383			372	
Starvation Cap Reductn	0	475		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.02	0.91		0.41	0.38		0.20	0.08			0.04	

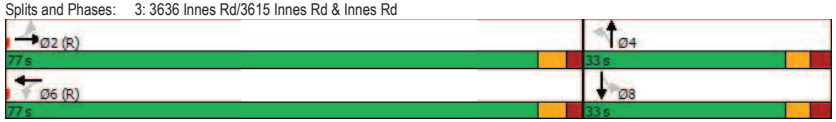
Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 78.4%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: 3636 Innes Rd/3615 Innes Rd & Innes Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1725	87	183	902	84	106	40	179	60	51	30
Future Volume (vph)	44	1725	87	183	902	84	106	40	179	60	51	30
Satd. Flow (prot)	1658	3316	1483	1658	3264	0	1658	1745	1483	0	1646	0
Flt Permitted	0.291			0.049			0.608				0.844	
Satd. Flow (perm)	506	3316	1399	86	3264	0	1042	1745	1460	0	1417	0
Satd. Flow (RTOR)			106		14				179		10	
Lane Group Flow (vph)	44	1725	87	183	986	0	106	40	179	0	141	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Detector Phase	2	2	2	1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	32.3	32.3	32.3	11.3	32.3		36.3	36.3	36.3	36.3	36.3	
Total Split (s)	68.0	68.0	68.0	20.0	88.0		37.0	37.0	37.0	37.0	37.0	
Total Split (%)	52.3%	52.3%	52.3%	15.4%	67.7%		28.5%	28.5%	28.5%	28.5%	28.5%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		4.3	4.3	4.3	4.3	4.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3		7.3	7.3	7.3		7.3	
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	75.1	75.1	75.1	96.3	96.3		20.1	20.1	20.1		20.1	
Actuated g/C Ratio	0.58	0.58	0.58	0.74	0.74		0.15	0.15	0.15		0.15	
v/c Ratio	0.15	0.90	0.10	0.75	0.41		0.66	0.15	0.48		0.62	
Control Delay	18.9	33.8	2.4	50.7	7.6		69.3	45.0	10.2		58.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	18.9	33.8	2.4	50.7	7.6		69.3	45.0	10.2		58.1	
LOS	B	C	A	D	A		E	D	B		E	
Approach Delay		32.0			14.4			33.7			58.1	
Approach LOS		C			B			C			E	
Queue Length 50th (m)	4.8	188.3	0.0	30.2	39.1		26.5	9.2	0.0		32.5	
Queue Length 95th (m)	14.6	#305.3	6.1	56.5	69.5		42.5	18.2	18.6		49.7	
Internal Link Dist (m)		561.5			192.3			77.4			48.4	
Turn Bay Length (m)	47.5		58.5	58.5			48.5		20.0			
Base Capacity (vph)	292	1915	852	259	2422		238	398	471		331	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.15	0.90	0.10	0.71	0.41		0.45	0.10	0.38		0.43	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 105 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lane Group	Ø3	Ø7
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	3	7
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	3.0	3.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 27.3	Intersection LOS: C
Intersection Capacity Utilization 96.9%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 4: Innes Rd & Viseneau Dr

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	1920	136	83	994	92	58	
Future Volume (vph)	1920	136	83	994	92	58	
Satd. Flow (prot)	3316	1483	1658	3316	1658	1483	
Flt Permitted			0.950		0.950		
Satd. Flow (perm)	3316	1483	1658	3316	1658	1483	
Satd. Flow (RTOR)							
Lane Group Flow (vph)	1920	136	83	994	92	58	
Turn Type	NA	Perm	Prot	NA	Prot	Perm	
Protected Phases	2		1	6	7		8
Permitted Phases		2				4	
Detector Phase	2	2	1	6	7	4	
Switch Phase							
Minimum Initial (s)	10.0	10.0	5.0	10.0	5.0	5.0	1.0
Minimum Split (s)	22.5	22.5	11.7	22.5	11.3	22.5	22.5
Total Split (s)	64.3	64.3	11.7	76.0	11.5	34.0	22.5
Total Split (%)	58.5%	58.5%	10.6%	69.1%	10.5%	30.9%	20%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.5	2.0
All-Red Time (s)	2.3	2.3	3.0	2.3	3.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.7	6.0	6.3	6.5	
Lead/Lag	Lag	Lag	Lead		Lag		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Recall Mode	C-Max	C-Max	None	C-Max	None	None	Max
Act Effct Green (s)	58.3	58.3	5.0	70.0	5.2	27.5	
Actuated g/C Ratio	0.53	0.53	0.05	0.64	0.05	0.25	
v/c Ratio	1.09	0.17	1.11	0.47	1.18	0.16	
Control Delay	70.0	15.2	180.4	13.4	204.4	33.7	
Queue Delay	3.2	0.0	0.0	0.0	0.0	0.4	
Total Delay	73.2	15.2	180.4	13.4	204.4	34.1	
LOS	E	B	F	B	F	C	
Approach Delay	69.4			26.3	138.6		
Approach LOS	E			C	F		
Queue Length 50th (m)	~241.2	12.9	~20.4	49.4	~23.7	9.8	
Queue Length 95th (m)	#283.9	m15.5	#52.6	106.1	#55.9	20.5	
Internal Link Dist (m)	206.5			221.9	61.3		
Turn Bay Length (m)		40.0	80.0		80.0		
Base Capacity (vph)	1757	785	75	2110	78	370	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	88	0	0	0	0	128	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	1.15	0.17	1.11	0.47	1.18	0.24	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18
Intersection Signal Delay: 58.4 — Intersection LOS: E
Intersection Capacity Utilization 82.1% — ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lamarche Ave & Innes Rd

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	19	131	0	24	195
Future Volume (vph)	0	19	131	0	24	195
Satd. Flow (prot)	1510	0	1745	0	0	1736
Flt Permitted						0.995
Satd. Flow (perm)	1510	0	1745	0	0	1736
Lane Group Flow (vph)	19	0	131	0	0	219
Sign Control	Stop		Free			Free

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	19	131	0	24	195
Future Vol, veh/h	0	19	131	0	24	195
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	19	131	0	24	195

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	374	131	0	0	131	0
Stage 1	131	-	-	-	-	-
Stage 2	243	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	627	919	-	-	1454	-
Stage 1	895	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	615	919	-	-	1454	-
Mov Cap-2 Maneuver	615	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	782	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	919	1454	-
HCM Lane V/C Ratio	-	-	0.021	0.017	-
HCM Control Delay (s)	-	-	9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	8	123	0	10	185
Future Volume (vph)	0	8	123	0	10	185
Satd. Flow (prot)	1510	0	1745	0	0	1740
Flt Permitted						0.997
Satd. Flow (perm)	1510	0	1745	0	0	1740
Lane Group Flow (vph)	8	0	123	0	0	195
Sign Control	Stop		Free			Free

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	123	0	10	185
Future Vol, veh/h	0	8	123	0	10	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	2	2	2	2	2	2
Mvmt Flow	0	8	123	0	10	185

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	328	123	0	0	123	0
Stage 1	123	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	666	928	-	-	1464	-
Stage 1	902	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	661	928	-	-	1464	-
Mov Cap-2 Maneuver	661	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	928	1464	-
HCM Lane V/C Ratio	-	-	0.009	0.007	-
HCM Control Delay (s)	-	-	8.9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	557	63	43	1571	144	94
Future Vol, veh/h	557	63	43	1571	144	94
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	557	63	43	1571	144	94

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	620	0	1461	310
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	872	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	956	-	~ 120	686
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	369	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	~ 115	686
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	352	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	41.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	956	-
HCM Lane V/C Ratio	0.735	-	-	0.045	-
HCM Control Delay (s)	41.5	-	-	8.9	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	5.5	-	-	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	26.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1920	136	83	994	92	58
Future Vol, veh/h	1920	136	83	994	92	58
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, %	2	2	2	2	2	2
Mvmt Flow	1920	136	83	994	92	58

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2056	0	2651	1028
Stage 1	-	-	-	-	1988	-
Stage 2	-	-	-	-	663	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	269	-	~ 19	231
Stage 1	-	-	-	-	92	-
Stage 2	-	-	-	-	474	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	269	-	~ 6	231
Mov Cap-2 Maneuver	-	-	-	-	~ 54	-
Stage 1	-	-	-	-	92	-
Stage 2	-	-	-	-	147	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	$ 559.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	77	-	-	269	-
HCM Lane V/C Ratio	1.948	-	-	0.309	-
HCM Control Delay (s)	$ 559.2	-	-	24.2	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	13.3	-	-	1.3	-

Notes

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

Appendix M

TDM Checklist

CGH TRANSPORTATION

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

Legend

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

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

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

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

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

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