INNES ROAD DEVELOPMENT
3817 - 3843 INNES ROAD
OTTAWA, ONTARIO

TIA - STRATEGY DOCUMENT (REVISED 2)

May 4, 2022

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Prepared for:

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INTRODUCTION

The Innes Road Development will be situated on a parcel of land at 3817 - 3843 Innes Road. The development will consist of two buildings containing 110 rental apartments. The site will have one site access to Innes Road with completion of the apartment development expected by the year 2024.

The Transportation Impact Assessment (TIA) report will be examining the operation of the apartment building access and connecting road segments and intersections in close proximity to the site. The study will follow the City of Ottawa document, *Transportation Impact Assessment Guidelines (2017)*. Exhibit 1.1 in the Appendix presents the consultants Certification Form.

STEP 1 - SCREENING

A Screening Form has been prepared which is included as Exhibit 1.2 in the Appendix. The Screening Form was submitted to the City of Ottawa along with the Scoping Document. The Screening Form has determined that the Trip Generation, Location, and Safety Triggers have been met and a Transportation Impact Assessment (TIA) must continue onto the next stage. The following will address the Scoping Document.

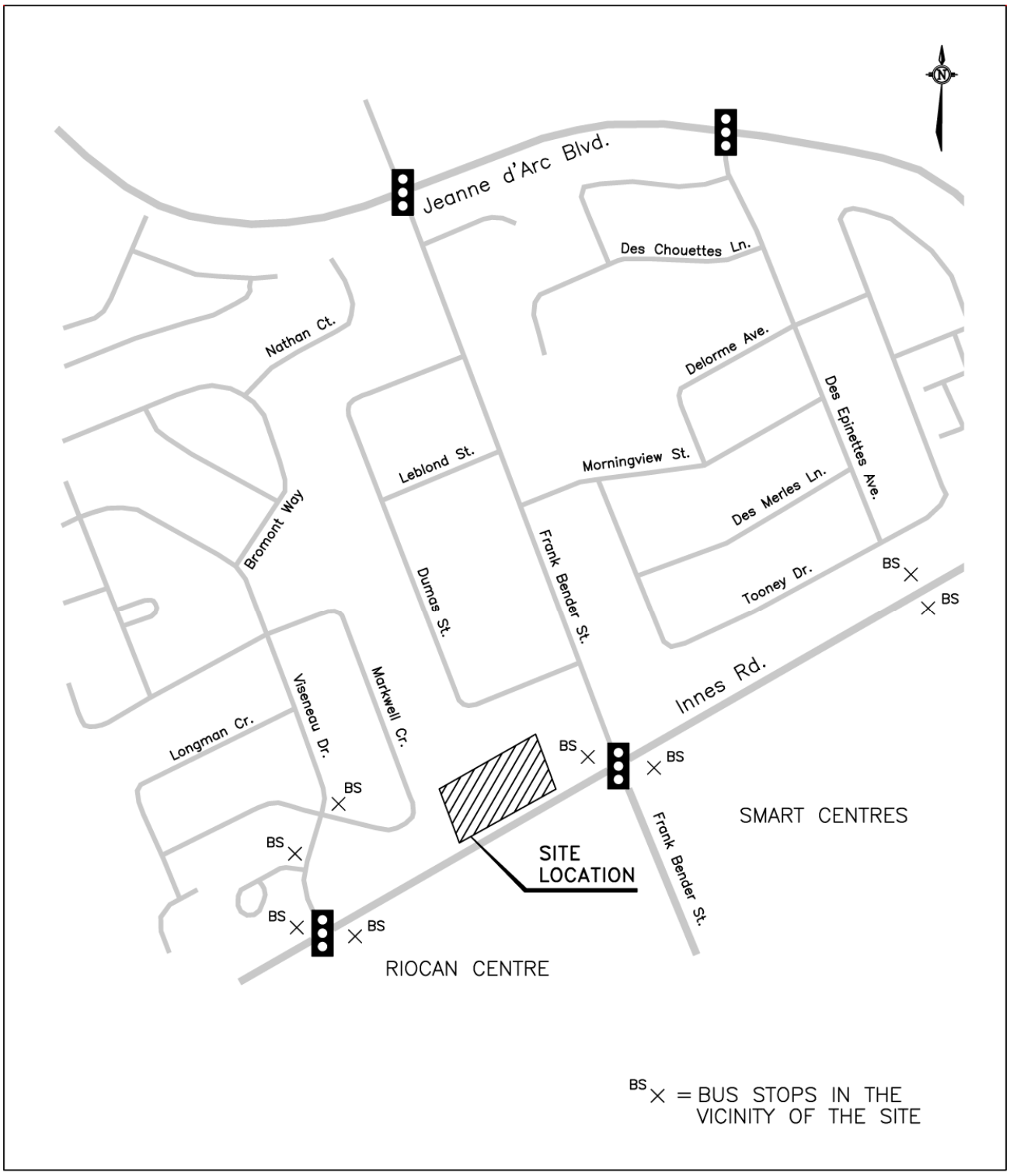
STEP 2 - SCOPING

MODULE 2.1 – Existing and Planned Conditions

Element 2.1.1 – Proposed Development

The proposed Innes Road Development will be located on three blocks of land at 3817, 3835 and 3843 Innes Road. The total property is 7,268 m^2 in size and is located on the north side of Innes Road approximately 132 m west of the intersection of Frank Bender Street and Innes Road. The three sites currently have two existing residential buildings. Development in the area consists of retail and commercial development along Innes Road and residential development on the local streets north of Innes Road. The property is currently zoned R4Z, Residential Fourth Density, which will support the proposed apartment development. Figure 2.1 provides a location plan of the site.

FIGURE 2.1
SITE LOCATION PLAN



NOT TO SCALE

The Innes Road Development will consist of two apartment buildings, each on a separate Block of land. The development will be constructed in two phases, one phase for each Block of land and apartment building. The total development will comprise of 110 residential rental apartments. The site will contain 44 surface parking spaces and 84 spaces in an underground parking garage for a total of 128 parking spaces which include 2 barrier free spaces. Bicycle racks will be provided in a secured bicycle room in the underground parking garage. The site will have a bicycle room for each Block providing a total of 110 spaces for interior bike parking.

The site will provide one access onto Innes Road. The access is located approximately 125 m west of Frank Bender Street. The access will be restricted to right-in/right-out turning movements which would be controlled by extending the existing raised center median along Innes Road by approximately 29 m.

A conceptual site plan of the two phases of the development is provided as Figure 2.2. The total development is expected to be completed and substantially occupied by the year 2024.

Element 2.1.2 – Existing Conditions

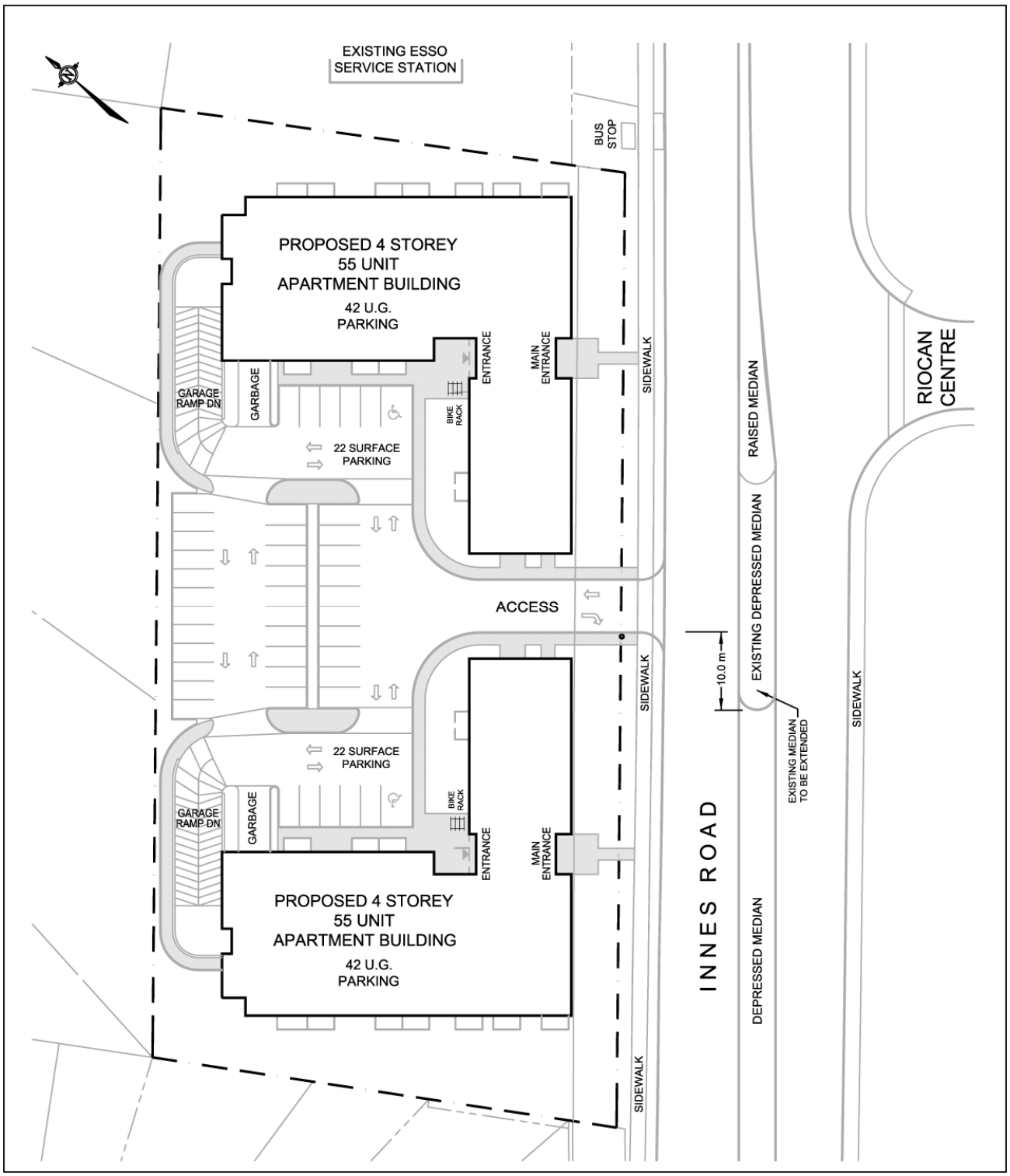
ROADS

The Innes Road Development is located along the north side of Innes Road. Adjacent to the east limit of the site is an Esso Service Centre with convenience mart which has two right-in/right-out accesses onto Innes Road, and one full movement access onto Frank Bender Street. There are no other driveways onto Innes Road along the north side between Viseneau Drive and Frank Bender Street. Along the south side of Innes Road across from the site is the Riocan Shopping Centre. There is one right-in/right-out access on the south side of Innes Road across from the east portion of the site.

Innes Road is a four lane divided roadway which is under the jurisdiction of the City of Ottawa and is designated in the *Ottawa 20/20 – Transportation Master Plan* (TMP) as an east-west arterial road. Innes Road in the vicinity of the site is designated as a "Spine Route" in the City's TMP with cycling lanes provided along the roadway adjacent to the site. There are pedestrian sidewalks along both sides of the road. The speed limit along Innes Road is posted at 60 km./h.

Approximately 132 m east of the site is Frank Bender Street. Frank Bender Street is a north-south road designated in the TMP as a two lane collector road in the section north of Innes Road which passes through a residential neighbourhood, and a major collector road south of Innes Road. The north section the road is a two lane urban street with a sidewalk along the east side of the road and a posted speed limit of 40 km./h. There are 5 speed humps along the road between Innes Road and Jeanne d'Arc Boulevard. The south section of road is a four lane divided road with sidewalks along both sides of the street which provides access to the retail and commercial shopping centres.

FIGURE 2.2
CONCEPTUAL SITE PLAN



NOT TO SCALE

Viseneau Drive is located approximately 240 m west of the site. The road is designated as collector road with a two lane urban cross section. Signs are posted which prohibits trucks. The speed limit is posted at 40 km./h. Viseneau Drive has a pedestrian sidewalk along the west side of the road. There are no cycling facilities along the road and the road is not designated as a cycling route.

Jeanne d'Arc Boulevard is located approximately 730 m east of the site and is designated in the City of Ottawa TMP as an arterial road. The road has a four lane divided urban cross section with a posted speed limit of 60 km./hr. Jeanne d'Arc Boulevard is designated as a "Spine Route" in the TMP. There are no dedicated cycling facilities along the road, which has pedestrian sidewalks along both sides of the road. South of Innes Road Jeanne d'Arc Boulevard becomes Mer Bleue Road. Mer Bleue Road is identified as an arterial road in the TMP. The road has a posted speed limit of 60 km./hr. with sidewalks along both sides of the road. The road is identified as a "Spine Route" and has designated cycling lanes.

INTERSECTIONS

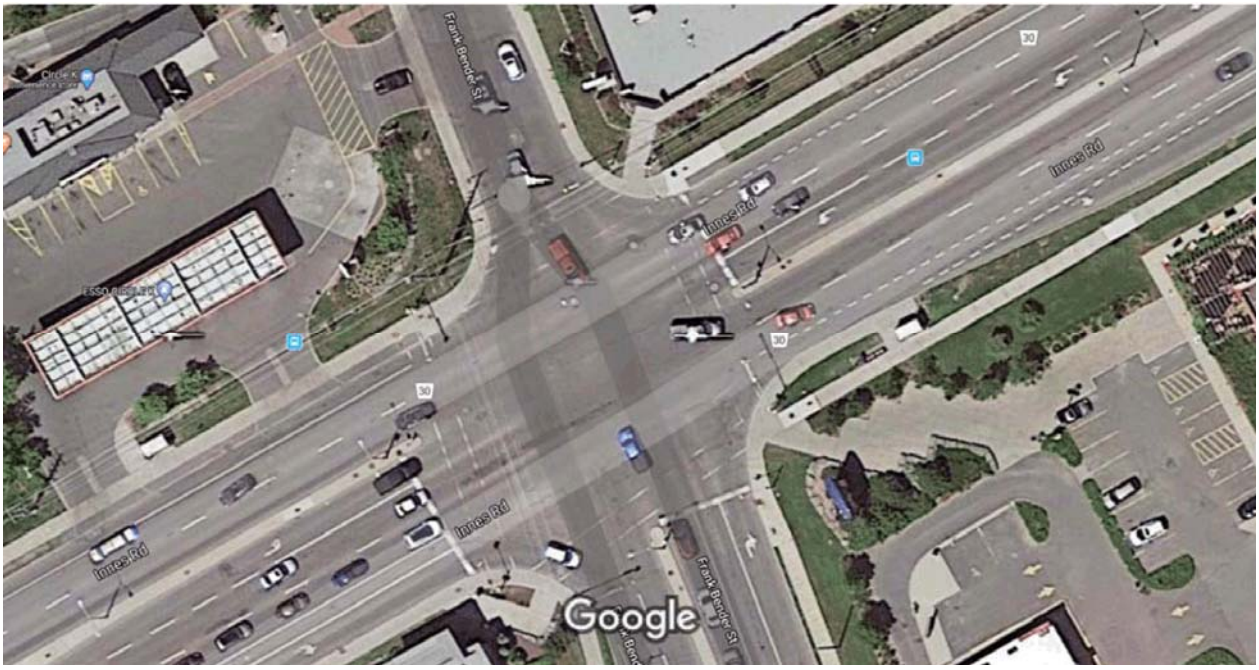
The intersection of Frank Bender Street and Innes Road is controlled by traffic signals with Innes Road forming the eastbound and westbound approaches, and Frank Bender Street the northbound and southbound approaches. The intersection has the following lane configuration:

Northbound Frank Bender Street Approach	One exclusive left turn lane
	One through lane
	One exclusive right turn lane
Southbound Frank Bender Street Approach	One exclusive left turn lane
	One shared through/right lane
Eastbound Innes Road Approach	One exclusive left turn lane
	Two through lanes
	One exclusive right turn lane
Westbound Innes Road Approach	One exclusive left turn lane
	One through lane
	One shared through/right lane

The intersection of Viseneau Drive and Innes Road is controlled by traffic signals with Viseneau Drive forming the southbound approach, and the access to the Riocan Centre the northbound approach. The intersection has the following lane configuration:

Northbound Riocan Centre Approach	One exclusive left turn lane
	One through lane
	One exclusive right turn lane
Southbound Viseneau Drive Approach	One shared left/through/right lane
Eastbound Innes Road Approach	One exclusive left turn lane
	Two through lanes
	One exclusive right turn lane
Westbound Innes Road Approach	One exclusive left turn lane
	One through lane
	One shared through/right lane

INTERSECTION OF FRANK BENDER STREET AND INNES ROAD



INTERSECTION OF VISENEAU DRIVE AND INNES ROAD

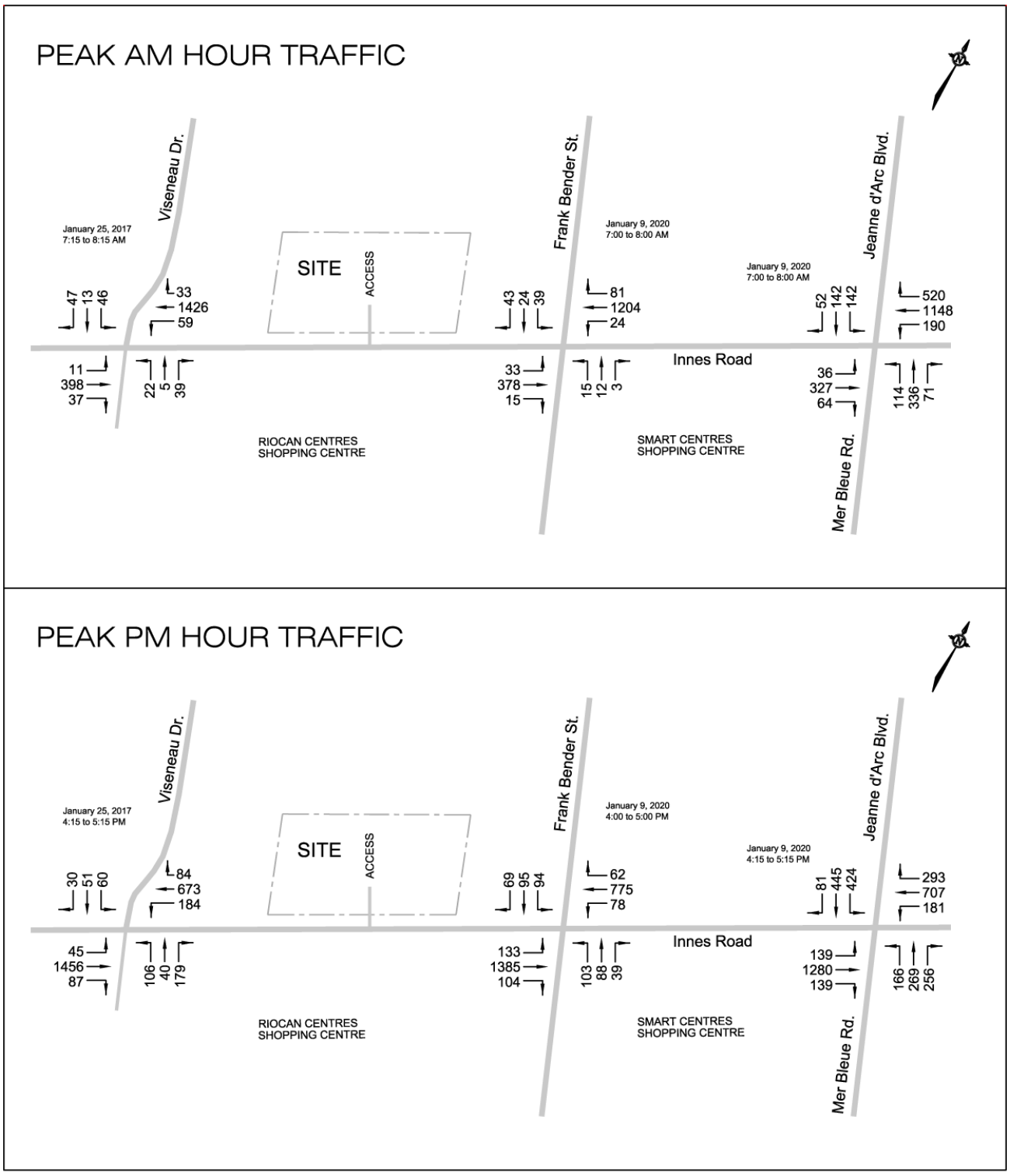
The intersection of Jeanne d'Arc Boulevard (Mer Bleue Road) and Innes Road is controlled by traffic signals where Jeanne d'Arc Boulevard forms the southbound approach and Mer Bleue Road the northbound approach. The intersection has the following lane configuration:

Northbound Mer Bleue Road Approach	Two exclusive left turn lanes One through lane One shared through/right lane (channelized)
Southbound Jeanne d'Arc Blvd. Approach	Two exclusive left turn lanes One through lane One shared through/right lane (channelized)
Eastbound Innes Road Approach	One exclusive left turn lane Two through lanes One exclusive right turn lane (channelized)
Westbound Innes Road Approach	One exclusive left turn lane Two through lanes One exclusive right turn lane (channelized)

INTERSECTION OF JEANNE D'ARC BOULEVARD AND INNES ROAD

Figure 2.3 shows the weekday peak AM and PM hour traffic counts obtained from the City of Ottawa at the Frank Bender/Innes intersection taken January 9, 2020, the Viseneau/Innes intersection taken January 25, 2017, and the Jeanne d'Arc/Innes intersection taken January 9, 2020. The traffic counts are presented in the Appendix as Exhibit 2.1 for the Frank Bender/Innes intersection, Exhibit 2.2 for the Viseneau/Innes intersection, and Exhibit 2.3 for the Jeanne d'Arc/Innes intersection.

FIGURE 2.3
PEAK AM AND PM HOUR TRAFFIC COUNTS



TRANSIT

Local Routes 131 and 138 travel along Innes Road, with Route 131 traveling to the Jeanne d'Arc Rapid Route Station and Route 138 travelling to both the Jeanne d'Arc and Place d'Orléans Rapid Route Stations, each with 30 minute peak hour service. Frequent Route 25 travels along Innes Road between the Blair Transitway Station and the Millennium Rapid Route Station with 10 minute peak hour service. Weekday 15 minute peak hour service is provided by Route 231 which travels along Viseneau Drive to the Jeanne d'Arc Rapid Route Station. The bus routes are provided in Exhibit 2.4.

Bus stops are located along Innes Road in close proximity to the site with the westbound Innes Road stop located in front of the Esso Service Centre at the northwest corner of the Frank Bender/Innes intersection, and the eastbound Innes Road stop located at the southeast corner of the Frank Bender/Innes intersection. The locations of the bus stops in the vicinity of the site are shown in Figure 2.1.

COLLISION HISTORY

Collision reports were obtained from the City of Ottawa through Open Data Ottawa for the five year time period between the years January 1, 2014 and December 31, 2018. The collision data was obtained for the Frank Bender/Innes, Viseneau/Innes, and the Jeanne d'Arc/Innes intersections along with the road segments along Innes Road between Viseneau Drive and Frank Bender Street, and Frank Bender Street and Jeanne d'Arc Boulevard. Over the five year period there were 34 collisions at the Frank Bender/Innes intersection, and 14 collisions along Innes Road segment past the site. The Viseneau/Innes and Jeanne d'Arc/Innes intersections experienced 36 and 104 collisions respectively. The road segment between Frank Bender Street and Jeanne d'Arc Boulevard experienced 38 collisions over the same five year period. The collision data for all intersections and road segments showed that the majority of collisions were rear end collisions which would not be attributed to the roadway infrastructure. A summary of the type and year of each collision is provided in Table 2.1.

Element 2.1.3 – Planned Conditions

The City of Ottawa *Transportation Master Plan 2013* was reviewed to identify transit and roadway projects in the vicinity of the development which may have an impact on travel demands and trip patterns. The document identified in the 2031 Affordable Network the extension of the LRT Confederation Line from the Blair Road Transit Station easterly to Place d'Orléans. Under the 2031 Affordable Transit Priority projects, peak period bus lanes and transit signal priority were identified along Blackburn Hamlet Bypass between Innes Road and Brian Coburn Boulevard.

Under the roadway projects, the document identified the extension of Brian Coburn Boulevard. Phase 1 has already been completed between Mer Bleue Road and Navan Road which was identified in the TMP to take place between 2014 and 2019. Phase 2 will be the continuation of the extension of Brian Coburn Boulevard from Navan Road to Innes Road and is identified in the TMP. The alignment options are still under review.

TABLE 2.1
COLLISION SUMMARY

YEAR	COLLISION TYPE					TOTAL
	REAR END	ANGULAR	TURNING	SIDESWIPE	OTHER-SMV	
Frank Bender Street and Innes Road Intersection						
2014	2	0	2	1	1	6
2015	6	1	1	2	0	10
2016	3	0	3	0	0	6
2017	4	1	1	0	0	6
2018	3	0	2	1	0	6
TOTAL	18	2	9	4	1	34
Viseneau Drive and Innes Road Intersection						
2014	2	2	2	0	0	6
2015	3	0	3	0	0	6
2016	7	2	1	0	1	11
2017	0	0	4	0	0	4
2018	6	0	0	3	0	9
TOTAL	18	4	10	3	1	36
Jeanne d'Arc Boulevard and Innes Intersection						
2014	11	2	4	1	1	19
2015	12	1	1	0	2	16
2016	9	1	6	2	1	19
2017	11	4	9	3	1	28
2018	12	1	6	3	0	22
TOTAL	55	9	26	9	5	104
Innes Road Between Viseneau Drive and Frank Bender Street						
2014	3	0	0	1	0	4
2015	1	0	0	2	0	3
2016	1	0	0	3	0	4
2017	2	0	0	0	0	2
2018	0	0	0	1	0	1
TOTAL	7	0	0	7	0	14
Innes Road Between Frank Bender Street and Jeanne d'Arc Boulevard						
2014	3	1	1	3	0	8
2015	3	2	0	3	0	8
2016	5	1	1	1	1	9
2017	3	0	1	1	1	6
2018	6	0	0	1	0	7
TOTAL	20	4	3	9	2	38

The TMP has identified the construction of queue jump lanes and transit signal priority at selected intersections along Innes Road between Jeanne d'Arc Boulevard and Blackburn Hamlet Bypass as a Transit Priority Project in the 2031 Affordable Network. The measures would reduce travel time and improve reliability.

Other study area developments which may have an impact of the surrounding road network which are in the approval process or have been approved are the following:

2025 Innes Road - The SmartREIT is located 1.0 kilometre east of the site at the southeast corner of the Jeanne d'Arc/Innes intersection. The development will comprise of approximately 183,000 ft^2 gross floor area of retail space, 30,000 ft^2 of restaurant, and 10,000 ft^2 for banking use.

3434 Innes Road - The development is a six storey mixed-use building located at the northwest corner of the intersection of Innes Road and Page Road which is approximately 1.3 km west of the site. The development would provide 35 residential units above a ground floor commercial use.

3490 Innes Road - The development is located on the south side of Innes Road just east of Page Road and about 1.2 km west of the site. The development would consist of a subdivision with 534 single family residential homes and townhouse units.

3604 Innes Road - The development is a subdivision located on the south side of Innes Road at the intersection of Boyer Road. The subdivision would be approximately 825 m west of the site and would comprise of 457 single family and townhouse dwellings units.

MODULE 2.2 – Study Area and Time Periods

Element 2.2.1 – Study Area

The number of site generated trips would be low with the TIA Trip Generation Trigger just meeting the 90 unit trigger with a total of 110 apartment units. The Location Trigger was met due to the site location being in a Design Priority Area (DPA), and the Safety Trigger met by being within 150 m of a signalized intersection.

The study area was determined following an examination of the size of the development and TIA Triggers satisfied by the development, along with all major intersections located within 1 km. of the site as stipulated in the TIA Guidelines. The study area would comprise of the site access onto Innes Road and the Frank Bender/Innes, Viseneau/Innes, and Jeanne d'Arc/Innes intersections. The road segment would consist of Innes Road between Frank Bender Street and Viseneau Drive, and the segment between Frank Bender Street and Jeanne d'Arc Boulevard.

The study will examine the intersection geometry and roadway segments in accordance with the City of Ottawa *Transportation Impact Assessment Guidelines (2017).*

Element 2.2.2 – Time Periods

The time periods for the analysis would be determined from the background traffic from the traffic counts obtained from the City of Ottawa at the Frank Bender/Innes intersection. The peak hours for the analysis would be the weekday peak AM and PM hours which would coincide with the trips from the residential apartment units of the development.

Element 2.2.3 – Horizon Years

The development would be constructed in two phases, with each phase representing the construction of one apartment building. The total development is expected to be completed and substantially occupied by the year 2024. The TIA study will examine the site at the completion of both phases in 2024, and the impact of the development traffic at five years beyond completion at the year 2029.

MODULE 2.3 – Exemptions Review

The exemptions, which provide possible reductions to the scope of work of the TIA Study, were examined using Table 4: Possible Exemptions which is provided in the City's *Transportation Impact Assessment Guidelines (2017).* Utilizing the table, the following lists the possible exemptions proposed for the TIA Study report:

MODULE	ELEMENT	EXEMPTION CONSIDERATIONS
Design Review Component		
4.1 Development Design	4.1.2 Circulation and Access	No - The access and circulation of on-site traffic will be examined.
	4.1.3 New Street Networks	Yes – The development does not propose any new municipal streets.
4.2 Parking	4.2.1 Parking Supply	No – Parking does not meet the City of Ottawa parking Bylaws.
	4.2.2 Spillover Parking	No - Spillover will be examined as parking does not meet bylaws.
Network Impact Component		
4.5 Transportation Demand Management	All Elements	No – TDM measures will be examined.
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Yes – Access to the development will be from an arterial road.
4.8 Network Concept		Yes - The site would not generate more than 200 person-trips per peak hour in excess of the volume permitted by established zoning.

STEP 3 - FORECASTING

MODULE 3.1 - Development-generated Travel Demand

Element 3.1.1 – Trip Generation and Mode Shares

The residential development at 3817 - 3843 Innes Road would consist of 110 residential apartments in two free-standing buildings. Both apartment buildings would be 4 storeys in height, with the site having one access onto Innes Road. The site will provide both surface and underground parking.

The number of expected site generated trips utilized the trip statistical data documented in the *2009 TRANS Trip Generation Study* report. The analysis used the Vehicle Trip Generation Rates from Table 6.3 of the TRANS document for ITE Land Use 223, "Mid-rise apartments (3-10 floors)". The Base Rate was for a Suburban Area (Outside the Greenbelt). The number of site generated trips was proportioned inbound/outbound to the directional distribution shown in Table 3.17 of the document. The trips rates and distribution are shown below in Table 3.1.

TABLE 3.1
VEHICLE TRIP GENERATION RATES

Trip Rate	Peak AM Hour		Peak PM Hour	
Blended Trip Rate	0.29 T/Dwelling Units		0.37 T/Dwelling Units	
Directional Distribution	24% Entering	77% Exiting	62% Entering	39% Exiting

The site generated trips were determined by the product of the number of dwelling units (110 apartment units) and the trip rates during the peak hour as shown in Table 3.1. The total number of auto-trips is shown in Table 3.2. The person-trips were determined by the number of auto-trips divided by the mode share for the number of vehicle-trips. The mode share used was from Table 3.13 of the *2009 TRANS Trip Generation Study* report for an apartment development in a suburban area (outside the greenbelt). The mode share is 0.44 vehicle-trips for the peak AM hour and PM hour. Table 3.2 shows the future peak hour person-trips.

TABLE 3.2
TOTAL PEAK HOUR SITE GENERATED TRIPS

Apartment Units	AUTO-TRIP GENERATION		FUTURE PERSON-TRIPS	
	Peak AM Hr.	Peak PM Hr.	Peak AM Hr.	Peak PM Hr.
110 Apartment Units	32 veh.	41 veh.	73 per.	93 per.

The modal split of trips was determined from the City of Ottawa document, *2011 NCR Household Origin-Destination Survey*, January 2013, and comments from City of Ottawa staff. The primary travel modal share used the demographic characteristics for the Orleans Area (Page 104) for trips. The residential modal share was based on all observed trips within the Orleans district, including those with an origin or destination beyond that area. Table 3.3 presents the modal share summary which will be used in the TIA study for the residential land use.

TABLE 3.3
MODE SHARE SUMMARY (Person-Trips)

Future Mode Share Targets for the Development		
Travel Mode		**Rationale**
Auto Driver	55%	Consistent with modal share targets and proximity to employment areas
Auto Passenger	10%	
Transit	30%	Consistent with the 2009 TRANS and 2011 TRANS-OD reports
Non-Auto	5%	

OC Transpo provides Local Routes 131 and 138 and Frequent Route 25 which travel past the site along Innes Road to OC Transpo transit stations. The bus stops are located as far side bus stops at the Frank Bender/Innes intersection which is 132 m east of the site. Cycling lanes are provided along Innes Road which is identified in the City of Ottawa TMP as a Spine Route. Pedestrian sidewalks are provided on both sides of Innes Road and Jeanne d'Arc Boulevard, and along one site of the street for both Viseneau Drive and Frank Bender Street.

The peak hour person-trips per mode were determined by the product of the peak hour future person-trips from Table 3.2 and the future mode share from Table 3.3. The results are shown in Table 3.4 for the residential apartment buildings on Innes Road.

The TIA Guidelines allow for three Trip Reduction Factors. The three trip reductions would consist of trips from existing development on site, pass-by trips, and shared trips within the site between two or more uses. No trip reduction factors were applied for the following reasons:

1. The existing buildings on site would generate a negligible number of new trips.
2. The residential use would generate all primary trips with no pass-by trips.
3. The residential apartments would be a single use with no shared trips between other uses on site.

TABLE 3.4
FUTURE SITE GENERATED PERSON-TRIPS

TRAVEL MODE	DEVELOPMENT GENERATED PERSON-TRIPS	
	PEAK AM HR.	PEAK PM HR.
Auto Driver	40 per. trips	51 per. trips
Auto Passenger	7 per. trips	9 per. trips
Transit	22 per. trips	28 per. trips
Non-Auto	4 per. trips	5 per. trips
Total Trips	73 per. trips	93 per. trips

Element 3.1.2 – Trip Distribution

The distribution of site generated vehicle trips for the proposed apartment development was determined from the background traffic at major intersections in the area which would comprise mainly of trips to/from work. The trip pattern was applied to the surrounding roads assuming the shortest and most convenient route. The trip distribution was also compared to the distribution of trips from other traffic studies in the area. The trip distribution for the residential trips during the weekday peak AM and PM hour is as follows:

To/From the north along Frank Bender Street	10% (to Jeanne d'Arc Blvd.)
To/From the east along Innes Road	20%
To/From the west along Innes Road	70%

Element 3.1.3 – Trip Assignment

The distribution of site generated vehicle-trips was determined by applying the directional distribution shown in Table 3.1 to the Auto Driver trips shown in Table 3.4. Table 3.5 presents the distribution of vehicle-trips entering and exiting the site.

TABLE 3.5
PEAK HOUR DISTRIBUTION OF VEHICLE-TRIPS

PEAK HOUR TRIPS / BUILDING USE	WEEKDAY PEAK AM HR.			WEEKDAY PEAK PM HR.		
	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
110 Apartment Units	40	9 (24%)	31 (77%)	51	31 (62%)	20 (39%)

The trip distribution, as discussed in Element 3.1.2, was applied to the peak AM and PM peak hour vehicle-trips shown in Table 3.5. Figure 3.1 presents the peak AM and PM hour residential trips to/from the site.

MODULE 3.2 - Background Network Travel Demands

Element 3.2.1 – Transportation Network Plans

The City of Ottawa *Transportation Master Plan (TMP) 2013* was reviewed to identify transit and roadway projects in the vicinity of the development. The proposed changes to the transportation network are identified in this report under Element 2.1.3 - Planned Conditions. The most significant changes in the network would be the proposed extension of Brian Coburn Boulevard from Navan Road to Innes Road, and the construction of the Cumberland Transitway between Blair Road and Frank Kenny Road. These projects would be outside the study area of the TIA, but would reduce traffic along Innes Road past the site.

Element 3.2.2 – Background Growth

The background growth in traffic represents the increase or decrease in traffic due to development outside the study area. The study has examined historical traffic counts along Innes Road past the site. The 2016 counts taken along Innes Road when compared to the 2020 counts, determined that with the exception of the eastbound peak PM hour traffic, the eastbound/westbound peak AM hour and westbound peak PM hour traffic all experienced a reduction in traffic over the four year period.

The trip trend of trips to/from the Ottawa Inner Area for auto driver trips was examined in the *National Capital Region Travel Trends* document prepared by the IBI Group. The document showed that trips from the Orleans Area increased at an annual compounded rate of 1.47 percent for the peak AM hour between the years of 2005 and 2011.

The study has therefore assumed that the background traffic would experience an annual average compounded increase of 1.0 percent which is consistent with traffic studies for other development in the area. The 1.0 percent annual increase would translate to the following growth factors which were applied to all intersection approaches:

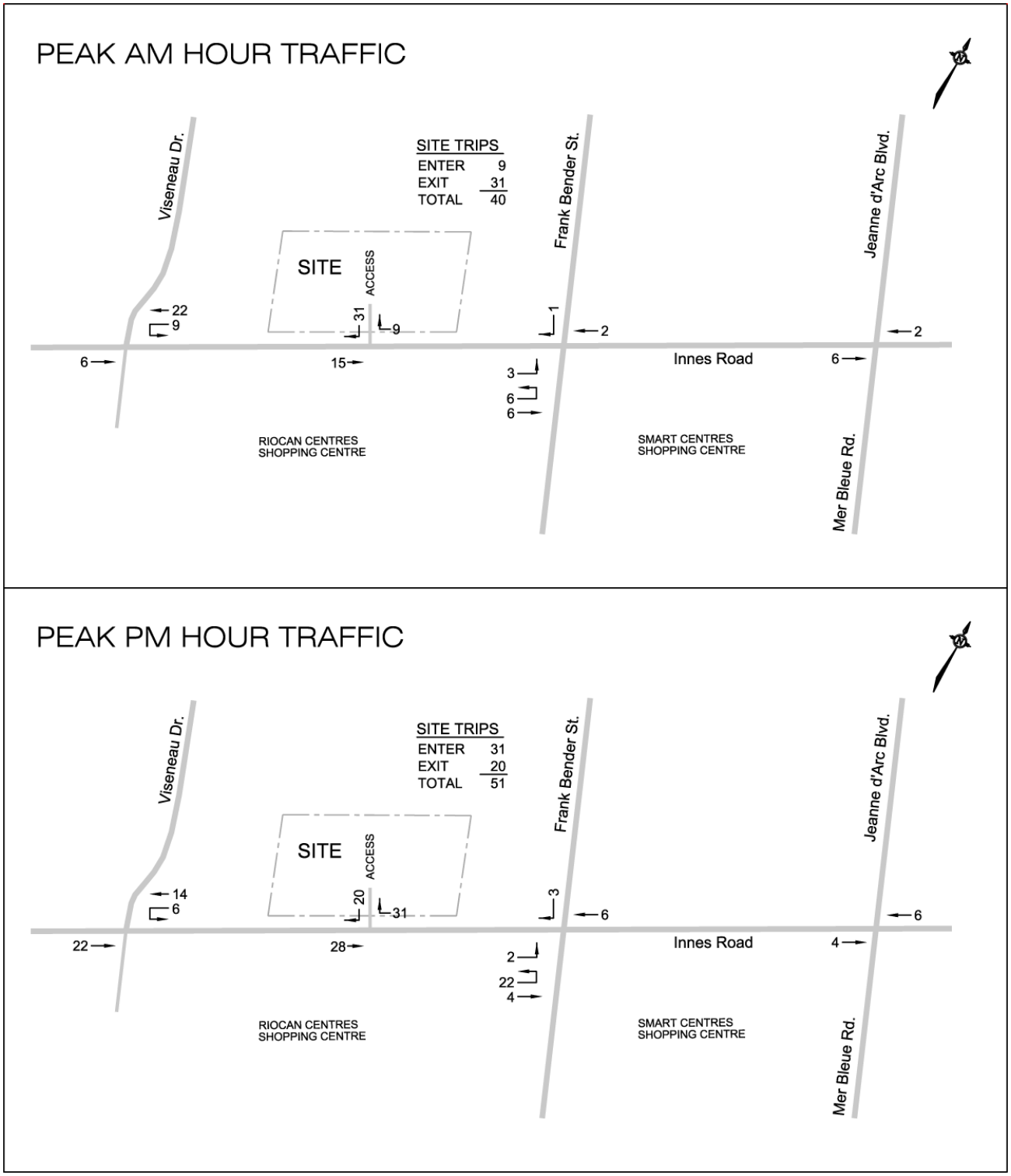
Growth Factor at the Frank Bender/Innes and Jeanne d'Arc/Innes Intersections

2020 → 2024 = 1.041 Completion
2020 → 2029 = 1.094 Completion + 5 Years

Growth Factor at the Viseneau/Innes Intersection

2017 → 2024 = 1.072 Completion
2017 → 2029 = 1.127 Completion + 5 Years

FIGURE 3.1
PEAK AM AND PM HOUR SITE GENERATED TRIPS



NOT TO SCALE

Element 3.2.3 – Other Developments

The study area comprises of the road segment and intersections along Innes Road between Viseneau Drive and Jeanne d'Arc Boulevard (Mer Bleue Road). Other developments in the area are identified in Element 2.1.3 - Planned Conditions. The TIA studies for the other developments were reviewed and it was determined that the background growth factors would account for the expected new development in the area. The extension of the Brian Coburn Boulevard from Navan Road to Innes Road and the construction of the Cumberland Transitway would result in a reduction of traffic past the site.

Figure 3.2 presents the 2024 peak AM and PM peak hour background vehicle traffic (does not include trips from the proposed apartment development). Figure 3.3 shows the expected 2029 peak hour background traffic which represents five years beyond completion of the development. All background traffic includes the 1.0 percent annual average compounded increase in traffic.

MODULE 3.3 - Demand Rationalization

Innes Road and the signalized intersections within the study area would not exhibit capacity issues with travel demand. The roadway, cycling facilities, and OC Transpo bus routes with direct access to transit stations, would provide sufficient capacity to handle the expected trips from the apartment development. There would be no requirement to reduce travel demand from the development due to insufficient infrastructure capacity.

The total vehicular traffic is the sum of the peak hour site generated trips and the peak hour background traffic. The site generated trips would be the addition of the apartment trips from Figure 3.1, and the background traffic (Figure 3.2 for the year 2024 and Figure 3.3 for the year 2029). Figure 3.4 presents the total 2024 peak hour vehicular traffic and Figure 3.5 the total 2029 peak hour vehicular traffic.

FIGURE 3.2
2024 PEAK AM AND PM HOUR BACKGROUND TRAFFIC

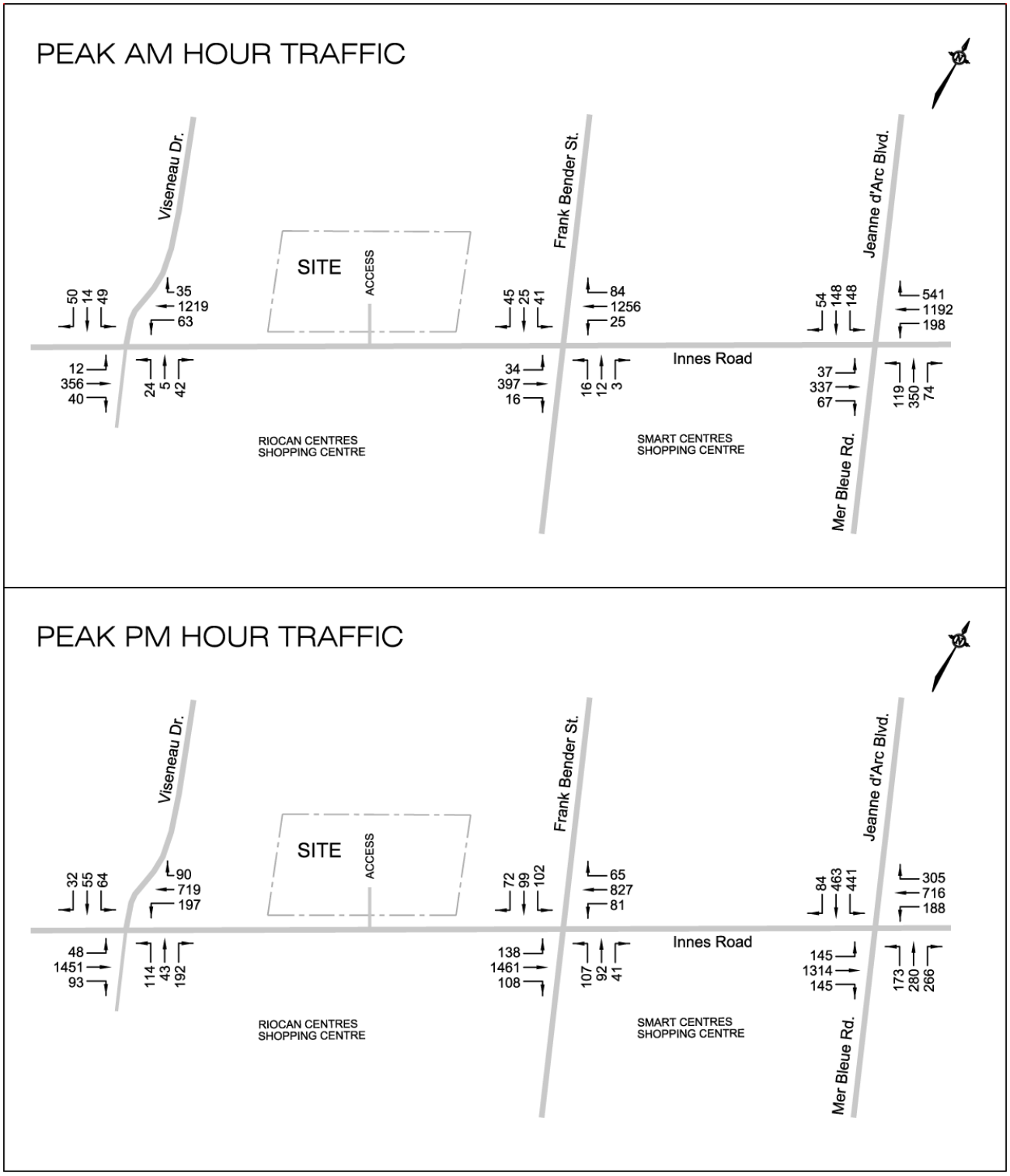


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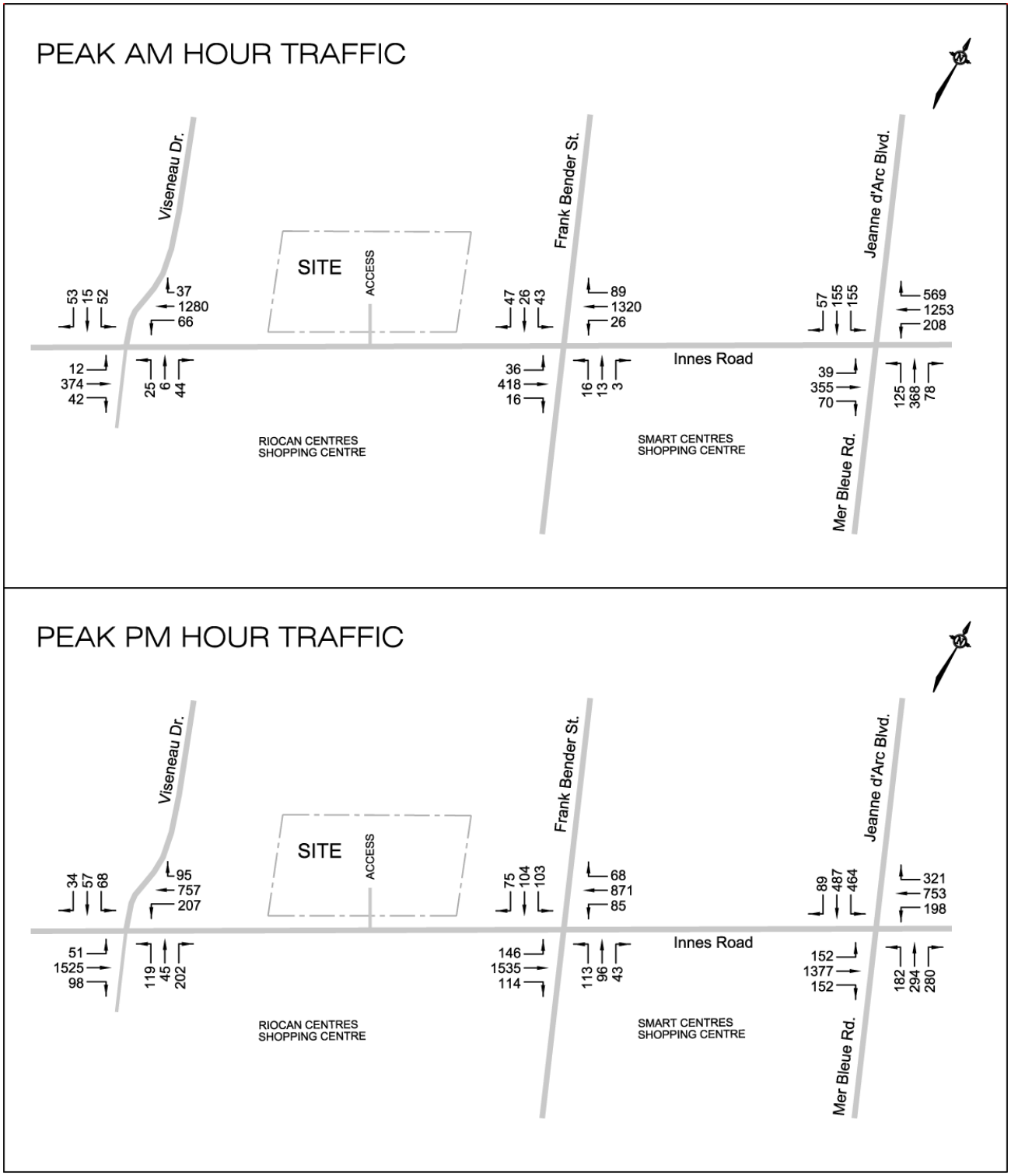
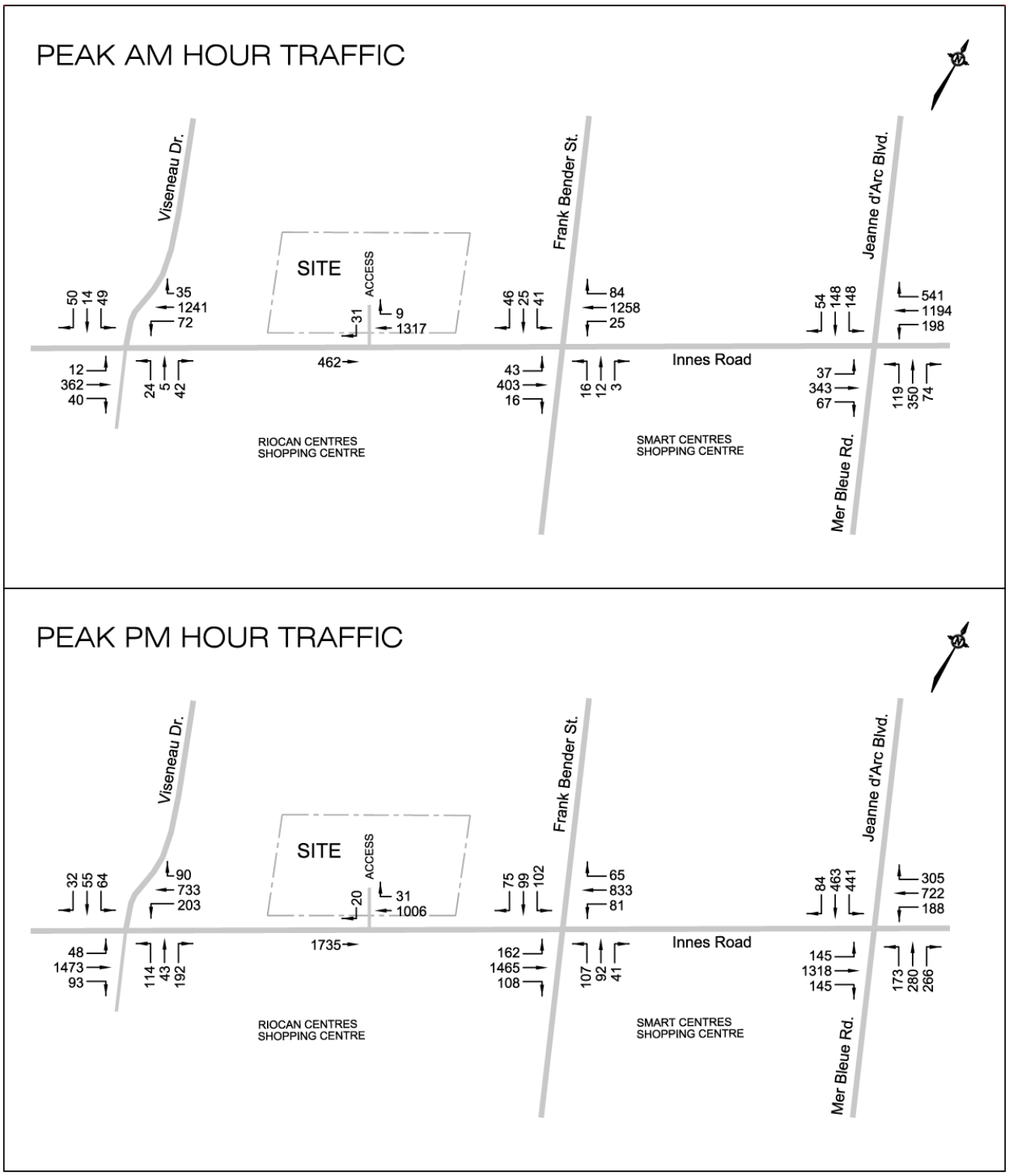
FIGURE 3.3
2029 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



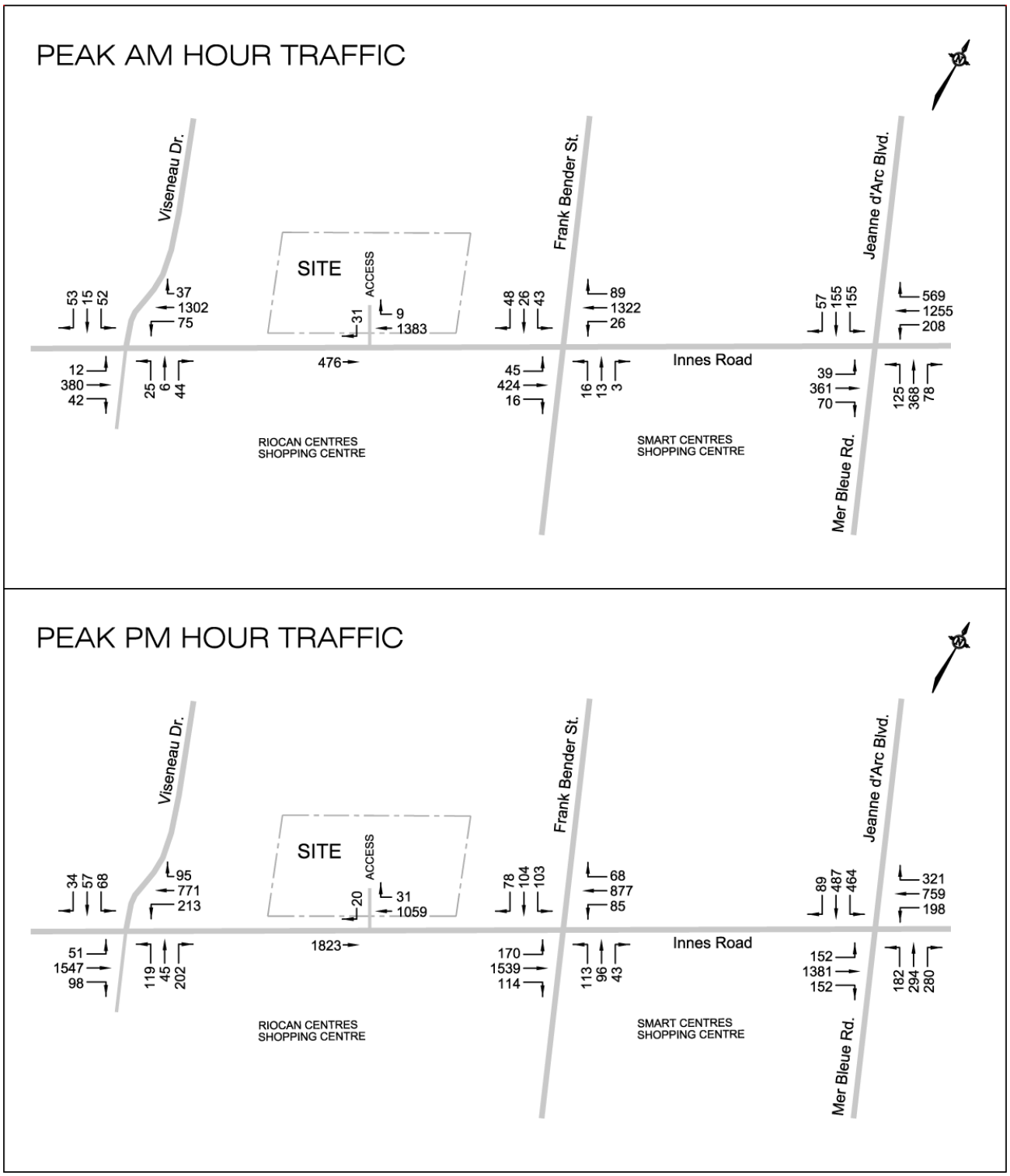
NOT TO SCALE

FIGURE 3.4
2024 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

FIGURE 3.5
2029 PEAK AM AND PM HOUR TOTAL TRAFFIC



STEP 4 – ANALYSIS

MODULE 4.1 – Development Design

Element 4.1.1 – Design for Sustainable Modes

The Site Plan provides on-site parking for residents of the apartment building. There are 44 surface and 84 underground parking spaces for a total of 128 vehicular parking spaces of which 2 will be designated as barrier free. The underground parking garage will have access onto Innes Road from the site Access. The parking provided does not meet the 154 space parking requirements of the City of Ottawa By-laws. An amendment to the By-laws is required.

There is storage space (racks) for 118 bicycles on site. On the surface, bike racks would be located outside the entrance of each of the two buildings for total of 8 storage spaces. There would be storage for 110 bicycles in a secured bicycle storage room in the underground parking garage.

There are pedestrian sidewalks along both sides of Innes Road and the site is in close proximity to a signalized intersection (Frank Bender/Innes) which will allow pedestrians a safe crossing of Innes Road to the retail and commercial on the south side of the road.

The site is served by several OC Transpo transit routes with bus stops within close proximity (< 200 m) to all entrances to the apartment buildings. The eastbound and westbound Innes Road transit routes have bus stops located at the intersection of Frank Bender Street and Innes Road.

The study has utilized the *TDM - Supportive Development Design and Infrastructure Checklist* for a Residential Development which is provided below. The checklist examines the opportunity to implement facilities which are supportive of sustainable modes.

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

Legend

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

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

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☒ There are secured bicycle storage rooms in the underground parking garage
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☒ The development will provide 110 bicycle parking spaces in the garage, and 8 surface parking spaces
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☒ All bike racks are horizontal storage spaces
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐ N/A
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐ N/A
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐ N/A
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐ N/A

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☒ The Site Plan provides 128 surface and garage parking spaces. The By-law requires 154 spaces
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☒ Short-term parking will be accommodated within the surface parking area
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐ N/A
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

Element 4.1.2 – Circulation and Access

The site will have one right-in/right-out access. The access will have a pavement width of 6.7 m and a clear throat length of 30 m which exceeds the TAC guidelines of 25 m for the minimum clear throat length for a major driveway onto an arterial road for an apartment land use.

The designated fire route connects to Innes Road from the site Access. The fire route is 6.7 m in width providing access to both apartment buildings.

All service vehicles and moving vans will park along the aisle by the rear access to the building to load/unload. The site access to Innes Road will provide an efficient circulation of vehicles through the site.

Garbage containers will be kept in a designated area next to the buildings which would provide easy accessibility to a private garbage contractor.

The existing four entrances (depressed curb) and sidewalk onto Innes Road for the previous uses will be removed under the proposed Site Plan.

Element 4.1.3 – New Street Networks

Exempt as determined in the Scoping Document.

MODULE 4.2 – Parking

Element 4.2.1 – Parking Supply

The on-site parking will comprise of 128 parking spaces for tenants and visitors for the 110 apartment units.

The City of Ottawa By-law requires 154 auto parking spaces for the total development, which would require an amendment to the By-law. The parking required under the City By-law was determined by the following:

110 units x 1.2 spaces/unit	=	132 spaces	Tenant Parking
110 units x 0.2 spaces/unit	=	22 spaces	Visitor Parking
Total Parking Supplied		154 spaces	

The site will provide 110 bike storage spaces in the underground parking garage plus 8 surface spaces, with the City By-law requiring 55 spaces determined by the following:

110 units x 0.5 bike spaces/unit = 55 bike spaces

Element 4.2.2 – Spillover Parking

The apartment development will provide 128 parking spaces. With the available transit service along Innes Road past the site and the high employment opportunities in the area from the commercial and retail in close proximity to the site, parking is not expected to be a problem.

If spillover parking were to take place, the closest area for on-street parking would be along Drolet Street which is a local street located behind the site and a minimum 285 m walk from the building entrances. Spillover parking is not expected to be an issue.

MODULE 4.3 – Boundary Street Design

The City of Ottawa Complete Streets concept allows for the safe movement of everyone whether they choose to walk, bike, drive, or take public transit. The boundary roads to the site would consist of Innes Road which the site borders the north side of the road. Frank Bender Street and Viseneau Drive are collector streets located east and west of the site.

Innes Road is an arterial road with pedestrian sidewalks along both sides of the road and a posted speed limit of 60 km./h. Frequent transit service routes pass along Innes Road adjacent to the site providing transit service to the Place d'Orléans Rapid Route Station and the Blair Transit Station.

The multi-modal level of service for the Innes Road segment between Jeanne d'Arc Boulevard and Viseneau Drive was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. The following examined the MMLOS for the various modes of travel along the Innes Road street segment.

PEDESTRIAN LEVEL OF SERVICE (PLOS)

There are sidewalks along both sides of Innes Road. The sidewalks are 2.0 m in width with a 1.5 m boulevard. Table 4.1 presents the level of service for the street segment adjacent to the site, with the analysis sheets provided in the Appendix.

TABLE 4.1
PEDESTRIAN LEVEL OF SERVICE (PLOS) – Street Segment

Street	Segment	Level of Service	Analysis
Innes Road	Jeanne d'Arc Blvd. to Viseneau Dr.	E	Exhibit 4.1

BICYCLE LEVEL OF SERVICE (BLOS)

Innes Road along the road segment is designated as a Spine Route in the TMP. A cycling lane of 2.0 m width is provided along both sides of Innes Road. Table 4.2 presents the level of service for the Innes Road segment.

TABLE 4.2
BICYCLE LEVEL OF SERVICE (BLOS) – Street Segment

Street	Segment	Level of Service	Analysis
Innes Road	Jeanne d'Arc Blvd. to Viseneau Dr.	D	Exhibit 4.2

TRANSIT LEVEL OF SERVICE (TLOS)

OC Transpo provides transit service with Local Routes 131 and 138 traveling past the site to the Jeanne d'Arc and Place d'Orléans Rapid Route Stations, and Frequent Route 25 traveling to the Blair Transitway Station. Table 4.3 presents the level of service along the Innes Road segment between Jeanne d'Arc Boulevard and Viseneau Drive. The analysis sheets are provided in the Appendix.

TABLE 4.3
TRANSIT LEVEL OF SERVICE (TLOS) – Street Segment

Street	Segment	Level of Service	Analysis
Innes Road	Jeanne d'Arc Blvd. to Viseneau Dr.	D	Exhibit 4.3

TRUCK LEVEL OF SERVICE (TkLOS)

The truck LOS was determined for the Innes Road segment adjacent to the site. The City of Ottawa has designated Innes Road as a truck route. Table 4.4 presents the truck level of service with the analysis sheets provided in the Appendix.

TABLE 4.4
TRUCK LEVEL OF SERVICE (TkLOS) – Street Segment

Street	Segment	Level of Service	Analysis
Innes Road	Jeanne d'Arc Blvd. to Viseneau Dr.	A	Exhibit 4.4

Traffic collisions along the Innes Road segment between Jeanne d'Arc Boulevard and Viseneau Drive are shown in Table 2.1 in Element 2.1.2. Over the five year period between January 1, 2014 and December 31, 2018, 52 collisions were recorded along the Innes Road segment. The pattern of collisions did not identify any measures which could be taken to reduce the number of collisions.

The Innes Road segment was analyzed to determine the level of service which was compared to the MMLOS targets for pedestrians, bicycles, transit and trucks. The calculated Level of Service (LOS) as shown in Tables 4.1 to 4.4 is compared to the LOS targets for all modes of travel for an Arterial Main Street as designated in the Official Plan - Urban Policy Plan. The LOS targets were obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*. Table 4.5 summarizes the MMLOS results for the road segments and targets.

TABLE 4.5
MULTI-MODAL (MMLOS) SUMMARY TABLE - Innes Road Street Segment

SEGMENTS	Level of Service (LOS) – 2029				
	Pedestrian	Bicycle	Transit	Auto	Truck
SEGMENT					
Calculated Innes Road	E	D	D	-	A
Target	C	C	D	-	D

Road Segment - Innes Road between Viseneau Drive and Jeanne d'Arc Boulevard

The pedestrian LOS did not meet the target due to the speed and volume of traffic along Innes Road.

The bicycle LOS target was not met because of the speed of traffic along Innes Road.

MODULE 4.4 – Access Intersection Design

Element 4.4.1 – Location and Design of Access

The development proposes one right-in/right-out access onto Innes Road which is located 125 m west of Frank Bender Street and 245 m east of Viseneau Drive. The turning movements at the access are controlled by a proposed extension to the center median along Innes Road past the site. To control the turning movements at the access, the center median was extended 29 m further west. The site Access will have a 6.7 m pavement width with one lane entering and one right turn lane exiting. The Access will have a clear throat length of 30 m.

The Esso Service Station is located adjacent to the east property line of the development. The station has two right-in/right-out accesses onto Innes Road with the first located 70 m east of the site Access and the second 95 m. Along the south side of Innes Road is the Riocan Centre shopping centre which has one access onto Innes Road which is located 30 m east of the site Access with right-in/right-out turning movements controlled by the center median.

Element 4.4.2 – Intersection Control

The site access onto Innes Road would be a right-in/right-out access controlled by a center median. The traffic controls would consist of the installation of a stop sign at the southbound Access exiting lane.

Element 4.4.3 – Intersection Design

The analysis of the Frank Bender/Innes, Viseneau /Innes, Jeanne d'Arc/Innes and Access/Innes intersections were completed for all modes using the *Multi-Modal Level of Service (MMLOS) Guidelines* and the *Highway Capacity Manual (HCM) 2010*. Each mode will be addressed in the following sections:

VEHICLE LEVEL OF SERVICE (LOS) – Intersection Capacity Analysis

The analysis of the site access and the Frank Bender/Innes, Viseneau /Innes, and Jeanne d'Arc/Innes intersections will use the *Highway Capacity Software, HCS2022 Release 8.1,* which uses the capacity analysis procedure as documented in the *Highway Capacity Manual (HCM) 7th Edition*.

For unsignalized intersections, the level of service of each lane movement and approach is determined as a function of the average control delay of vehicles at the approach. The following relates the level of service of each lane movement with the expected control delay at the approach.

LEVEL OF SERVICE	AVERAGE CONTROL DELAY	
Level of Service A	0-10 sec./vehicle	Little or No Delay
Level of Service B	>10-15 sec./vehicle	Short Traffic Delays
Level of Service C	>15-25 sec./vehicle	Average Traffic Delays
Level of Service D	>25-35 sec./vehicle	Long Traffic Delays
Level of Service E	>35-50 sec./vehicle	Very Long Traffic Delays
Level of Service F	>50 sec./vehicle	Extreme Delays – Demand Exceeds Capacity

The expected length of queue at the critical lane movements for an unsignalized two-way stop controlled intersection was determined by the calculation of the 95th percentile queue at the lane approach. The 95th percentile queue length is the calculated 95th greatest queue length out of 100 occurrences at a movement during a 15-minute peak period. The 95th percentile queue length is a function of the capacity of a movement and the total expected traffic, with the calculated value determining the magnitude of the queue by representing the queue length as fractions of vehicles.

For a signalized intersection, the operation or level of service of an intersection is determined from the volume to capacity ratio (v/c) for each lane movement as documented by the City of Ottawa in the *Transportation Impact Assessment Guidelines (2017)*. The following relates the level of service with the volume to capacity ratio at each lane movement.

LEVEL OF SERVICE	VOLUME TO CAPACITY RATIO
Level of Service A	0 to 0.60
Level of Service B	0.61 to 0.70
Level of Service C	0.71 to 0.80
Level of Service D	0.81 to 0.90
Level of Service E	0.91 to 1.00
Level of Service F	> 1.00

The results of the analysis are discussed in detail in the following sections:

Access and Innes Road Intersection

The intersection of Access and Innes Road is located 55.5 m west of the east property limit of the site. The access is a "T" intersection which is restricted to right-in/right-out turn movements. The turning movements would be controlled by the center median along Innes Road which will be extended 29 m west of the present position under the Innes Road Development project. A stop sign will be placed at the southbound site exit approach with the following intersection geometry:

Southbound Access 1 Approach	One right turn lane (Stop Sign)
Eastbound Innes Road Approach	Two through lanes
Westbound Innes Road Approach	One through lane
	One shared through/right lane

The operational analysis was conducted for the expected southbound right turn movements during the 2024 and 2029 peak AM and PM hours. The right turn approach was determined to function at a Level of Service (LOS) "C" during the 2024 peak AM hour and at a LOS "B" during the peak PM hour. Table 4.6 summarizes the 2024 operation of the intersection with the analysis sheets provided as Exhibit 4.5 and 4.6.

For the year 2029 traffic, the southbound approach to the intersection would continue to function at a LOS "C" during the peak AM hour and LOS "B" during the peak PM hour as shown in Table 4.6, with the analysis sheets provided as Exhibit 4.7 for the peak AM hour and 4.8 for the peak PM hour. The 95th percentile queue for the 2029 traffic was 0.3 vehicles (1 auto = 7 m) during the peak AM hour and 0.2 vehicles during the peak PM hour at the southbound approach. The site plan provides a 30 m clear throat distance at the site Access.

The construction of the site Access would only trigger the extension of the center median to control turning movements at the access.

TABLE 4.6
ACCESS/INNES INTERSECTION – LOS, Control Delay & v/c

INTERSECTION APPROACH	WEEKDAY PEAK AM HOUR *2024 Total* (2029 Total)			WEEKDAY PEAK PM HOUR *2024 Total* (2029 Total)		
	LOS	**Delay (sec)**	**V/C**	**LOS**	**Delay (sec)**	**V/C**
SB Right - Access	*C* (C)	*16.0* (16.7)	*0.09* (0.10)	*B* (B)	*13.1* (13.4)	*0.05* (0.05)
Total Intersection	*C* (C)	*16.0* (16.7)	*0.09* (0.10)	*B* (B)	*13.1* (13.4)	*0.05* (0.05)

Frank Bender Street and Innes Road Intersection

The intersection of Frank Bender Street and Innes Road is located 132 m east of the site. The intersection is controlled by traffic signals with Innes Road forming the eastbound and westbound approaches and Frank Bender Street the northbound and southbound approaches. The intersection was examined using the traffic signal timing plan which was obtained from the City of Ottawa. The analysis was for the existing 2020 traffic counts (Figure 2.3), for the 2024 and 2029 background traffic which does not include the site generated trips (Figure 3.2 and Figure 3.3), and the expected 2024 and 2029 total traffic including site trips (Figures 3.4 and 3.5).

The analysis determined that all approaches operated at an acceptable level of service for all peak AM periods, and at an acceptable level of service during the peak PM hour for all periods with the exception of the eastbound Innes Road through movement which functioned at a LOS “E”. All approaches functioned at the same level of service when comparing the 2029 background to the 2029 total traffic (including site trips). The total intersection operated at a LOS “A” during both the peak AM and PM hours. The additional site generated trips had only a minor impact on the operation of the intersection and did not trigger any required roadwork. Table 4.7 summarizes the operation of the intersection with the analysis sheets provided as Exhibits 4.9 to 4.18.

TABLE 4.7
FRANK BENDER/INNES INTERSECTION – LOS & v/c Ratio

APPROACH	**PEAK AM HOUR -** 2017 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)		**PEAK PM HOUR -** 2017 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left	A **A** [A] *A* (A)	0.177 **0.197** [0.230] *0.250* (0.288)	A **A** [A] *A* (A)	0.396 **0.425** [0.468] *0.502* (0.548)
EB Through	A **A** [A] *A* (A)	0.243 **0.256** [0.269] *0.259* (0.273)	D **E** [E] *E* (E)	0.869 **0.916** [0.963] *0.918* (0.965)
EB Right	A **A** [A] *A* (A)	0.022 **0.024** [0.024] *0.024* (0.024)	A **A** [A] *A* (A)	0.151 **0.157** [0.165] *0.157* (0.165)
WB Left	A **A** [A] *A* (A)	0.133 **0.138** [0.144] *0.138* (0.144)	A **A** [A] *A* (A)	0.251 **0.328** [0.344] *0.328* (0.344)
WB Through	B **B** [C] *B* (C)	0.651 **0.678** [0.712] *0.679* (0.713)	A **A** [A] *A* (A)	0.395 **0.412** [0.433] *0.414* (0.436)
WB Right	B **B** [C] *B* (C)	0.654 **0.683** [0.719] *0.684* (0.720)	A **A** [A] *A* (A)	0.395 **0.412** [0.433] *0.414* (0.436)
NB Left	A **A** [A] *A* (A)	0.042 **0.045** [0.046] *0.045* (0.046)	A **A** [A] *A* (A)	0.498 **0.533** [0.583] *0.541* (0.592)
NB Through	A **A** [A] *A* (A)	0.026 **0.026** [0.029] *0.026* (0.029)	A **A** [A] *A* (A)	0.229 **0.239** [0.250] *0.239* (0.250)
NB Right	A **A** [A] *A* (A)	0.008 **0.008** [0.008] *0.008* (0.008)	A **A** [A] *A* (A)	0.122 **0.128** [0.135] *0.128* (0.135)
SB Left	A **A** [A] *A* (A)	0.096 **0.101** [0.106] *0.101* (0.106)	A **A** [A] *A* (A)	0.342 **0.376** [0.384] *0.376* (0.384)
SB Through	A **A** [A] *A* (A)	0.169 **0.176** [0.184] *0.179* (0.187)	A **A** [A] *A* (A)	0.470 **0.490** [0.512] *0.499* (0.522)
Total Intersection	A **A** [A] *A* (A)	0.285 **0.299** [0.315] *0.302* (0.318)	A **A** [A] *A* (A)	0.461 **0.488** [0.514] *0.493* (0.520)

Viseneau Drive and Innes Road Intersection

The intersection of Viseneau Drive and Innes Road is located 240 m west of the site. The intersection is controlled by traffic signals with Innes Road forming the eastbound and westbound approaches, Viseneau Drive the southbound approach, and the Riocan Centre access the northbound approach. The traffic signal timing plan obtained from the City of Ottawa was used for all analysis periods.

The analysis determined that all approaches functioned at an acceptable level of service during the peak AM hour for all analysis periods. During the peak PM periods, all movements functioned at an acceptable level of service for all analysis periods with the exception of the eastbound Innes Road through movement which functioned at a LOS “F” for the 2029 traffic. The total intersection operated at a LOS “A” during both the peak AM and PM hours. All approaches functioned at the same level of service when comparing the 2029 background to the 2029 total traffic (including site trips). The additional site generated trips had only a minor impact on the operation of the

intersection and did not trigger any required roadwork. Table 4.8 summarizes the operation of the intersection with the analysis sheets provided as Exhibits 4.19 to 4.28.

TABLE 4.8
VISENEAU/INNES INTERSECTION – LOS & v/c Ratio

APPROACH	**PEAK AM HOUR -** 2017 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)		**PEAK PM HOUR -** 2017 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left	A **A** [A] *A* (A)	0.092 **0.073** [0.080] *0.075* (0.083)	A **A** [A] *A* (A)	0.129 **0.144** [0.159] *0.146* (0.161)
EB Through	A **A** [A] *A* (A)	0.285 **0.255** [0.268] *0.259* (0.272)	E **E** [F] *E* (F)	0.973 **0.969** [1.019] *0.984* (1.033)
EB Right	A **A** [A] *A* (A)	0.061 **0.066** [0.070] *0.066* (0.070)	A **A** [A] *A* (A)	0.135 **0.144** [0.152] *0.144* (0.152)
WB Left	A **A** [A] *A* (A)	0.327 **0.349** [0.366] *0.399* (0.415)	C **C** [D] *C* (D)	0.728 **0.779** [0.819] *0.803* (0.843)
WB Through	C **B** [C] *C* (C)	0.800 **0.689** [0.723] *0.701* (0.735)	A **A** [A] *A* (A)	0.376 **0.402** [0.424] *0.409* (0.431)
WB Right	C **B** [C] *C* (C)	0.803 **0.690** [0.725] *0.702* (0.737)	A **A** [A] *A* (A)	0.377 **0.402** [0.424] *0.409* (0.431)
NB Left	A **A** [A] *A* (A)	0.055 **0.061** [0.065] *0.061* (0.065)	A **A** [A] *A* (A)	0.367 **0.408** [0.438] *0.408* (0.438)
NB Through	A **A** [A] *A* (A)	0.009 **0.009** [0.011] *0.009* (0.011)	A **A** [A] *A* (A)	0.089 **0.095** [0.100] *0.095* (0.100)
NB Right	A **A** [A] *A* (A)	0.087 **0.094** [0.098] *0.094* (0.098)	A **A** [A] *A* (A)	0.484 **0.520** [0.547] *0.520* (0.547)
SB Lt/Thru/Rt	A **A** [A] *A* (A)	0.218 **0.232** [0.247] *0.232* (0.247)	A **A** [A] *A* (A)	0.334 **0.357** [0.377] *0.357* (0.377)
Total Intersection	A **A** [A] *A* (A)	0.356 **0.317** [0.334] 0.323 (0.341)	A **A** [A] *A* (A)	0.477 **0.495** [0.522] 0.502 (0.529)

Jeanne d'Arc Boulevard and Innes Road Intersection

The intersection of Jeanne d'Arc Boulevard and Innes Road is located 730 m east of the site. The intersection is controlled by traffic signals with Innes Road forming the eastbound and westbound approaches, Mer Bleue Road the northbound approach, and Jeanne d'Arc Boulevard the southbound approach. The intersection was analyzed for all periods using the traffic signal timing plan obtained from the City of Ottawa.

The operational analysis determined that during the peak AM hour, all movements functioned at an acceptable level of service with the exception of the westbound left turn movement which functioned at a LOS "F" for all 2020, 2024 and 2029 traffic scenarios. During the peak PM hour, most approaches functioned at a lower level of service due to the high volume of traffic. The total 2024 and 2029 level of service of the intersection was a LOS "A" during the peak AM hour and a LOS "D" during the peak PM hour.

The analysis determined that the level of service for the 2029 background and 2029 total traffic (including site trips) were the same for all peak AM and PM hour movements resulting in the development having only a minor impact on the operation of the intersection and would not trigger any required roadwork. Table 4.9 summarizes the operation of the intersection with the analysis sheets provided as Exhibits 4.29 to 4.38.

TABLE 4.9
JEANNE D'ARC/INNES INTERSECTION – LOS & v/c Ratio

APPROACH	**PEAK AM HOUR -** 2020 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)		**PEAK PM HOUR -** 2020 Existing **2024 Background** [2029 Background] *2024 Total* (2029 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left	A **A** [A] *A* (A)	0.379 **0.389** [0.410] *0.389* (0.410)	E **F** [F] *F* (F)	0.994 **1.037** [1.087] *1.037* (1.087)
EB Through	A **A** [A] *A* (A)	0.255 **0.263** [0.277] *0.267* (0.281)	E **F** [F] *F* (F)	0.992 **1.019** [1.068] *1.022* (1.071)
WB Left	F **F** [F] *F* (F)	1.936 **2.017** [2.119] *2.017* (2.119)	F **F** [F] *F* (F)	1.264 **1.312** [1.382] *1.312* (1.382)
WB Through	D **D** [E] *D* (E)	0.873 **0.907** [0.953] *0.908* (0.954)	A **A** [A] *A* (A)	0.552 **0.559** [0.588] *0.564* (0.593)
NB Left	A **A** [A] *A* (A)	0.439 **0.458** [0.482] *0.458* (0.482)	A **A** [A] *A* (A)	0.404 **0.421** [0.443] *0.421* (0.443)
NB Through	A **A** [B] *A* (B)	0.559 **0.582** [0.613] *0.582* (0.613)	D **D** [E] *D* (E)	0.838 **0.872** [0.916] *0.872* (0.916)
NB Right	A **A** [B] *A* (B)	0.570 **0.594** [0.624] *0.594* (0.624)	E **F** [F] *F* (F)	0.963 **1.001** [1.053] *1.001* (1.053)
SB Left	A **A** [A] *A* (A)	0.547 **0.570** [0.597] *0.570* (0.597)	F **F** [F] *F* (F)	1.025 **1.066** [1.121] *1.066* (1.121)
SB Through	A **A** [A] *A* (A)	0.259 **0.270** [0.284] *0.270* (0.284)	D **D** [E] *D* (E)	0.835 **0.868** [0.915] *0.868* (0.915)
SB Right	A **A** [A] *A* (A)	0.276 **0.287** [0.301] *0.287* (0.301)	D **D** [E] *D* (E)	0.844 **0.877** [0.923] *0.877* (0.923)
Total Intersection	A **A** [A] *A* (A)	0.538 **0.558** [0.587] 0.560 (0.589)	C **D** [D] *D* (D)	0.807 **0.832** [0.874] 0.834 (0.876)

PEDESTRIAN LEVEL OF SERVICE (PLOS)

The pedestrian level of service was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. There are sidewalks along both sides of Innes Road. The sidewalks are approximately 2.0 m in width and are adjacent to the curb. Table 4.10 presents the level of service for the three existing intersections, with the analysis sheets provided in the Appendix.

TABLE 4.10
PEDESTRIAN LEVEL OF SERVICE (PLOS) – Intersection

Intersection	Level of Service	Analysis
Frank Bender and Innes Road	F	Exhibit 4.39
Viseneau Drive and Innes Road	F	Exhibit 4.40
Jeanne d'Arc Boulevard and Innes Road	F	Exhibit 4.41

BICYCLE LEVEL OF SERVICE (BLOS)

The bicycle level of service (BLOS) was determined for the three intersections along Innes Road. There are cycling lanes along Innes Road. Cycling lanes also exist along Mer Bleue Road, and Jeanne d'Arc Boulevard for a distance of approximately 100 m. Table 4.11 presents the level of service for the three intersections with the analysis sheets provided in the Appendix.

TABLE 4.11
BICYCLE LEVEL OF SERVICE (BLOS) – Intersection

Intersection	Level of Service	Analysis
Frank Bender and Innes Road	F	Exhibit 4.42
Viseneau Drive and Innes Road	F	Exhibit 4.43
Jeanne d'Arc Boulevard and Innes Road	F	Exhibit 4.44

TRANSIT LEVEL OF SERVICE (TLOS)

OC Transpo provides transit service along Innes Road past the site with Local Routes 131 and 138 and frequent service Route 25. The TMP has identified a transit signal priority project along Innes Road between Jeanne d'Arc Boulevard and the Blackburn Hamlet Bypass which would improve transit service. Table 4.12 presents the level of service at the three intersections which was calculated from the evaluation tables provided in the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. The TLOS is based on the Control Delay at each intersection which was determined from the 2029 peak PM hour intersection analyses sheets for the eastbound Innes Road through movement. The analysis sheets are provided in the Appendix.

TABLE 4.12
TRANSIT LEVEL OF SERVICE (TLOS) – Intersection

Intersection	Level of Service	Analysis
Frank Bender and Innes Road	F	Exhibit 4.45
Viseneau Drive and Innes Road	F	Exhibit 4.46
Jeanne d'Arc Boulevard and Innes Road	F	Exhibit 4.47

TRUCK LEVEL OF SERVICE (TkLOS)

Innes Road, Frank Bender Street, Jeanne d'Arc Boulevard and Mer Bleue Road are all designated as truck routes. Viseneau Drive north of Innes Road prohibits trucks, but the access to the Riocan Centre south of Innes Road allows truck travel. The level of service for the intersections is presented in Table 4.13 with the analysis sheets provided in the Appendix.

TABLE 4.13
TRUCK LEVEL OF SERVICE (TkLOS) – Intersection

Intersection	Level of Service	Analysis
Frank Bender and Innes Road	B	Exhibit 4.48
Viseneau Drive (Riocan Centre) and Innes Road	B	Exhibit 4.49
Jeanne d'Arc Boulevard and Innes Road	B	Exhibit 4.50

MODULE 4.5 – Transportation Demand Management

Element 4.5.1 – Context for TDM

The site is located along a major arterial road which functions at an acceptable level of service. The surrounding land uses consist mainly of commercial and retail uses which would experience only a minor impact by the trips generated by the development.

The area is well service by transit and pedestrian sidewalks and cycling network. The number of residential trips would be low due to the number of units and available multimodal travel options. With Innes Road designated as a four lane arterial road, higher than expected site trips would not have a detrimental impact on the surrounding land uses.

Element 4.5.2 – Need and Opportunity

The residential component of the development would not require a program to promote various mode shares as the available transit routes and pedestrian/cycling facilities to the downtown core and transit stations would promote the use of alternative modes of travel. With the site located in close proximity to retail and other amenities, some tenants may not own a vehicle.

Element 4.5.3 – TDM Program

TDM measures could be implemented to encourage travel by sustainable modes which would be applied to the apartment development. The TDM measures, which would reduce the number of vehicle trips, would consist of the encouragement of transit and bicycle use. The programs would mainly be that of providing information in the form of transit schedules/routes, and maps showing designated bike routes.

The study has utilized the TDM Measures Checklist for a Residential Development which examines the implementation of facilities that are supportive of sustainable modes. The following provides the checklist which examines the Site Plan and transportation components for the proposed residential apartment development.

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)*	☒ Area maps for walking/cycling can be displayed on an information board in the lobby
		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)*	☒ Transit schedules can be displayed on an information board in the lobby
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	☐ The site is located in an area well served by transit
	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)*	☐ N/A
BASIC ★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☒ Unbundling parking from apartment rent will be considered

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	☒ A multimodal travel information package can be included with the rental agreement
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

MODULE 4.6 – Neighbourhood Traffic Management

Element 4.6.1 – Adjacent Neighbourhoods

Exempt as determined in the Scoping Document.

MODULE 4.7 - Transit

Element 4.7.1 – Route Capacity

OC Transpo provides Local Routes 131 and 138 and Frequent Route 25 along Innes Road past the site. The transit routes provide service locally to retail centers, and to transit stations and the downtown area. The low number of transit person trips would produce a minor impact on the capacity of transit in the area and would not trigger the need for additional transit capacity.

Element 4.7.2 – Transit Priority

There are currently no transit priority measures along Innes Road past the site. The site is well serviced by transit with short wait times between buses during peak hours. There would be no need to impost transit priority measures to improve transit service.

MODULE 4.8 – Review of Network Concept

Exempt as determined in the Scoping Document.

MODULE 4.9 – Intersection Design

Element 4.9.1 – Intersection Control

The three intersections examined in the study (Frank Bender/Innes, Viseneau/Innes, Jeanne d'Arc/Innes) are all controlled by traffic signals and function at an acceptable level of service. No further intersection control measures are required.

Element 4.9.2 – Intersection Design

The proposed access was analyzed to determine the operation from expected site generated trips, plus the three existing intersections along Innes Road in the study area. The performance analysis for all modes was determined in Element 4.4.3 Intersection Design. A summary of the MMLOS analysis is provided in Table 4.14 for the expected 2029 traffic at the three existing intersections.

The calculated Level of Service (LOS) as shown in Tables 4.6 to 4.13 is compared to the LOS targets for all modes of travel. The LOS targets were obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*. Table 4.14 summarizes the MMLOS results for the three intersections and targets.

TABLE 4.14
MULTI-MODAL (MMLOS) INTERSECTION SUMMARY TABLE - Intersection

INTERSECTION	Level of Service (LOS) – 2029				
	Pedestrian	Bicycle	Transit	Auto	Truck
CALCULATED					
Frank Bender/Innes	E	F	E	A	B
Viseneau/Innes	F	F	E	A	B
Jeanne d'Arc/Innes	E	F	E	D	B
TARGET	C	C	D	D	D

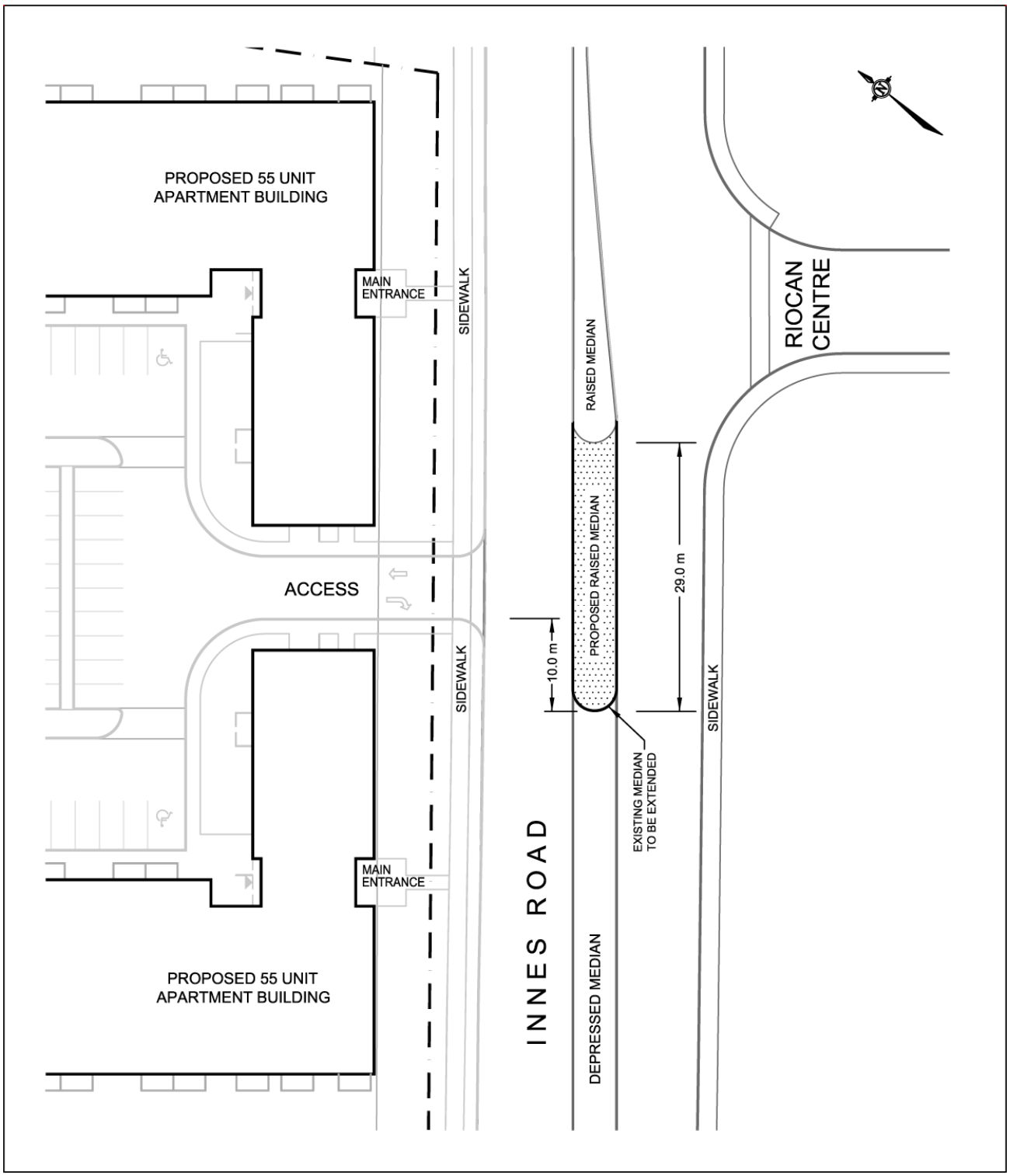
Access

The site Access will be restricted to right-in/right-out turning movements. The turning movements will be controlled by the center median along Innes Road. The existing median will require an extension of 29 m in order to control turning movements at the Access. Figure 4.1 shows a functional design of the median extension along Innes Road. Following the roadway modifications, the site access will operate at an acceptable level of service.

Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes Intersections

Auto LOS - Utilizing the expected 2029 peak AM and PM hour traffic, the Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes Intersections all operated at an acceptable level of service which would meet the MMLOS targets.

FIGURE 4.1
INNES ROAD MEDIAN EXTENSION



NOT TO SCALE

Pedestrian PLOS - For all three intersections the PLOS did not meet the target due to the number of lanes crossed and the length of the traffic signal cycle.

Bicycle BLOS - For all three intersections the BLOS did not meet the target due to the number of lanes crossed in making a left turn movement, and the travel speed of vehicles along Innes Road.

Transit TLOS - For all three intersections the TLOS did not meet the target due to the length of the traffic signal cycle.

SUMMARY

A Site Plan has been prepared for the development of a 0.727 ha parcel of land at 3817-3843 Innes Road. The site is located approximately 132 m west of Frank Bender Street and would consist of the construction of two apartment buildings.

The site would provide 110 rental apartments in the two 4 storey buildings. The site would have one access onto Innes Road, which would be restricted to right-in/right-out turning movements controlled by a center median along Innes Road.

The Transportation Impact Assessment report has established a study area which includes the Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes intersections. The operational analysis was completed for the weekday peak AM and PM hours at the completion of the development in 2024, and at five years beyond completion at the year 2029. The TIA analysis has examined all modes of transportation along the Innes Road segment and the intersections within the study area. The transportation analysis has determined the following:

1. The proposed Innes Road Development would be a residential apartment development providing 110 rental units. The total development is expected to generate 9 vehicle trips arriving and 31 vehicle trips departing during the weekday peak AM hour, and 31 vehicle trips arriving and 20 vehicle trips departing during the weekday peak PM hour.

2. The development would provide a total of 128 parking spaces including 2 barrier free spaces, of which 44 will be surface spaces and 84 spaces in an underground parking garage.

3. The Site Plan provides bicycle racks in a bike room in the parking garage for 110 bikes, with 8 spaces in bike racks located outside the entrance to each building for a total of 118 spaces for bicycles.

4. The site will have one access onto Innes Road. The access will be restricted to right-in/right-out turning movements controlled by a center median along Innes Road. The existing median must be extended 29 m further west to control the turning movements at the access as shown in Figure 4.1.

5. The MMLOS analysis of the Innes Road segment between Viseneau Drive and Jeanne d'Arc Boulevard determined that the pedestrian PLOS and bicycle BLOS targets were not met. The low level of service of the PLOS and BLOS was attributed to the volume and speed of traffic along Innes Road. The site would have a minor impact on the level of service of the road segment.

6. The analysis of the Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes intersections determined that for the 2029 Auto LOS, the eastbound through movement at the Viseneau/Innes functioned at a LOS "F" during the peak PM hour, and all of the approaches at the Jeanne d'Arc/Innes intersection functioned at a LOS "E" of "F" during the peak PM hour due to the volume of traffic.

   For the Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes intersections, the Pedestrian PLOS functioned at a LOS "E" or "F" due the number of travel lanes and signal cycle length, the Bicycle BLOS at a LOS "F" due to the number of travel lanes and traffic speed, and the Transit TLOS at a LOS "E" due to the length of the traffic signal cycle. There are no recommended modifications to the intersection resulting from the development of the site.

7. The intersections were examined using the existing traffic counts, the traffic at the year 2024 following the completion of the development, and at the year 2029 which represents five years beyond completion. The analysis was also performed for the 2024 and 2029 background traffic. The analysis determined that for the 2029 total traffic including site trips, all intersections operated at the same level of service as the 2029 background traffic which did not include the site generated trips. The conclusion is that the trips from the site would result in a minor impact and not change the level of service. The development at 3817 - 3943 Innes Road would require the extension of the center median to control turning movements at the site access, but would not trigger the requirement for roadway or intersection modifications at the Frank Bender/Innes, Viseneau/Innes and Jeanne d'Arc/Innes intersections.

Prepared by:

David J. Halpenny

David J. Halpenny, M. Eng., P. Eng.

APPENDIX

CERTIFICATION FORM

SCREENING FORM

BUS ROUTE MAPS

TRAFFIC COUNTS

MMLOS ROAD SEGMENT AND INTERSECTION ANALYSIS

EXHIBIT 1.1
CERTIFICATION FORM

Transportation Impact Assessment Guidelines

Certification Form for TIA Study PM

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

- [X] 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;
- [X] 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;
- [X] 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
- [X] I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise
  - [X] 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

Dated at Ottawa (City) this 2nd day of September, 20 21.

Name : David J. Halpenny

Professional title: President, D. J. Halpenny & Associates Ltd.

D J Halpenny

Signature of individual certifier that s/he meets the above criteria

Office Contact Information (Please Print)	
Address:	P.O. Box 774
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Telephone / Extension:	613-692-8662
E-Mail Address:	David@DJHalpenny.com

Stamp

EXHIBIT 1.2
SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	3817-3843 Innes Road, Ottawa
Description of Location	Residential Development
Land Use Classification	"R4Z" Zoning – Residential Fourth Density
Development Size (units)	110 Units total in three Apartment Buildings
Development Size (m^2)	7,268 m^2 Lot Area
Number of Accesses and Locations	One access onto Innes Road
Phase of Development	Two Phases of development
Buildout Year	2024

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

2. Trip Generation Trigger

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

Land Use Type	Minimum Development Size
Apartments	110 units

	Yes	No
110 Apartment units > 90 Minimum Development Size	X	

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

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

3. Location Triggers

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

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

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

4. Safety Triggers

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

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

5. Summary

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

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

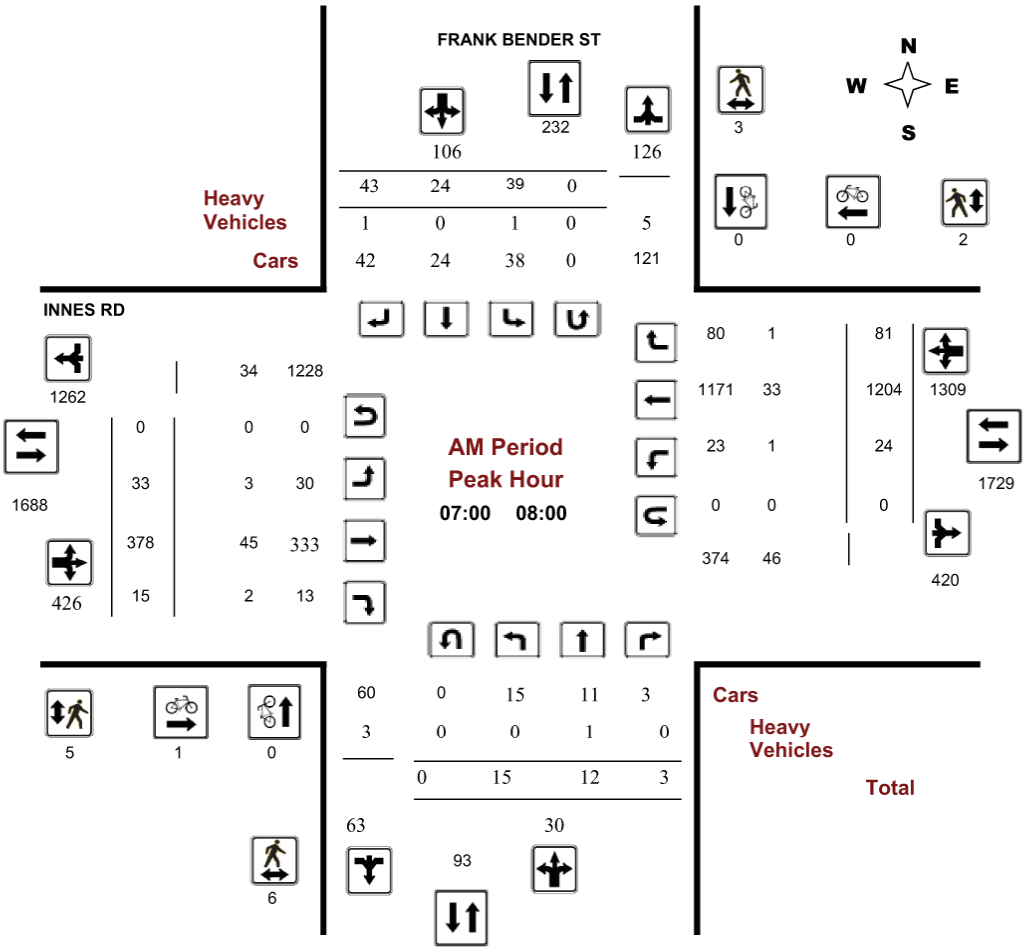
EXHIBIT 2.1
2020 PEAK AM HOUR TRAFFIC COUNTS - FRANK BENDER/INNES INTERSECTION

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FRANK BENDER ST @ INNES RD

Survey Date: Thursday, January 09, 2020 **WO No:** 39283
Start Time: 07:00 **Device:** Miovision



Comments 5469224 - THU JAN 09, 2020 - 8HRS - LORETTA

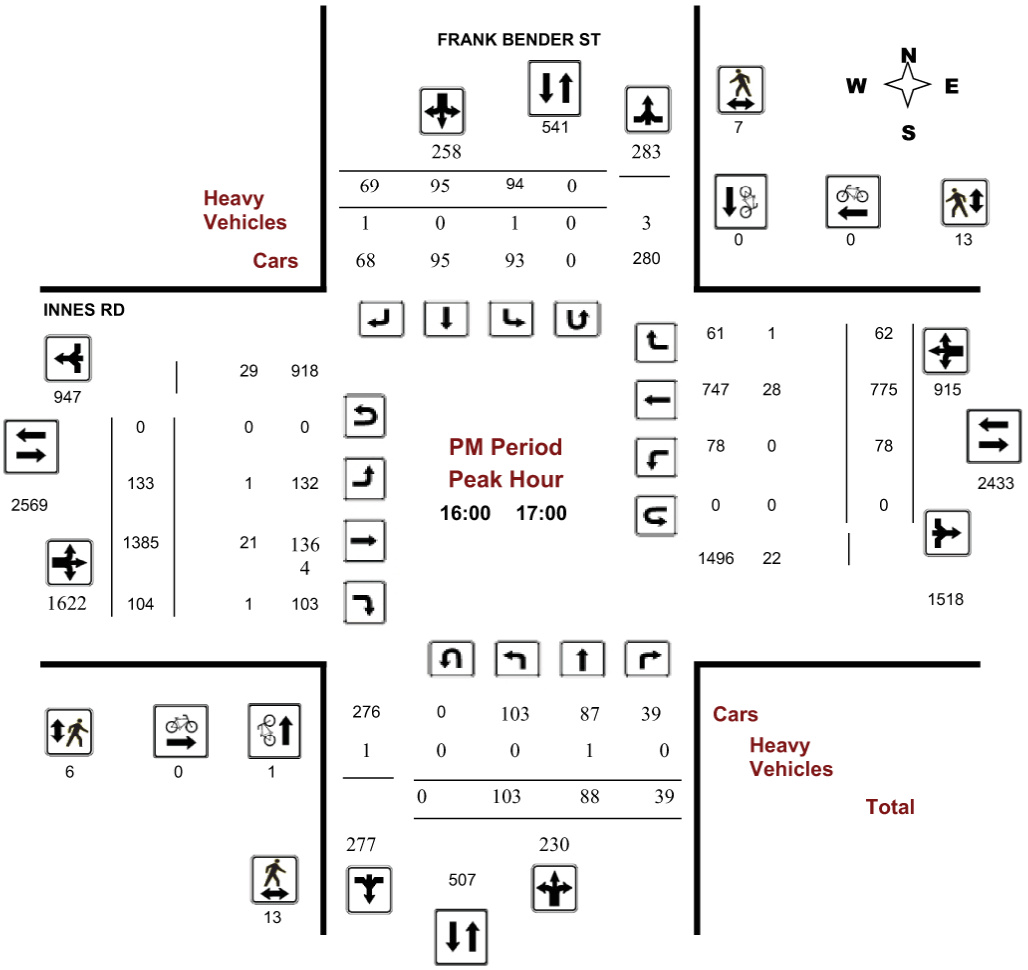
2020 PEAK PM HOUR TRAFFIC COUNTS - FRANK BENDER/INNES INTERSECTION

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

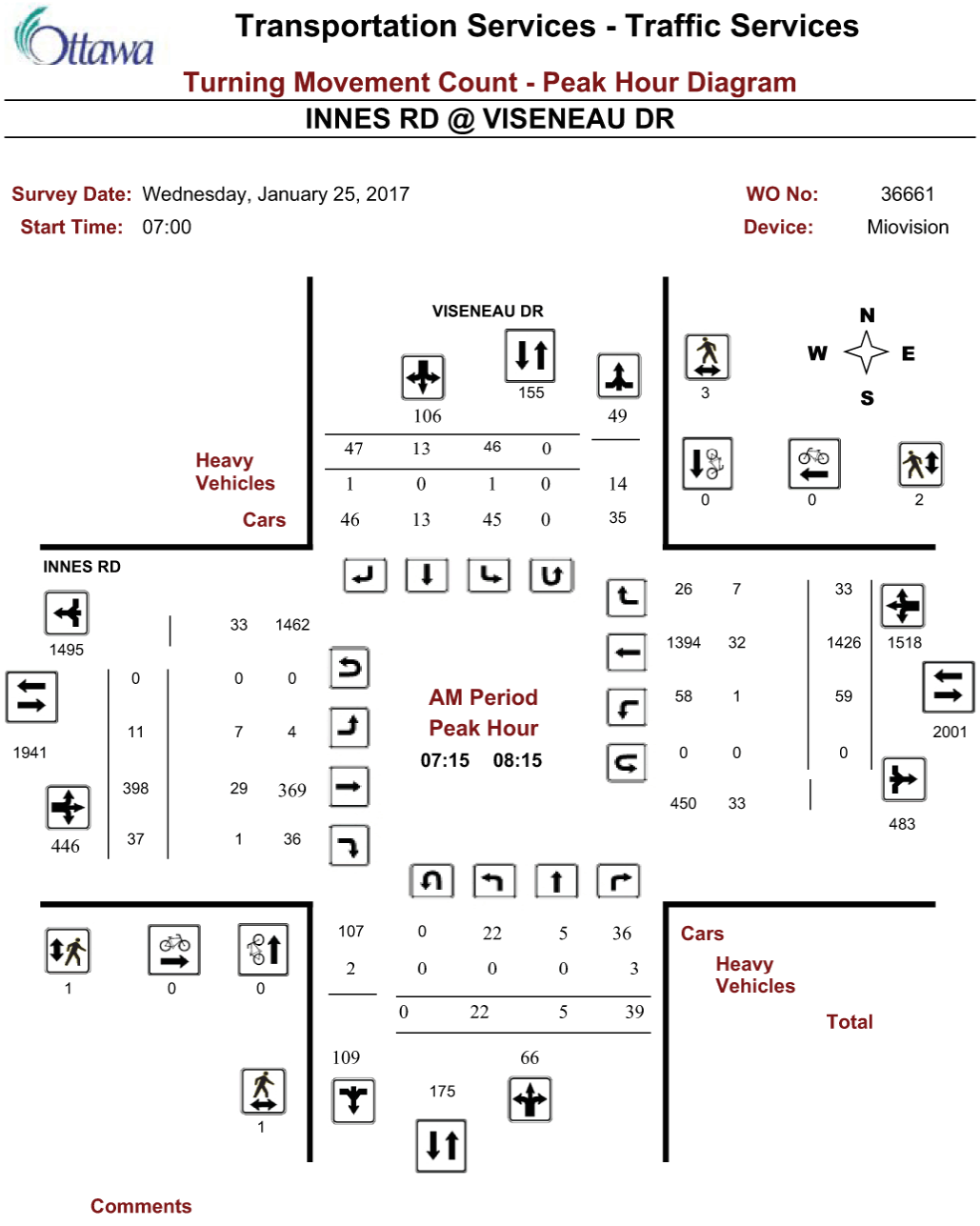
FRANK BENDER ST @ INNES RD

Survey Date: Thursday, January 09, 2020 **WO No:** 39283
Start Time: 07:00 **Device:** Miovision



Comments 5469224 - THU JAN 09, 2020 - 8HRS - LORETTA

EXHIBIT 2.2
2017 PEAK AM HOUR TRAFFIC COUNTS - VISENEAU/INNES INTERSECTION



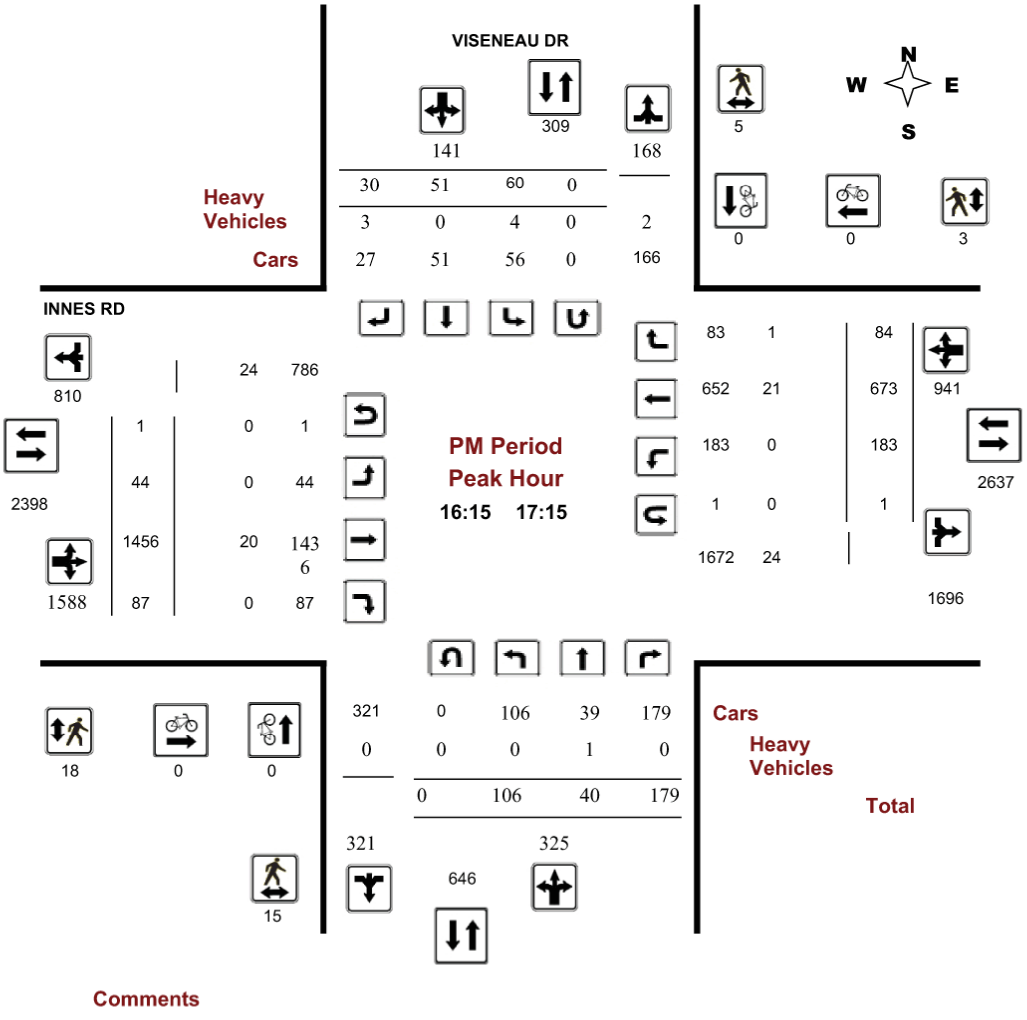
2017 PEAK PM HOUR TRAFFIC COUNTS - VISENEAU/INNES INTERSECTION

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

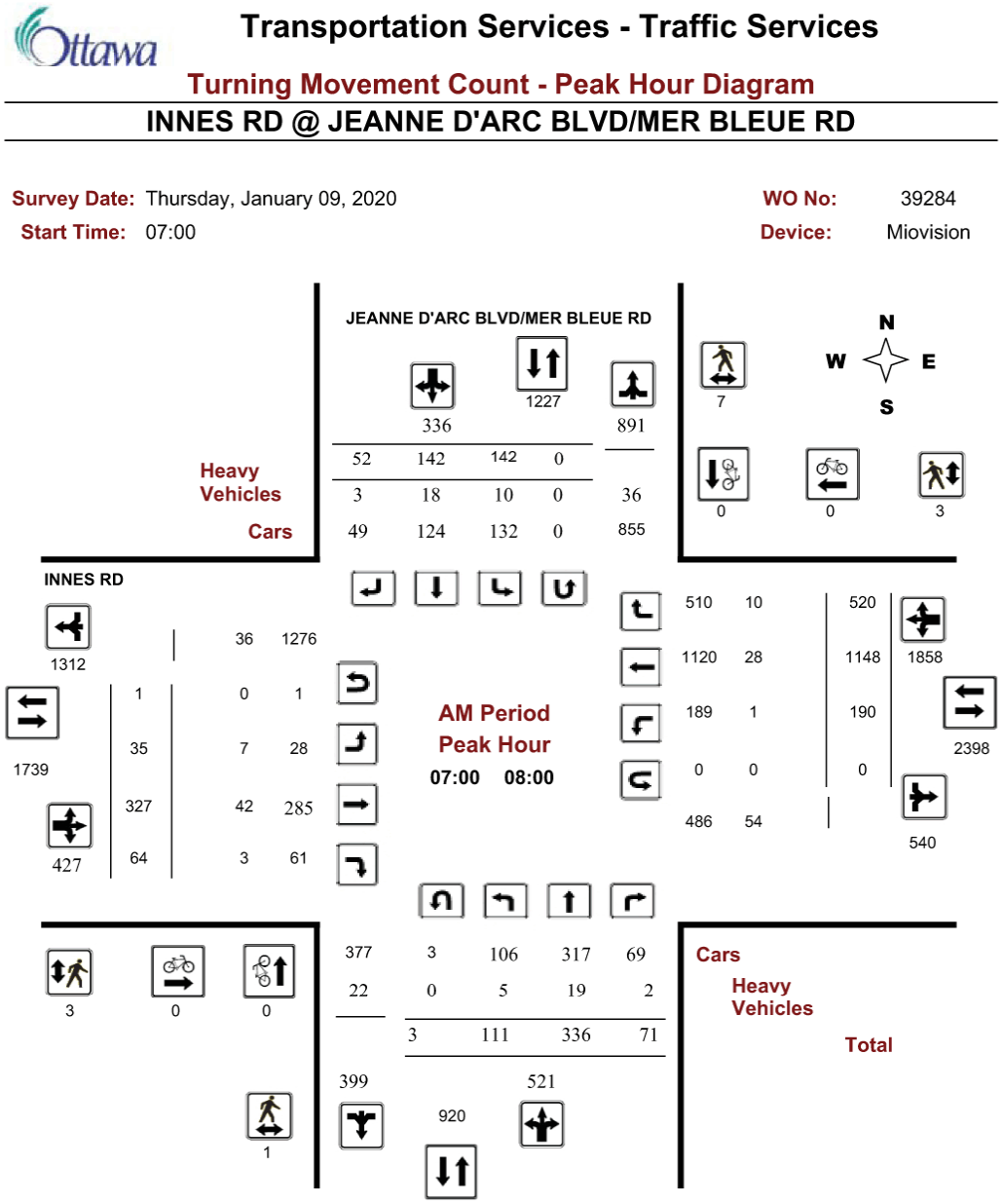
INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661
Start Time: 07:00 **Device:** Miovision



Comments

EXHIBIT 2.3
2020 PEAK AM HOUR TRAFFIC COUNTS - JEANNE D'ARC/INNES INTERSECTION



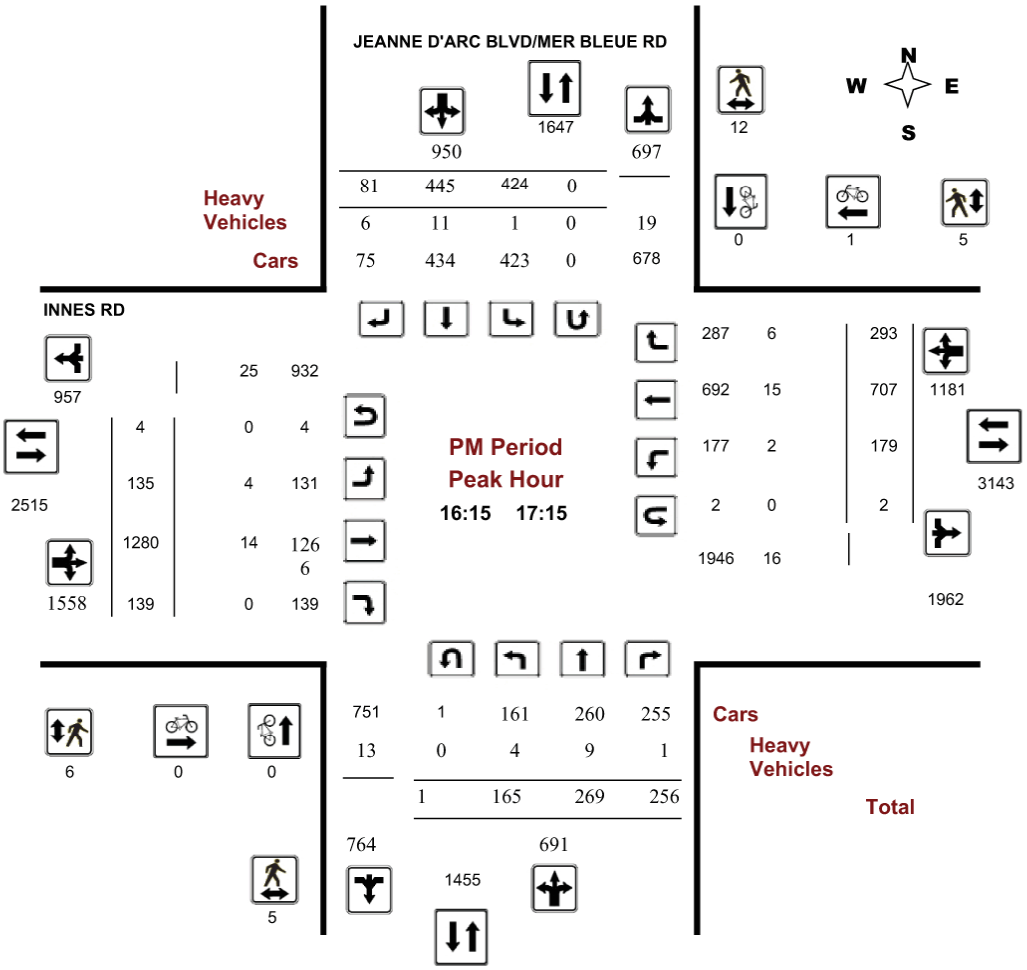
2020 PEAK PM HOUR TRAFFIC COUNTS - JEANNE D'ARC/INNES INTERSECTION

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

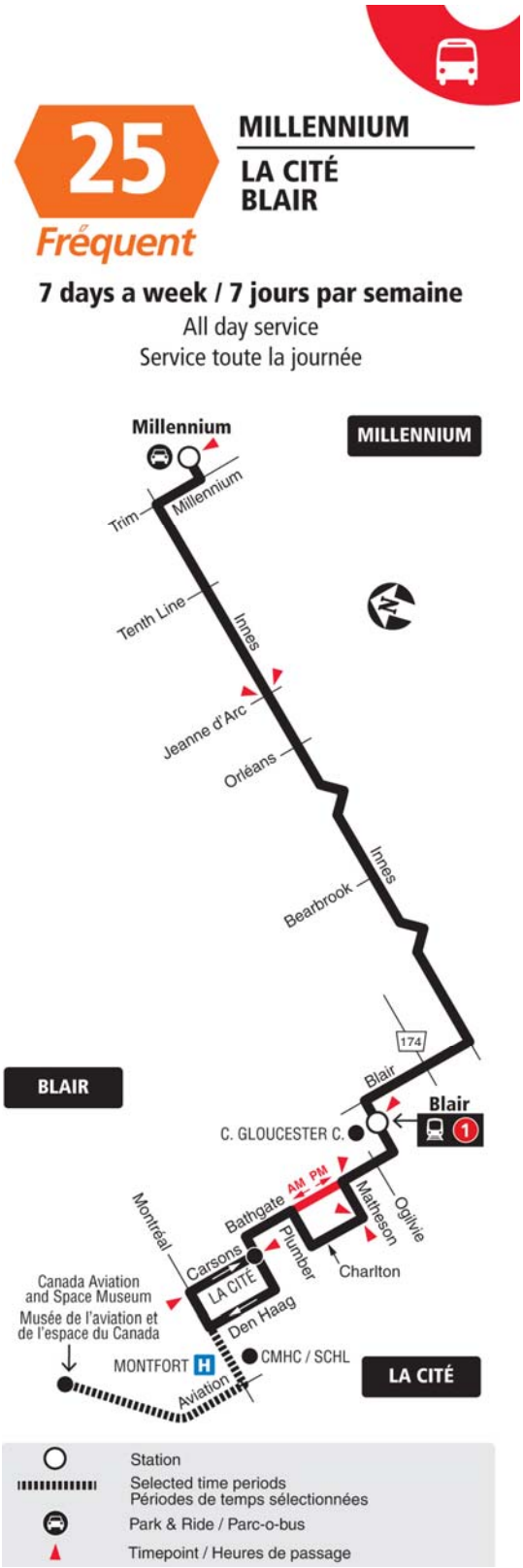
INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

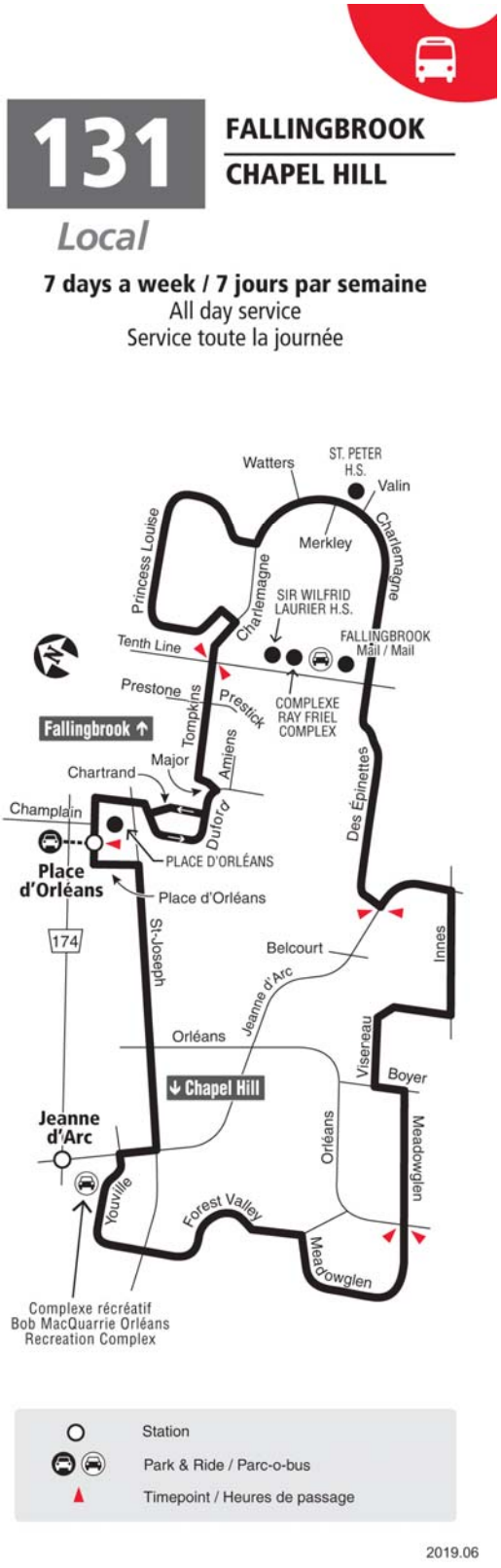
Survey Date: Thursday, January 09, 2020 **WO No:** 39284
Start Time: 07:00 **Device:** Miovision



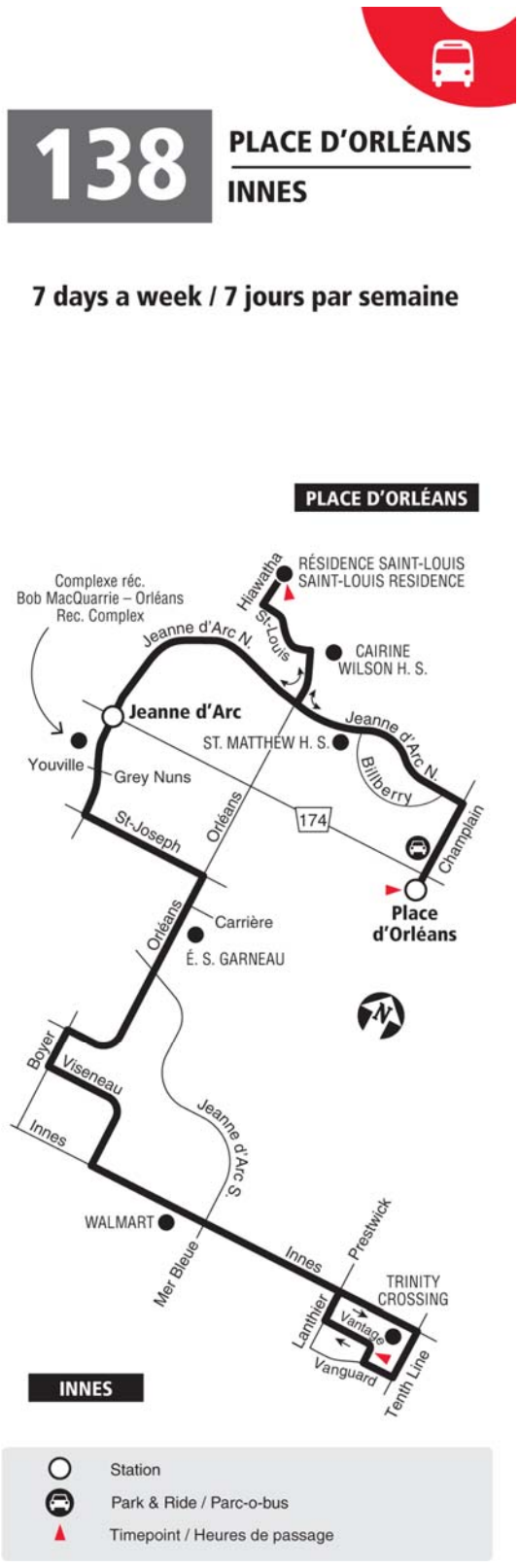
Comments 5469225 - THU JAN 09, 2020 - 8HRS - LORETTA

EXHIBIT 2.4
OC TRANSPO BUS ROUTE - Route 25 and Route 131





OC TRANSPO BUS ROUTE - Route 138 and Route 231



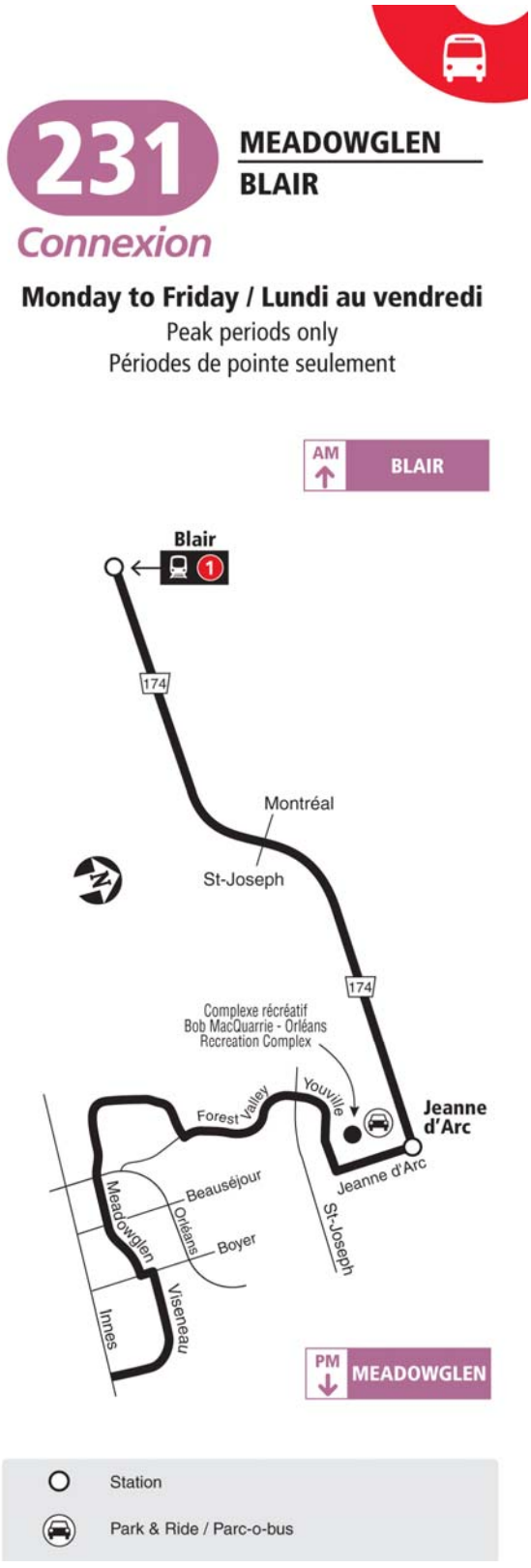


EXHIBIT 4.1
INNES ROAD - PLOS SEGMENT EVALUATION

STREET	Innes Road
FROM	Viseneau Drive
TO	Jeanne d'Arc Boulevard
YEAR	2029
DIRECTION	Eastbound–Westbound
MMLOS MODE	PLOS

SEGMENT SCORE **E**

Sidewalk Width (m)	Boulevard Width (m)	Motor Vehicle Traffic Volume (AADT)	Presence of On-street Parking	Segment PLOS			
				Operating Speed (km/h)			
				≤30	>30 or 50	>50 or 60	>60 [1]
2.0 or more	> 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	B	N/A
			No	A	B	C	D
	0.5 to 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	C	N/A
			No	A	C	D	E
	0	≤ 3000	NA	A	B	C	D
		> 3000	Yes	B	B	D	N/A
			No	B	C	E	F
1.8	> 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	C	N/A
			No	A	C	D	E
	0.5 to 2	≤ 3000	N/A	A	B	B	D
		> 3000	Yes	A	C	C	N/A
			No	B	C	E	E
	0	≤ 3000	N/A	A	B	C	D
		> 3000	Yes	B	C	D	N/A
			No	C	D	F	F
1.5	> 2	≤ 3000	N/A	C	C	C	C
		> 3000	Yes	C	C	D	N/A
			No	C	D	E	E
	0.5 to 2	≤ 3000	N/A	C	C	C	D
		> 3000	Yes	C	C	D	N/A
			No	D	E	E	E
	0	N/A		D	E	F [2]	F [2]
<1.5	N/A			F [3]	F [3]	F [3]	F [3]
No sidewalk	N/A			C [4]	F [3]	F [3]	F [3]

EXHIBIT 4.2
INNES ROAD - BLOS SEGMENT EVALUATION

STREET	Innes Road
FROM	Viseneay Drive
TO	Jeanne d'Arc Boulevard
YEAR	2029
DIRECTION	Eastbound–Westbound
MMLOS MODE	BLOS

SEGMENT SCORE **D**

Type of Bikeway		LOS
Physically Separated Bikeway (cycle tracks, protected bike lanes and multi-use paths). Physical separation refers to, but is not limited to, curbs, raised medians, bollards and parking lanes (adjacent to the bike lane along the travelled way i.e. not curbside).		A
Bike Lanes Not Adjacent Parking Lane - Select Worst Scoring Criteria		
No. of Travel Lanes	1 travel lane in each direction	A
	2 travel lanes in each direction separated by a raised median	B
	2 travel lanes in each direction without a separating median	C
	More than 2 travel lanes in each direction	D
Bike Lane Width	≥ 1.8 m wide bike lane (includes marked buffer and paved gutter width)	A
	≥1.5 m to <1.8 m wide bike lane (includes marked buffer and paved gutter width)	B
	≥1.2 m to <1.5 m wide bike lane (includes marked buffer and paved gutter width)	C
Operating Speed	≤ 50 km/h operating speed	A
	60 km/h operating speed	C
	≥ 70 km/h operating speed	E
Bike lane blockage (commercial areas)	Rare	A
	Frequent	C
Bike Lanes Adjacent to curbside Parking Lane - Select Worst Scoring Criteria		
No. of Travel Lanes	1 travel lane in each direction	A
	2 or more travel lanes in each direction	C
Bike Lane and Parking Lane Width	4.5 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	A
	4.25 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	B
	≤ 4.0 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	C
Operating Speed	< 40 km/h operating speed	A
	50 km/h operating speed	B
	60 km/h operating speed	D
	≥ 70 km/h operating speed	F
Bike lane blockage (commercial areas)	Rare	A
	Frequent	C
Mixed Traffic		
No. of Travel Lanes and Operating Speed	2 travel lanes; ≤ 40 km/h; no marked centerline or classified as residential	A
	2 to 3 travel lanes; ≤ 40 km/h	B
	2 travel lanes; 50 km/h; no marked centerline or classified as residential	B
	2 to 3 travel lanes; 50 km/h	D
	4 to 5 travel lanes; ≤ 40 km/h	D
	4 to 5 travel lanes; ≥ 50 km/h	E
	6 or more travel lanes; ≤ 40 km/h	E
	≥ 60 km/h	F
Unsignalized Crossing along Route: no median refuge		
No. of Travel Lanes on Side Street and Operating Speed	3 or less lanes being crossed; ≤ 40 km/h	A
	4 to 5 lanes being crossed; ≤ 40 km/h	B
	3 or less lanes being crossed; 50 km/h	B
	4 to 5 lanes being crossed; 50 km/h	C
	3 or less lanes being crossed; 60 km/h	C
	4 to 5 lanes being crossed; 60 km/h	D
	6 or more lanes being crossed; ≤ 40 km/h	E
	3 or less lanes being crossed; ≥ 65 km/h	E
	6 or more lanes being crossed; ≥ 50 km/h	F
	4 to 5 lanes being crossed; ≥ 65 km/h	F
Unsignalized Crossing along Route: with median refuge (≥ 1.8 m wide)		
No. of Travel Lanes on Side Street and Operating Speed	5 or less lanes being crossed; ≤ 40 km/h	A
	3 or less lanes being crossed; 50 km/h	A
	6 or more lanes being crossed; ≤ 40 km/h	B
	4 to 5 lanes being crossed; 50 km/h	B
	3 or less lanes being crossed; 60 km/h	B
	6 or more lanes being crossed; 50 km/h	C
	4 to 5 lanes being crossed; 60 km/h	C
	3 or less lanes being crossed; ≥ 65 km/h	D
	6 or more lanes being crossed; 60 km/h	E
	4 to 5 lanes being crossed; ≥ 65 km/h	E
	6 or more lanes being crossed; ≥ 65 km/h	F

NOT APPLICABLE

NOT APPLICABLE

NOT APPLICABLE

NOT APPLICABLE

EXHIBIT 4.3
INNES ROAD - TLOS SEGMENT EVALUATION

STREET	Innes Road
FROM	Viseneau Drive
TO	Jeanne d'Arc Boulevard
YEAR	2029
DIRECTION	Eastbound–Westbound
MMLOS MODE	TLOS

SEGMENT SCORE **D**

Facility Type		Level/exposure to congestion delay, friction and incidents			Quantitative Measurement	LOS
		Congestion	Friction	Incident Potential		
Segregated ROW		No	No	No	N/A	A
Bus lane	No/limited parking/driveway friction	No	Low	Low	$C_f \leq 60$	B
	Frequent parking/driveway friction	No	Medium	Medium	$C_f > 60$	C
Mixed Traffic	Limited parking/driveway friction	Yes	Low	Medium	$Vt/Vp \geq 0.8$	D
	Moderate parking/driveway friction	Yes	Medium	Medium	$Vt/Vp \leq 0.6$	E
	Frequent parking/driveway friction	Yes	High	High	$Vt/Vp < 0.4$	F

Notes:

Cf, Conflict Factor = = (Number of driveways x crossing volume) / 1 km

Vt/Vp is the ratio of average transit travel speed to posted speed limit

EXHIBIT 4.4
INNES ROAD - TkLOS SEGMENT EVALUATION

STREET	Innes Road
FROM	Viseneau Drive
TO	Jeanne d'Arc Boulevard
YEAR	2029
DIRECTION	Eastbound–Westbound
MMLOS MODE	TkLOS

SEGMENT SCORE **A**

Exhibit 20 – TkLOS Segment Evaluation Table

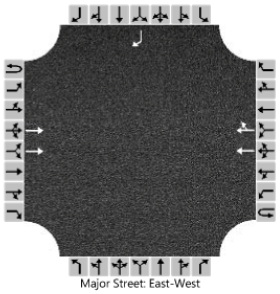
Curb Lane Width (m)	Only two travel lanes (one in each direction)	More than two travel lanes
>3.7	B	A
≤3.5	C	A
≤3.3	D	C
≤3.2	E	D
≤3	F	E

EXHIBIT 4.5
2024 PEAK AM HOUR ANALYSIS (Total Traffic) - Access/Innes

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Access/Innes
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	12/8/2020	East/West Street	Innes Road
Analysis Year	2024	North/South Street	Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Innes Road Development		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume (veh/h)			462				1317	9								31
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																6.9
Critical Headway (sec)																6.90
Base Follow-Up Headway (sec)																3.3
Follow-Up Headway (sec)																3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)																34
Capacity, c (veh/h)																361
v/c Ratio																0.09
95% Queue Length, Q_{95} (veh)																0.3
Control Delay (s/veh)																16.0
Level of Service (LOS)																C
Approach Delay (s/veh)													16.0			
Approach LOS													C			

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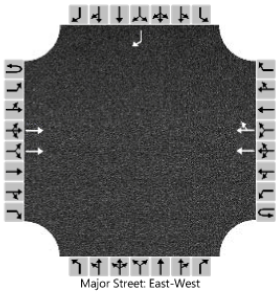
EXHIBIT 4.6
2024 PEAK PM HOUR ANALYSIS (Total Traffic) - Access/Innes

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Access/Innes
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	12/8/2020	East/West Street	Innes Road
Analysis Year	2024	North/South Street	Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Innes Road Development		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume (veh/h)			1735				1006	31								20
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																6.9
Critical Headway (sec)																6.90
Base Follow-Up Headway (sec)																3.3
Follow-Up Headway (sec)																3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)																22
Capacity, c (veh/h)																468
v/c Ratio																0.05
95% Queue Length, Q_{95} (veh)																0.1
Control Delay (s/veh)																13.1
Level of Service (LOS)																B
Approach Delay (s/veh)													13.1			
Approach LOS													B			

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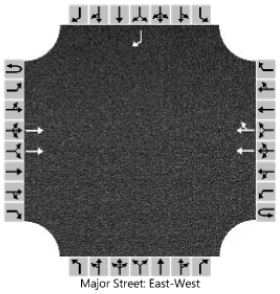
EXHIBIT 4.7
2029 PEAK AM HOUR ANALYSIS (Total Traffic) - Access/Innes

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Access/Innes
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	12/8/2020	East/West Street	Innes Road
Analysis Year	2029	North/South Street	Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Innes Road Development		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume (veh/h)			476				1383	9								31
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																6.9
Critical Headway (sec)																6.90
Base Follow-Up Headway (sec)																3.3
Follow-Up Headway (sec)																3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)																34
Capacity, c (veh/h)																342
v/c Ratio																0.10
95% Queue Length, Q_{95} (veh)																0.3
Control Delay (s/veh)																16.7
Level of Service (LOS)																C
Approach Delay (s/veh)													16.7			
Approach LOS													C			

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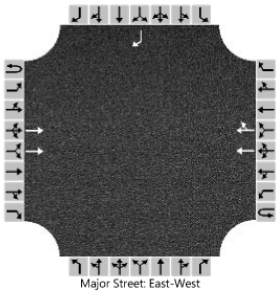
EXHIBIT 4.8
2029 PEAK PM HOUR ANALYSIS (Total Traffic) - Access/Innes

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Access/Innes
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	12/8/2020	East/West Street	Innes Road
Analysis Year	2029	North/South Street	Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Innes Road Development		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	0	0		0	0	1
Configuration			T				T	TR								R
Volume (veh/h)			1823				1059	31								20
Percent Heavy Vehicles (%)																0
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)																6.9
Critical Headway (sec)																6.90
Base Follow-Up Headway (sec)																3.3
Follow-Up Headway (sec)																3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)																22
Capacity, c (veh/h)																449
v/c Ratio																0.05
95% Queue Length, Q_{95} (veh)																0.2
Control Delay (s/veh)																13.4
Level of Service (LOS)																B
Approach Delay (s/veh)														13.4		
Approach LOS														B		

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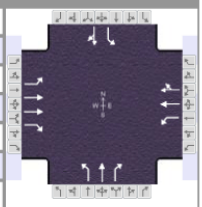
EXHIBIT 4.9
2020 PEAK AM HOUR ANALYSIS (Existing Traffic) - Frank Bender/Innes

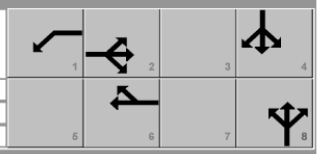
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2020	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2020_ex_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	33	378	15	24	1204	81	15	12	3	39	24	43

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.3	55.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		62.0	12.0	74.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.2		3.2
Queue Clearance Time (*g s*), s			3.5			6.9		5.9
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.2		0.3
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.29			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	36	411	16	26	706	691	16	13	3	42	73	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	377	1647	1425	1661	1744	1699	1346	1800	1495	1394	1570	
Queue Service Time (*g s*), s	7.4	7.6	0.6	1.5	28.3	28.5	1.0	0.6	0.2	2.5	3.9	
Cycle Queue Clearance Time (*g c*), s	23.9	7.6	0.6	1.5	28.3	28.5	4.9	0.6	0.2	3.1	3.9	
Green Ratio (*g/C*)	0.51	0.51	0.51	0.12	0.62	0.62	0.27	0.27	0.27	0.27	0.27	
Capacity (*c*), veh/h	202	1689	731	196	1084	1056	388	494	411	441	431	
Volume-to-Capacity Ratio (*X*)	0.177	0.243	0.022	0.133	0.651	0.654	0.042	0.026	0.008	0.096	0.169	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.8	2.8	0.2	0.6	11.0	10.8	0.3	0.3	0.1	0.8	1.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	24.7	14.9	13.2	43.5	13.5	13.3	32.2	29.2	29.0	30.3	30.4	
Incremental Delay (*d 2*), s/veh	1.9	0.3	0.1	0.1	3.0	3.2	0.0	0.0	0.0	0.0	0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	26.6	15.3	13.3	43.6	16.5	16.4	32.2	29.2	29.0	30.3	30.4	
Level of Service (LOS)	C	B	B	D	B	B	C	C	C	C	C	
Approach Delay, s/veh / LOS	16.1	B		17.0	B		30.7	C		30.4	C	
Intersection Delay, s/veh / LOS	17.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.88	B	2.29	B	2.45	B
Bicycle LOS Score / LOS	0.87	A	1.66	B	0.54	A	0.68	A

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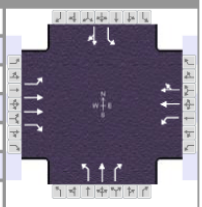
EXHIBIT 4.10
2020 PEAK PM HOUR ANALYSIS (Existing Traffic) - Frank Bender/Innes

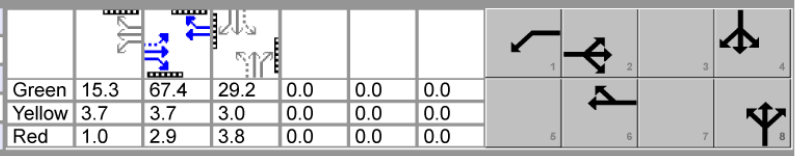
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2020	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2020_ex_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	133	1385	104	62	775	78	103	88	39	94	95	69

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	15.3	67.4	29.2	0.0	0.0	0.0	
Yellow	3.7	3.7	3.0	0.0	0.0	0.0	
Red	1.0	2.9	3.8	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		74.0	20.0	94.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			6.6			25.5		16.7
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.5		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.00			0.79		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	145	1505	113	67	472	455	112	96	42	102	178	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	589	1647	1425	1661	1758	1692	1224	1800	1493	1285	1634	
Queue Service Time (*g s*), s	20.1	51.9	5.3	4.6	15.3	15.3	11.3	5.6	2.9	9.1	12.2	
Cycle Queue Clearance Time (*g c*), s	20.1	51.9	5.3	4.6	15.3	15.3	23.5	5.6	2.9	14.7	12.2	
Green Ratio (*g/C*)	0.53	0.53	0.53	0.16	0.68	0.68	0.23	0.23	0.23	0.23	0.23	
Capacity (*c*), veh/h	365	1733	750	268	1195	1151	225	418	347	298	380	
Volume-to-Capacity Ratio (*X*)	0.396	0.869	0.151	0.251	0.395	0.395	0.498	0.229	0.122	0.342	0.470	
Back of Queue (Q), ft/ln (50 th percentile)												
Back of Queue (Q), veh/ln (50 th percentile)	3.0	20.9	1.8	1.9	5.8	5.6	3.5	2.5	1.1	2.9	5.0	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	19.3	26.9	15.9	47.6	9.3	9.1	53.1	40.5	39.4	46.4	43.0	
Incremental Delay (*d 2*), s/veh	3.2	6.2	0.4	0.2	1.0	1.0	0.6	0.1	0.1	0.3	0.3	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	22.5	33.1	16.3	47.8	10.3	10.1	53.8	40.6	39.5	46.7	43.3	
Level of Service (LOS)	C	C	B	D	B	B	D	D	D	D	D	
Approach Delay, s/veh / LOS	31.2	C		12.7	B		46.3	D		44.6	D	
Intersection Delay, s/veh / LOS	27.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.88	B	2.30	B	2.46	B
Bicycle LOS Score / LOS	1.94	B	1.31	A	0.90	A	0.95	A

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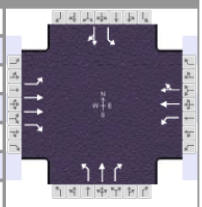
EXHIBIT 4.11
2024 PEAK AM HOUR ANALYSIS (Background Traffic) - Frank Bender

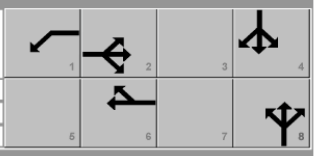
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2024_bak_AM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	34	397	16	25	1256	84	16	12	3	41	25	45

Signal Information					Green	Yellow	Red
Cycle, s	110.0	Reference Phase	2		7.3	3.7	1.0
Offset, s	0	Reference Point	End		55.4	3.7	2.9
Uncoordinated	No	Simult. Gap E/W	On		29.2	3.0	3.8
Force Mode	Fixed	Simult. Gap N/S	On		0.0	0.0	0.0
					0.0	0.0	0.0
					0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		62.0	12.0	74.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.2		3.2
Queue Clearance Time (*g s*), s			3.6			7.2		6.1
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.3		0.3
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.33			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	37	432	17	27	735	721	17	13	3	45	76	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	356	1647	1425	1661	1744	1699	1342	1800	1495	1394	1570	
Queue Service Time (*g s*), s	8.4	8.1	0.7	1.6	30.3	30.7	1.1	0.6	0.2	2.7	4.1	
Cycle Queue Clearance Time (*g c*), s	27.0	8.1	0.7	1.6	30.3	30.7	5.2	0.6	0.2	3.2	4.1	
Green Ratio (*g/C*)	0.51	0.51	0.51	0.12	0.62	0.62	0.27	0.27	0.27	0.27	0.27	
Capacity (*c*), veh/h	188	1689	731	196	1084	1056	384	494	411	441	431	
Volume-to-Capacity Ratio (*X*)	0.197	0.256	0.024	0.138	0.678	0.683	0.045	0.026	0.008	0.101	0.176	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.8	3.0	0.2	0.7	11.8	11.6	0.4	0.3	0.1	0.9	1.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	26.5	15.0	13.2	43.5	13.9	13.7	32.4	29.2	29.0	30.3	30.4	
Incremental Delay (*d 2*), s/veh	2.3	0.4	0.1	0.1	3.4	3.6	0.0	0.0	0.0	0.0	0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	28.8	15.4	13.3	43.6	17.3	17.2	32.4	29.2	29.0	30.4	30.5	
Level of Service (LOS)	C	B	B	D	B	B	C	C	C	C	C	
Approach Delay, s/veh / LOS	16.3	B		17.7	B		30.8	C		30.4	C	
Intersection Delay, s/veh / LOS	18.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.88	B	2.29	B	2.45	B
Bicycle LOS Score / LOS	0.89	A	1.71	B	0.54	A	0.69	A

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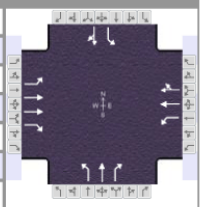
EXHIBIT 4.12
2024 PEAK PM HOUR ANALYSIS (Background Traffic) - Frank Bender

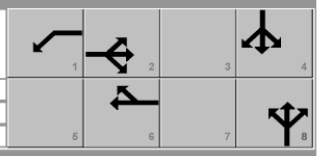
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2024_bak_PM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	138	1461	108	81	827	65	107	92	41	102	99	72

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.3	67.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		74.0	20.0	94.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			8.1			26.7		17.9
Green Extension Time (*g e*), s		0.0	0.1	0.0		0.4		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.00			1.00		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	150	1588	117	88	492	477	116	100	45	111	186	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	566	1647	1425	1661	1758	1705	1216	1800	1493	1280	1634	
Queue Service Time (*g s*), s	22.2	57.4	5.5	6.1	16.2	16.2	11.9	5.9	3.1	10.0	12.8	
Cycle Queue Clearance Time (*g c*), s	22.2	57.4	5.5	6.1	16.2	16.2	24.7	5.9	3.1	15.9	12.8	
Green Ratio (*g/C*)	0.53	0.53	0.53	0.16	0.68	0.68	0.23	0.23	0.23	0.23	0.23	
Capacity (*c*), veh/h	353	1733	750	268	1195	1160	218	418	347	295	380	
Volume-to-Capacity Ratio (*X*)	0.425	0.916	0.157	0.328	0.412	0.412	0.533	0.239	0.128	0.376	0.490	
Back of Queue (Q), ft/ln (50 th percentile)												
Back of Queue (Q), veh/ln (50 th percentile)	3.2	23.7	1.9	2.5	6.1	6.0	3.7	2.6	1.1	3.2	5.2	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	19.9	28.2	15.9	48.3	9.4	9.2	53.9	40.6	39.5	47.0	43.2	
Incremental Delay (*d 2*), s/veh	3.7	9.2	0.4	0.3	1.0	1.1	1.3	0.1	0.1	0.3	0.4	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	23.6	37.3	16.3	48.5	10.5	10.3	55.3	40.7	39.5	47.3	43.6	
Level of Service (LOS)	C	D	B	D	B	B	E	D	D	D	D	
Approach Delay, s/veh / LOS	34.9	C		13.6	B		47.0	D		45.0	D	
Intersection Delay, s/veh / LOS	30.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.88	B	2.30	B	2.46	B
Bicycle LOS Score / LOS	2.02	B	1.36	A	0.92	A	0.98	A

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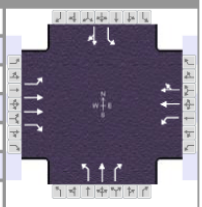
EXHIBIT 4.13
2029 PEAK AM HOUR ANALYSIS (Background Traffic) - Frank Bender/Innes

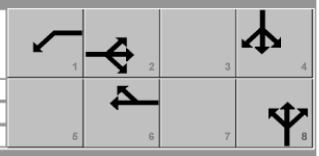
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2029_bak_AM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	36	418	16	26	1320	89	16	13	3	43	26	47

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.3	55.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		62.0	12.0	74.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.2		3.2
Queue Clearance Time (*g s*), s			3.7			7.4		6.2
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.3		0.3
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.38			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	39	454	17	28	773	759	17	14	3	47	79	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	331	1647	1425	1661	1744	1699	1338	1800	1495	1392	1570	
Queue Service Time (*g s*), s	10.1	8.6	0.7	1.7	33.1	33.6	1.1	0.6	0.2	2.8	4.2	
Cycle Queue Clearance Time (*g c*), s	31.7	8.6	0.7	1.7	33.1	33.6	5.4	0.6	0.2	3.4	4.2	
Green Ratio (*g/C*)	0.51	0.51	0.51	0.12	0.62	0.62	0.27	0.27	0.27	0.27	0.27	
Capacity (*c*), veh/h	170	1689	731	196	1084	1056	381	494	411	440	431	
Volume-to-Capacity Ratio (*X*)	0.230	0.269	0.024	0.144	0.712	0.719	0.046	0.029	0.008	0.106	0.184	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.9	3.2	0.2	0.7	12.9	12.9	0.4	0.3	0.1	0.9	1.6	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	29.1	15.1	13.2	43.5	14.4	14.2	32.5	29.2	29.0	30.4	30.5	
Incremental Delay (*d 2*), s/veh	3.1	0.4	0.1	0.1	4.0	4.2	0.0	0.0	0.0	0.0	0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	32.3	15.5	13.3	43.6	18.4	18.4	32.6	29.2	29.0	30.5	30.6	
Level of Service (LOS)	C	B	B	D	B	B	C	C	C	C	C	
Approach Delay, s/veh / LOS	16.7	B		18.9	B		30.9	C		30.5	C	
Intersection Delay, s/veh / LOS	19.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.88	B	2.29	B	2.45	B
Bicycle LOS Score / LOS	0.91	A	1.77	B	0.54	A	0.70	A

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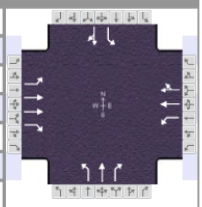
EXHIBIT 4.14
2029 PEAK PM HOUR ANALYSIS (Background Traffic) - Frank Bender/Innes

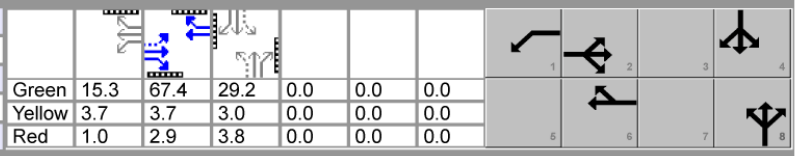
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2029_bak_PM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	146	1535	114	85	871	68	113	96	43	103	104	75

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	15.3	67.4	29.2	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	1.0	2.9	3.8	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		74.0	20.0	94.0		36.0		36.0
Change Period, ($Y+R_c$), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (g_s), s			8.4			28.3		18.3
Green Extension Time (g_e), s		0.0	0.1	0.0		0.2		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.01			1.00		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	159	1668	124	92	518	503	123	104	47	112	195	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	539	1647	1425	1661	1758	1706	1207	1800	1493	1275	1634	
Queue Service Time (g_s), s	25.7	63.2	5.9	6.4	17.4	17.4	12.8	6.1	3.2	10.2	13.5	
Cycle Queue Clearance Time (g_c), s	25.7	63.2	5.9	6.4	17.4	17.4	26.3	6.1	3.2	16.3	13.5	
Green Ratio (*g/C*)	0.53	0.53	0.53	0.16	0.68	0.68	0.23	0.23	0.23	0.23	0.23	
Capacity (*c*), veh/h	339	1733	750	268	1195	1160	211	418	347	291	380	
Volume-to-Capacity Ratio (*X*)	0.468	0.963	0.165	0.344	0.433	0.433	0.583	0.250	0.135	0.384	0.512	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	3.6	27.2	2.0	2.7	6.6	6.4	4.0	2.7	1.2	3.3	5.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	20.7	29.6	16.0	48.4	9.6	9.4	55.0	40.7	39.5	47.3	43.5	
Incremental Delay (d_2), s/veh	4.6	14.4	0.5	0.3	1.1	1.2	2.8	0.1	0.1	0.3	0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	25.3	44.0	16.5	48.7	10.8	10.6	57.7	40.8	39.6	47.6	44.0	
Level of Service (LOS)	C	D	B	D	B	B	E	D	D	D	D	
Approach Delay, s/veh / LOS	40.7	D		13.8	B		48.2	D		45.3	D	
Intersection Delay, s/veh / LOS	33.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.88	B	2.30	B	2.46	B
Bicycle LOS Score / LOS	2.10	B	1.41	A	0.94	A	0.99	A

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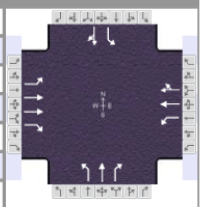
EXHIBIT 4.15
2024 PEAK AM HOUR ANALYSIS (Total Traffic) - Frank Bender/Innes

HCS Signalized Intersection Results Summary

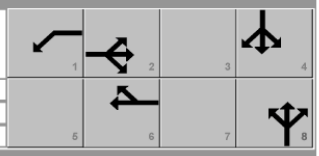
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2024_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	43	403	16	25	1258	84	16	12	3	41	25	46

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.3	55.4	29.2	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	1.0	2.9	3.8	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		62.0	12.0	74.0		36.0		36.0
Change Period, ($Y+R_c$), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.2		3.2
Queue Clearance Time (g_s), s			3.6			7.2		6.1
Green Extension Time (g_e), s		0.0	0.0	0.0		0.3		0.3
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.33			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	47	438	17	27	737	722	17	13	3	45	77	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	355	1647	1425	1661	1744	1699	1341	1800	1495	1394	1569	
Queue Service Time (g_s), s	11.0	8.2	0.7	1.6	30.4	30.8	1.1	0.6	0.2	2.7	4.1	
Cycle Queue Clearance Time (g_c), s	29.7	8.2	0.7	1.6	30.4	30.8	5.2	0.6	0.2	3.2	4.1	
Green Ratio (*g/C*)	0.51	0.51	0.51	0.12	0.62	0.62	0.27	0.27	0.27	0.27	0.27	
Capacity (*c*), veh/h	187	1689	731	196	1084	1056	383	494	411	441	431	
Volume-to-Capacity Ratio (*X*)	0.250	0.259	0.024	0.138	0.679	0.684	0.045	0.026	0.008	0.101	0.179	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	3.1	0.2	0.7	11.8	11.7	0.4	0.3	0.1	0.9	1.6	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	27.4	15.1	13.2	43.5	13.9	13.7	32.4	29.2	29.0	30.3	30.4	
Incremental Delay (d_2), s/veh	3.2	0.4	0.1	0.1	3.4	3.6	0.0	0.0	0.0	0.0	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	30.6	15.4	13.3	43.6	17.3	17.3	32.5	29.2	29.0	30.4	30.5	
Level of Service (LOS)	C	B	B	D	B	B	C	C	C	C	C	
Approach Delay, s/veh / LOS	16.8	B		17.8	B		30.8	C		30.5	C	
Intersection Delay, s/veh / LOS	18.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.88	B	2.29	B	2.45	B
Bicycle LOS Score / LOS	0.90	A	1.71	B	0.54	A	0.69	A

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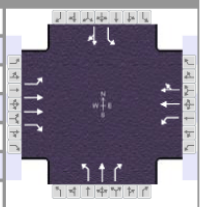
EXHIBIT 4.16
2024 PEAK PM HOUR ANALYSIS (Total Traffic) - Frank Bender/Innes

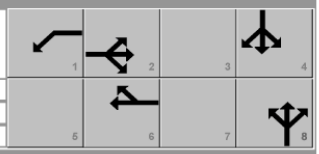
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2024_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	162	1464	108	81	833	65	107	92	41	102	99	75

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.3	67.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		74.0	20.0	94.0		36.0		36.0
Change Period, ($Y+R_c$), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (g_s), s			8.1			27.1		17.9
Green Extension Time (g_e), s		0.0	0.1	0.0		0.3		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.00			1.00		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	176	1591	117	88	495	481	116	100	45	111	189	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	562	1647	1425	1661	1758	1706	1213	1800	1493	1280	1631	
Queue Service Time (g_s), s	28.1	57.6	5.5	6.1	16.3	16.3	12.0	5.9	3.1	10.0	13.1	
Cycle Queue Clearance Time (g_c), s	28.1	57.6	5.5	6.1	16.3	16.3	25.1	5.9	3.1	15.9	13.1	
Green Ratio (*g/C*)	0.53	0.53	0.53	0.16	0.68	0.68	0.23	0.23	0.23	0.23	0.23	
Capacity (*c*), veh/h	351	1733	750	268	1195	1160	215	418	347	295	379	
Volume-to-Capacity Ratio (*X*)	0.502	0.918	0.157	0.328	0.414	0.414	0.541	0.239	0.128	0.376	0.499	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	4.1	23.8	1.9	2.5	6.2	6.0	3.7	2.6	1.1	3.2	5.3	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	21.3	28.2	15.9	48.3	9.4	9.3	54.2	40.6	39.5	47.0	43.3	
Incremental Delay (d_2), s/veh	5.0	9.3	0.4	0.3	1.1	1.1	1.5	0.1	0.1	0.3	0.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	26.3	37.6	16.3	48.5	10.5	10.4	55.7	40.7	39.5	47.3	43.7	
Level of Service (LOS)	C	D	B	D	B	B	E	D	D	D	D	
Approach Delay, s/veh / LOS	35.2	D		13.6	B		47.2	D		45.0	D	
Intersection Delay, s/veh / LOS	30.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.88	B	2.30	B	2.46	B
Bicycle LOS Score / LOS	2.04	B	1.37	A	0.92	A	0.98	A

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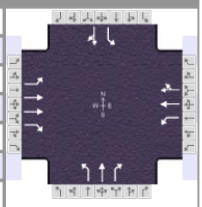
EXHIBIT 4.17
2029 PEAK AM HOUR ANALYSIS (Total Traffic) - Frank Bender/Innes

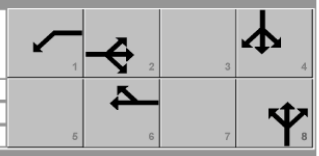
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2029_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	424	16	26	1322	89	16	13	3	43	26	48

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.3	55.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		62.0	12.0	74.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.2		3.2
Queue Clearance Time (*g s*), s			3.7			7.4		6.3
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.3		0.3
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.38			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	49	461	17	28	774	760	17	14	3	47	80	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	331	1647	1425	1661	1744	1699	1337	1800	1495	1392	1569	
Queue Service Time (*g s*), s	13.1	8.7	0.7	1.7	33.2	33.7	1.1	0.6	0.2	2.8	4.3	
Cycle Queue Clearance Time (*g c*), s	34.8	8.7	0.7	1.7	33.2	33.7	5.4	0.6	0.2	3.4	4.3	
Green Ratio (*g/C*)	0.51	0.51	0.51	0.12	0.62	0.62	0.27	0.27	0.27	0.27	0.27	
Capacity (*c*), veh/h	170	1689	731	196	1084	1056	380	494	411	440	431	
Volume-to-Capacity Ratio (*X*)	0.288	0.273	0.024	0.144	0.713	0.720	0.046	0.029	0.008	0.106	0.187	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.2	3.3	0.2	0.7	13.0	12.9	0.4	0.3	0.1	0.9	1.6	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	30.2	15.2	13.2	43.5	14.4	14.2	32.6	29.2	29.0	30.4	30.5	
Incremental Delay (*d 2*), s/veh	4.2	0.4	0.1	0.1	4.0	4.2	0.0	0.0	0.0	0.0	0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	34.5	15.6	13.3	43.6	18.4	18.5	32.6	29.2	29.0	30.5	30.6	
Level of Service (LOS)	C	B	B	D	B	B	C	C	C	C	C	
Approach Delay, s/veh / LOS	17.3	B		18.9	B		30.9	C		30.5	C	
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.09	B	1.88	B	2.29	B	2.45	B
Bicycle LOS Score / LOS	0.92	A	1.78	B	0.54	A	0.70	A

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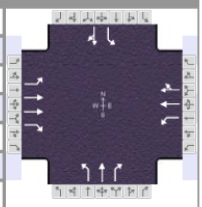
EXHIBIT 4.18
2029 PEAK PM HOUR ANALYSIS (Total Traffic) - Frank Bender/Innes

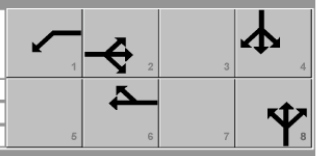
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Frank Bender/Innes	File Name	723_2029_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	170	1539	114	85	877	68	113	96	43	103	104	78

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.3	67.4		29.2	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	2.9		3.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		6.0
Phase Duration, s		74.0	20.0	94.0		36.0		36.0
Change Period, (*Y+R c*), s		6.6	4.7	6.6		6.8		6.8
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			8.4			28.7		18.3
Green Extension Time (*g e*), s		0.0	0.1	0.0		0.1		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			0.01			1.00		0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	185	1673	124	92	521	506	123	104	47	112	198	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	536	1647	1425	1661	1758	1706	1203	1800	1493	1275	1631	
Queue Service Time (*g s*), s	32.4	63.6	5.9	6.4	17.5	17.5	12.9	6.1	3.2	10.2	13.8	
Cycle Queue Clearance Time (*g c*), s	32.4	63.6	5.9	6.4	17.5	17.5	26.7	6.1	3.2	16.3	13.8	
Green Ratio (*g/C*)	0.53	0.53	0.53	0.16	0.68	0.68	0.23	0.23	0.23	0.23	0.23	
Capacity (*c*), veh/h	337	1733	750	268	1195	1160	207	418	347	291	379	
Volume-to-Capacity Ratio (*X*)	0.548	0.965	0.165	0.344	0.436	0.436	0.592	0.250	0.135	0.384	0.522	
Back of Queue (Q), ft/ln (50 th percentile)												
Back of Queue (Q), veh/ln (50 th percentile)	4.5	27.4	2.0	2.7	6.7	6.5	4.1	2.7	1.2	3.3	5.6	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	22.3	29.7	16.0	48.4	9.6	9.5	55.3	40.7	39.5	47.3	43.6	
Incremental Delay (*d 2*), s/veh	6.3	14.8	0.5	0.3	1.2	1.2	3.1	0.1	0.1	0.3	0.6	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	28.6	44.5	16.5	48.7	10.8	10.7	58.3	40.8	39.6	47.6	44.2	
Level of Service (LOS)	C	D	B	D	B	B	E	D	D	D	D	
Approach Delay, s/veh / LOS	41.2	D		13.9	B		48.5	D		45.5	D	
Intersection Delay, s/veh / LOS	33.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.88	B	2.30	B	2.46	B
Bicycle LOS Score / LOS	2.12	B	1.41	A	0.94	A	1.00	A

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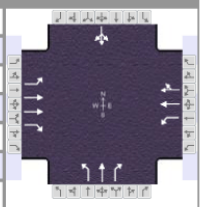
EXHIBIT 4.19
2017 PEAK AM HOUR ANALYSIS (Existing Traffic) - Viseneau/Innes

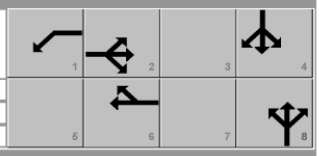
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2017	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2017_ex_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	11	398	37	59	1426	33	22	5	39	46	13	47

Signal Information					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Cycle, s	110.0	Reference Phase	2	Green	5.7	49.7	34.7	0.0	0.0	0.0		
Offset, s	0	Reference Point	End	Yellow	3.7	3.7	3.0	0.0	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Red	2.6	2.6	4.3	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On									



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		56.0	12.0	68.0		42.0		42.0
Change Period, ($Y+R_c$), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (g_s), s			5.9			9.4		8.0
Green Extension Time (g_e), s		0.0	0.0	0.0		0.3		0.4
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	12	433	40	64	795	791	24	5	42		115	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	314	1647	1424	1661	1744	1727	1356	1800	1497		1486	
Queue Service Time (g_s), s	3.4	9.0	1.7	3.9	39.6	39.9	1.4	0.2	2.2		3.4	
Cycle Queue Clearance Time (g_c), s	31.4	9.0	1.7	3.9	39.6	39.9	7.4	0.2	2.2		6.0	
Green Ratio (*g/C*)	0.46	0.46	0.46	0.12	0.57	0.57	0.32	0.32	0.32		0.32	
Capacity (*c*), veh/h	131	1518	656	196	994	985	432	584	486		529	
Volume-to-Capacity Ratio (*X*)	0.092	0.285	0.061	0.327	0.800	0.803	0.055	0.009	0.087		0.218	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.3	3.4	0.6	1.6	16.5	16.5	0.5	0.1	0.8		2.2	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (d_1), s/veh	35.9	18.4	16.4	44.5	19.0	18.8	29.8	25.2	25.8		27.1	
Incremental Delay (d_2), s/veh	1.4	0.5	0.2	0.4	6.7	6.9	0.0	0.0	0.0		0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	37.3	18.9	16.6	44.8	25.8	25.7	29.9	25.2	25.9		27.1	
Level of Service (LOS)	D	B	B	D	C	C	C	C	C		C	
Approach Delay, s/veh / LOS	19.1	B		26.5	C		27.1	C		27.1	C	
Intersection Delay, s/veh / LOS	25.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.67	B	2.29	B	2.44	B
Bicycle LOS Score / LOS	0.89	A	1.85	B	0.61	A	0.68	A

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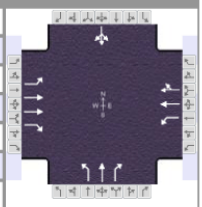
EXHIBIT 4.20
2017 PEAK PM HOUR ANALYSIS (Existing Traffic) - Viseneau/Innes

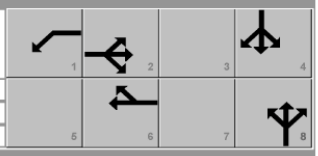
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2017	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2017_ex_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	1456	87	184	673	84	106	40	179	60	51	30

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	13.7	61.7		34.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6		4.3	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		68.0	20.0	88.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			16.5			22.2		12.2
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.9		1.0
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.01		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	49	1583	95	200	421	402	115	43	195		153	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	669	1687	1457	1701	1758	1677	1318	1786	1463		1529	
Queue Service Time (*g s*), s	5.3	59.5	4.7	14.5	14.9	14.9	10.0	2.4	14.5		7.5	
Cycle Queue Clearance Time (*g c*), s	5.3	59.5	4.7	14.5	14.9	14.9	20.2	2.4	14.5		10.2	
Green Ratio (*g/C*)	0.48	0.48	0.48	0.16	0.64	0.64	0.27	0.27	0.27		0.27	
Capacity (*c*), veh/h	378	1627	703	275	1118	1067	314	490	402		459	
Volume-to-Capacity Ratio (*X*)	0.129	0.973	0.135	0.728	0.376	0.377	0.367	0.089	0.484		0.334	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.9	27.0	1.7	6.8	5.9	5.6	3.3	1.0	5.2		3.9	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	18.8	32.8	18.6	51.8	11.5	11.3	46.0	35.1	39.4		37.8	
Incremental Delay (*d 2*), s/veh	0.7	16.7	0.4	8.2	1.0	1.0	0.3	0.0	0.3		0.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	19.5	49.5	19.0	60.0	12.5	12.3	46.3	35.1	39.8		38.0	
Level of Service (LOS)	B	D	B	E	B	B	D	D	D		D	
Approach Delay, s/veh / LOS	47.0	D		21.7	C		41.3	D		38.0	D	
Intersection Delay, s/veh / LOS	38.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.66	B	2.30	B	2.45	B
Bicycle LOS Score / LOS	1.91	B	1.33	A	1.07	A	0.74	A

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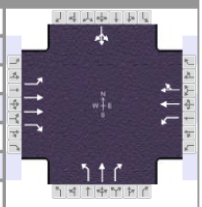
EXHIBIT 4.21
2024 PEAK AM HOUR ANALYSIS (Background Traffic) - Viseneau/Innes

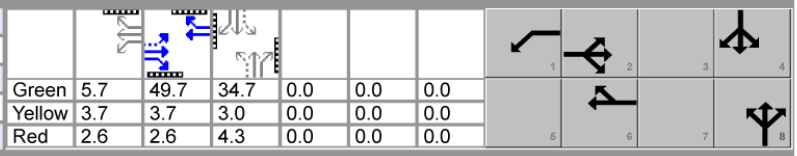
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2024_bak_AM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	356	40	63	1219	35	24	5	42	49	14	50

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.7	49.7	34.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	2.6	2.6	4.3	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		56.0	12.0	68.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			6.2			10.0		8.5
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.4		0.4
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	13	387	43	68	685	678	26	5	46		123	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	390	1647	1424	1661	1744	1724	1351	1800	1497		1486	
Queue Service Time (*g s*), s	2.7	7.9	1.9	4.2	30.6	30.7	1.6	0.2	2.3		3.8	
Cycle Queue Clearance Time (*g c*), s	21.4	7.9	1.9	4.2	30.6	30.7	8.0	0.2	2.3		6.5	
Green Ratio (*g/C*)	0.46	0.46	0.46	0.12	0.57	0.57	0.32	0.32	0.32		0.32	
Capacity (*c*), veh/h	179	1518	656	196	994	982	425	584	486		529	
Volume-to-Capacity Ratio (*X*)	0.073	0.255	0.066	0.349	0.689	0.690	0.061	0.009	0.094		0.232	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.3	3.0	0.6	1.7	12.4	12.3	0.5	0.1	0.8		2.3	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	28.6	18.1	16.5	44.6	17.0	16.8	30.2	25.2	25.9		27.2	
Incremental Delay (*d 2*), s/veh	0.8	0.4	0.2	0.4	3.9	4.0	0.0	0.0	0.0		0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	29.4	18.5	16.7	45.0	20.9	20.7	30.2	25.2	25.9		27.3	
Level of Service (LOS)	C	B	B	D	C	C	C	C	C		C	
Approach Delay, s/veh / LOS	18.7	B		22.0	C		27.3	C		27.3	C	
Intersection Delay, s/veh / LOS	21.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.67	B	2.29	B	2.44	B
Bicycle LOS Score / LOS	0.85	A	1.67	B	0.61	A	0.69	A

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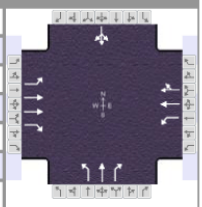
EXHIBIT 4.22
2024 PEAK PM HOUR ANALYSIS (Background Traffic) - Viseneau/Innes

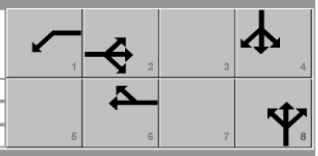
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2024_bak_PM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	48	1451	93	197	719	90	114	43	192	64	55	32

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	13.7	61.7		34.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6		4.3	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		68.0	20.0	88.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			17.7			24.1		13.1
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.0		1.1
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.02		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	52	1577	101	214	450	429	124	47	209		164	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	635	1687	1457	1701	1758	1677	1310	1786	1463		1528	
Queue Service Time (*g s*), s	6.0	59.1	5.0	15.7	16.3	16.3	11.0	2.5	15.7		8.4	
Cycle Queue Clearance Time (*g c*), s	6.0	59.1	5.0	15.7	16.3	16.3	22.1	2.5	15.7		11.1	
Green Ratio (*g/C*)	0.48	0.48	0.48	0.16	0.64	0.64	0.27	0.27	0.27		0.27	
Capacity (*c*), veh/h	362	1627	703	275	1118	1067	304	490	402		459	
Volume-to-Capacity Ratio (*X*)	0.144	0.969	0.144	0.779	0.402	0.402	0.408	0.095	0.520		0.357	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.0	26.7	1.8	7.6	6.4	6.1	3.6	1.1	5.7		4.2	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	19.0	32.7	18.7	52.3	11.8	11.6	47.2	35.1	39.9		38.1	
Incremental Delay (*d 2*), s/veh	0.8	16.1	0.4	12.2	1.1	1.1	0.3	0.0	0.6		0.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	19.8	48.8	19.1	64.5	12.8	12.7	47.5	35.2	40.5		38.3	
Level of Service (LOS)	B	D	B	E	B	B	D	D	D		D	
Approach Delay, s/veh / LOS	46.2	D		22.9	C		42.1	D		38.3	D	
Intersection Delay, s/veh / LOS	37.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.66	B	2.30	B	2.45	B
Bicycle LOS Score / LOS	1.92	B	1.39	A	1.11	A	0.76	A

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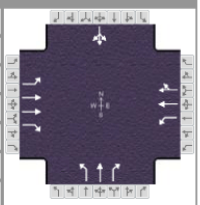
EXHIBIT 4.23
2029 PEAK AM HOUR ANALYSIS (Background Traffic) - Viseneau/Innes

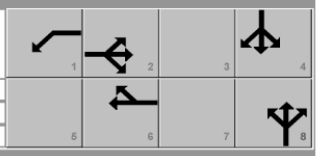
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2029_bak_AM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	374	42	66	1280	37	25	6	44	53	15	52

Signal Information												
Cycle, s	110.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	5.7	49.7	34.7	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.7	3.7	3.0	0.0	0.0	0.0		
				Red	2.6	2.6	4.3	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		56.0	12.0	68.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			6.4			10.6		8.9
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.4		0.4
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	13	407	46	72	719	712	27	7	48		130	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	365	1647	1424	1661	1744	1723	1347	1800	1497		1485	
Queue Service Time (*g s*), s	3.0	8.4	2.0	4.4	33.2	33.3	1.7	0.3	2.5		4.4	
Cycle Queue Clearance Time (*g c*), s	24.3	8.4	2.0	4.4	33.2	33.3	8.6	0.3	2.5		6.9	
Green Ratio (*g/C*)	0.46	0.46	0.46	0.12	0.57	0.57	0.32	0.32	0.32		0.32	
Capacity (*c*), veh/h	163	1518	656	196	994	982	418	584	486		529	
Volume-to-Capacity Ratio (*X*)	0.080	0.268	0.070	0.366	0.723	0.725	0.065	0.011	0.098		0.247	
Back of Queue (Q), ft/ln (50 th percentile)	7.9	83	17.4	46.7	349.5	337.1	13.6	2.9	21.7		63.6	
Back of Queue (Q), veh/ln (50 th percentile)	0.3	3.2	0.7	1.8	13.5	13.5	0.5	0.1	0.9		2.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	30.7	18.2	16.5	44.7	17.6	17.3	30.6	25.2	25.9		27.4	
Incremental Delay (*d 2*), s/veh	1.0	0.4	0.2	0.4	4.6	4.7	0.0	0.0	0.0		0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	31.6	18.7	16.7	45.1	22.2	22.0	30.6	25.2	26.0		27.5	
Level of Service (LOS)	C	B	B	D	C	C	C	C	C		C	
Approach Delay, s/veh / LOS	18.8	B		23.2	C		27.4	C		27.5	C	
Intersection Delay, s/veh / LOS	22.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.67	B	2.29	B	2.44	B
Bicycle LOS Score / LOS	0.87	A	1.73	B	0.62	A	0.70	A

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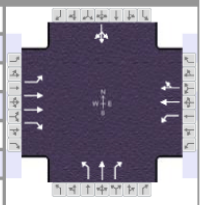
EXHIBIT 4.24
2029 PEAK PM HOUR ANALYSIS (Background Traffic) - Viseneau/Innes

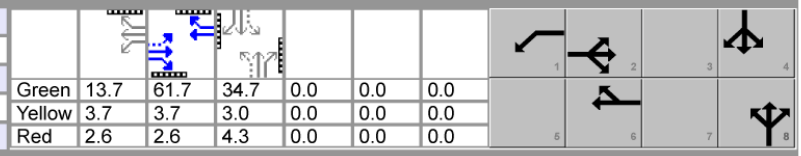
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2029_bak_PM.xus		
Project Description	Innes Road Development - Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	51	1525	98	207	757	95	119	45	202	68	57	34

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.7	61.7	34.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	2.6	2.6	4.3	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		68.0	20.0	88.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			18.6			25.5		13.8
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.0		1.2
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.05		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	55	1658	107	225	474	452	129	49	220		173	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	608	1687	1457	1701	1758	1677	1305	1786	1463		1525	
Queue Service Time (*g s*), s	6.8	62.7	5.3	16.6	17.5	17.5	11.7	2.7	16.7		9.1	
Cycle Queue Clearance Time (*g c*), s	6.8	62.7	5.3	16.6	17.5	17.5	23.5	2.7	16.7		11.8	
Green Ratio (*g/C*)	0.48	0.48	0.48	0.16	0.64	0.64	0.27	0.27	0.27		0.27	
Capacity (*c*), veh/h	349	1627	703	275	1118	1067	296	490	402		458	
Volume-to-Capacity Ratio (*X*)	0.159	1.019	0.152	0.819	0.424	0.424	0.438	0.100	0.547		0.377	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.0	30.6	1.9	8.3	6.9	6.6	3.8	1.2	6.1		4.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	19.2	33.7	18.8	52.7	12.0	11.8	48.0	35.2	40.2		38.4	
Incremental Delay (*d 2*), s/veh	1.0	27.1	0.5	16.4	1.2	1.2	0.4	0.0	0.9		0.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	20.1	60.8	19.3	69.1	13.2	13.0	48.4	35.2	41.1		38.6	
Level of Service (LOS)	C	F	B	E	B	B	D	D	D		D	
Approach Delay, s/veh / LOS	57.1	E		24.0	C		42.8	D		38.6	D	
Intersection Delay, s/veh / LOS	43.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.66	B	2.30	B	2.45	B
Bicycle LOS Score / LOS	1.99	B	1.44	A	1.14	A	0.77	A

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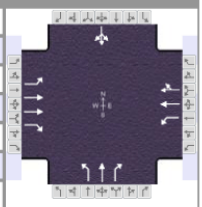
EXHIBIT 4.25
2024 PEAK AM HOUR ANALYSIS (Total Traffic) - Viseneau/Innes

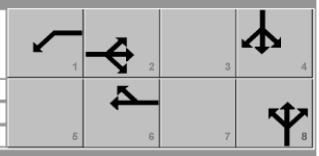
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2024_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	362	40	72	1241	35	24	5	42	49	14	50

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	5.7	49.7		34.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6		4.3	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		56.0	12.0	68.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			6.8			10.0		8.5
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.4		0.4
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	13	393	43	78	697	690	26	5	46		123	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	381	1647	1424	1661	1744	1724	1351	1800	1497		1486	
Queue Service Time (*g s*), s	2.8	8.0	1.9	4.8	31.5	31.6	1.6	0.2	2.3		3.8	
Cycle Queue Clearance Time (*g c*), s	22.4	8.0	1.9	4.8	31.5	31.6	8.0	0.2	2.3		6.5	
Green Ratio (*g/C*)	0.46	0.46	0.46	0.12	0.57	0.57	0.32	0.32	0.32		0.32	
Capacity (*c*), veh/h	173	1518	656	196	994	983	425	584	486		529	
Volume-to-Capacity Ratio (*X*)	0.075	0.259	0.066	0.399	0.701	0.702	0.061	0.009	0.094		0.232	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.3	3.1	0.6	2.0	12.8	12.7	0.5	0.1	0.8		2.3	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	29.3	18.2	16.5	44.9	17.2	17.0	30.2	25.2	25.9		27.2	
Incremental Delay (*d 2*), s/veh	0.8	0.4	0.2	0.5	4.1	4.2	0.0	0.0	0.0		0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	30.1	18.6	16.7	45.4	21.3	21.2	30.2	25.2	25.9		27.3	
Level of Service (LOS)	C	B	B	D	C	C	C	C	C		C	
Approach Delay, s/veh / LOS	18.7	B		22.5	C		27.3	C		27.3	C	
Intersection Delay, s/veh / LOS	22.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.67	B	2.29	B	2.44	B
Bicycle LOS Score / LOS	0.86	A	1.70	B	0.61	A	0.69	A

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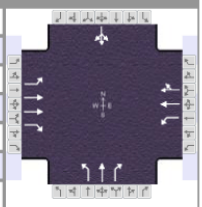
EXHIBIT 4.26
2024 PEAK PM HOUR ANALYSIS (Total Traffic) - Viseneau/Innes

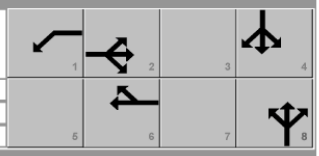
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2024_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	48	1473	93	203	733	90	114	43	192	64	55	32

Signal Information					EB			WB			NB			SB		
Cycle, s	130.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	13.7	61.7		34.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6		4.3	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		68.0	20.0	88.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			18.2			24.1		13.1
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.0		1.1
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.02		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	52	1601	101	221	458	437	124	47	209		164	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	626	1687	1457	1701	1758	1679	1310	1786	1463		1528	
Queue Service Time (*g s*), s	6.1	60.8	5.0	16.2	16.6	16.6	11.0	2.5	15.7		8.4	
Cycle Queue Clearance Time (*g c*), s	6.1	60.8	5.0	16.2	16.6	16.6	22.1	2.5	15.7		11.1	
Green Ratio (*g/C*)	0.48	0.48	0.48	0.16	0.64	0.64	0.27	0.27	0.27		0.27	
Capacity (*c*), veh/h	357	1627	703	275	1118	1068	304	490	402		459	
Volume-to-Capacity Ratio (*X*)	0.146	0.984	0.144	0.803	0.409	0.409	0.408	0.095	0.520		0.357	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.0	28.0	1.8	8.0	6.6	6.3	3.6	1.1	5.7		4.2	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	19.0	33.2	18.7	52.5	11.8	11.6	47.2	35.1	39.9		38.1	
Incremental Delay (*d 2*), s/veh	0.9	18.8	0.4	14.6	1.1	1.2	0.3	0.0	0.6		0.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	19.9	52.0	19.1	67.1	12.9	12.8	47.5	35.2	40.5		38.3	
Level of Service (LOS)	B	D	B	E	B	B	D	D	D		D	
Approach Delay, s/veh / LOS	49.1	D		23.6	C		42.1	D		38.3	D	
Intersection Delay, s/veh / LOS	39.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.66	B	2.30	B	2.45	B
Bicycle LOS Score / LOS	1.93	B	1.41	A	1.11	A	0.76	A

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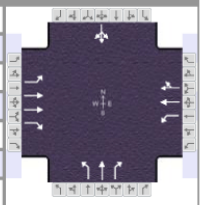
EXHIBIT 4.27
2029 PEAK AM HOUR ANALYSIS (Total Traffic) - Viseneau/Innes

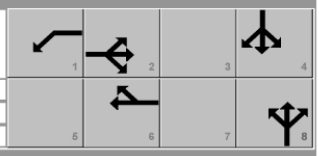
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2029_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	380	42	75	1302	37	25	6	44	52	15	53

Signal Information					EB		WB			NB		
Cycle, s	110.0	Reference Phase	2									
Offset, s	0	Reference Point	End	Green	5.7	49.7	34.7	0.0	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7	3.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6	4.3	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		56.0	12.0	68.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			7.0			10.6		8.9
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.4		0.4
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	13	413	46	82	731	725	27	7	48		130	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	357	1647	1424	1661	1744	1724	1346	1800	1497		1486	
Queue Service Time (*g s*), s	3.1	8.5	2.0	5.0	34.1	34.3	1.7	0.3	2.5		4.3	
Cycle Queue Clearance Time (*g c*), s	25.4	8.5	2.0	5.0	34.1	34.3	8.6	0.3	2.5		6.9	
Green Ratio (*g/C*)	0.46	0.46	0.46	0.12	0.57	0.57	0.32	0.32	0.32		0.32	
Capacity (*c*), veh/h	158	1518	656	196	994	983	418	584	486		529	
Volume-to-Capacity Ratio (*X*)	0.083	0.272	0.070	0.415	0.735	0.737	0.065	0.011	0.098		0.247	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	0.3	3.3	0.7	2.1	14.0	13.9	0.5	0.1	0.9		2.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	31.4	18.3	16.5	45.0	17.8	17.5	30.6	25.2	25.9		27.4	
Incremental Delay (*d 2*), s/veh	1.0	0.4	0.2	0.5	4.8	4.9	0.0	0.0	0.0		0.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	32.4	18.7	16.7	45.5	22.6	22.5	30.6	25.2	26.0		27.5	
Level of Service (LOS)	C	B	B	D	C	C	C	C	C		C	
Approach Delay, s/veh / LOS	18.9	B		23.8	C		27.4	C		27.5	C	
Intersection Delay, s/veh / LOS	23.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.67	B	2.29	B	2.44	B
Bicycle LOS Score / LOS	0.88	A	1.76	B	0.62	A	0.70	A

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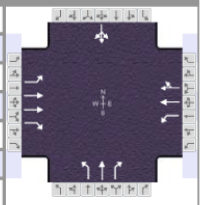
EXHIBIT 4.28
2029 PEAK PM HOUR ANALYSIS (Total Traffic) - Viseneau/Innes

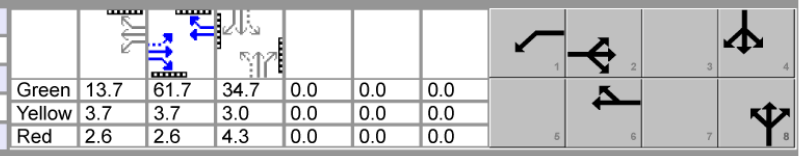
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Viseneau/Innes	File Name	723_2029_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	51	1547	98	213	771	95	119	45	202	68	57	34

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.7	61.7	34.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	2.6	2.6	4.3	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		4
Case Number		5.3	2.0	4.0		5.0		8.0
Phase Duration, s		68.0	20.0	88.0		42.0		42.0
Change Period, (*Y+R c*), s		6.3	6.3	6.3		7.3		7.3
Max Allow Headway (*MAH*), s		0.0	3.1	0.0		3.3		3.3
Queue Clearance Time (*g s*), s			19.2			25.5		13.8
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.0		1.2
Phase Call Probability			1.00			1.00		1.00
Max Out Probability			1.00			0.05		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	55	1682	107	232	482	460	129	49	220		173	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	599	1687	1457	1701	1758	1678	1305	1786	1463		1525	
Queue Service Time (*g s*), s	6.9	62.7	5.3	17.2	17.8	17.8	11.7	2.7	16.7		9.1	
Cycle Queue Clearance Time (*g c*), s	6.9	62.7	5.3	17.2	17.8	17.8	23.5	2.7	16.7		11.8	
Green Ratio (*g/C*)	0.48	0.48	0.48	0.16	0.64	0.64	0.27	0.27	0.27		0.27	
Capacity (*c*), veh/h	344	1627	703	275	1118	1068	296	490	402		458	
Volume-to-Capacity Ratio (*X*)	0.161	1.033	0.152	0.843	0.431	0.431	0.438	0.100	0.547		0.377	
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.0	31.6	1.9	8.8	7.0	6.7	3.8	1.2	6.1		4.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Uniform Delay (*d 1*), s/veh	19.2	33.7	18.8	52.9	12.0	11.9	48.0	35.2	40.2		38.4	
Incremental Delay (*d 2*), s/veh	1.0	31.4	0.5	19.5	1.2	1.3	0.4	0.0	0.9		0.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	20.2	65.1	19.3	72.4	13.3	13.1	48.4	35.2	41.1		38.6	
Level of Service (LOS)	C	F	B	E	B	B	D	D	D		D	
Approach Delay, s/veh / LOS	61.1	E		24.9	C		42.8	D		38.6	D	
Intersection Delay, s/veh / LOS	46.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.10	B	1.66	B	2.30	B	2.45	B
Bicycle LOS Score / LOS	2.01	B	1.46	A	1.14	A	0.77	A

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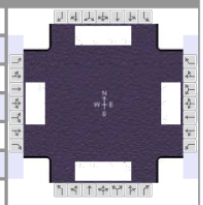
EXHIBIT 4.29
2020 PEAK AM HOUR ANALYSIS (Existing Traffic) - Jeanne d'Arc/Innes

HCS Signalized Intersection Results Summary

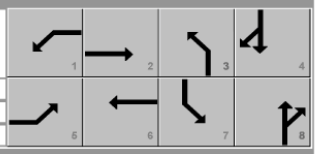
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2020	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2020_ex_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	36	327		190	1148		114	336	71	142	142	52

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

	EB			WB			NB			SB		
Green	5.9	45.6		24.8	8.7	0.0	0.0					
Yellow	3.7	3.7		3.7	3.7	0.0	0.0					
Red	2.4	2.7		2.5	2.6	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	12.0	52.0	12.0	52.0	15.0	31.0	15.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	4.5		8.9		6.0	15.0	7.1	7.8
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.2	0.6	0.1	0.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.01	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	39	355		207	1248		124	227	216	154	108	103
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1647		1701	1687		1600	1730	1613	1600	1772	1595
Queue Service Time (g_s), s	2.5	7.7		6.9	37.2		4.0	12.7	13.0	5.1	5.4	5.8
Cycle Queue Clearance Time (g_c), s	2.5	7.7		6.9	37.2		4.0	12.7	13.0	5.1	5.4	5.8
Green Ratio (*g/C*)	0.06	0.42		0.06	0.42		0.09	0.23	0.23	0.09	0.23	0.23
Capacity (*c*), veh/h	103	1395		107	1429		282	406	378	282	416	374
Volume-to-Capacity Ratio (*X*)	0.379	0.255		1.936	0.873		0.439	0.559	0.570	0.547	0.259	0.276
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.0	3.0		16.3	15.9		1.6	5.4	5.2	2.1	2.3	2.3
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	49.5	20.8		51.6	29.4		47.6	37.5	37.2	48.0	34.7	34.5
Incremental Delay (d_2), s/veh	0.8	0.4		453.4	7.6		0.4	1.1	1.3	1.3	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.3	21.2		505.0	37.1		48.0	38.5	38.5	49.3	34.8	34.6
Level of Service (LOS)	D	C		F	D		D	D	D	D	C	C
Approach Delay, s/veh / LOS	24.1	C		103.5	F		40.6	D		40.9	D	
Intersection Delay, s/veh / LOS	71.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.43	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	0.81	A	1.69	B	0.95	A	0.79	A

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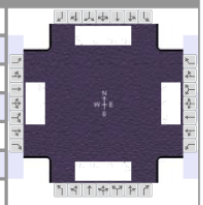
EXHIBIT 4.30
2020 PEAK PM HOUR ANALYSIS (Existing Traffic) - Jeanne d'Arc/Innes

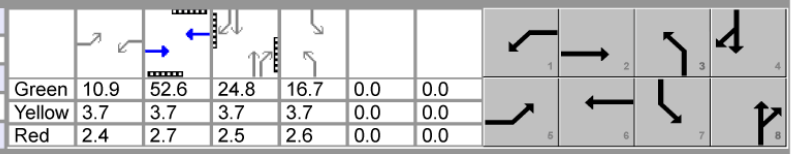
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2020	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2020_ex_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	139	1280		181	707		166	269	256	424	445	81

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	52.6	24.8	16.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	17.0	59.0	17.0	59.0	23.0	31.0	23.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.1
Queue Clearance Time (g_s), s	13.8		13.9		8.5	26.6	19.7	23.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.06	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	151	1391		197	768		180	292	278	461	294	278
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661	1700		1701	1687		1639	1758	1456	1652	1772	1662
Queue Service Time (g_s), s	11.8	52.9		11.9	22.5		6.5	20.8	24.6	17.7	20.7	21.0
Cycle Queue Clearance Time (g_c), s	11.8	52.9		11.9	22.5		6.5	20.8	24.6	17.7	20.7	21.0
Green Ratio (*g/C*)	0.09	0.41		0.09	0.41		0.14	0.20	0.20	0.14	0.20	0.20
Capacity (*c*), veh/h	152	1402		156	1391		446	349	289	450	352	330
Volume-to-Capacity Ratio (*X*)	0.994	0.992		1.264	0.552		0.404	0.838	0.963	1.025	0.835	0.844
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	7.9	25.7		12.0	9.3		2.7	10.6	12.3	10.4	10.6	10.2
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.0	38.2		59.1	29.4		51.3	50.6	51.6	56.2	50.5	50.2
Incremental Delay (d_2), s/veh	71.0	22.3		159.8	1.6		0.2	15.5	42.5	48.9	15.0	16.9
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	130.0	60.5		218.8	31.0		51.6	66.0	94.2	105.0	65.5	67.1
Level of Service (LOS)	F	E		F	C		D	E	F	F	E	E
Approach Delay, s/veh / LOS	67.3	E		69.3	E		73.0	E		83.6	F	
Intersection Delay, s/veh / LOS	72.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.44	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	1.76	B	1.28	A	1.11	A	1.34	A

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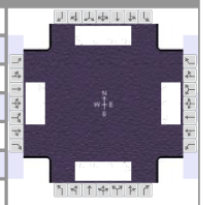
EXHIBIT 4.31
2024 PEAK AM HOUR ANALYSIS (Background Traffic) - Jeanne d'Arc/Innes

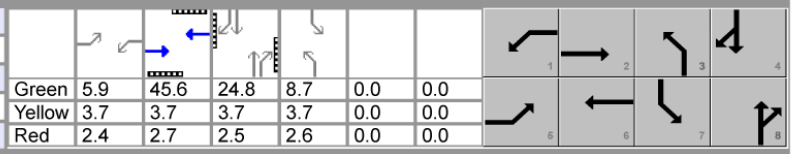
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2024_bak_AM.xus		
Project Description	Innes Road Development Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	37	337		198	1192		119	350	74	148	148	54

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.9	45.6	24.8	8.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	12.0	52.0	12.0	52.0	15.0	31.0	15.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	4.6		8.9		6.2	15.6	7.3	8.1
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.02	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	40	366		215	1296		129	236	225	161	112	107
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1647		1701	1687		1600	1730	1613	1600	1772	1595
Queue Service Time (g_s), s	2.6	7.9		6.9	39.5		4.2	13.3	13.6	5.3	5.7	6.1
Cycle Queue Clearance Time (g_c), s	2.6	7.9		6.9	39.5		4.2	13.3	13.6	5.3	5.7	6.1
Green Ratio (*g/C*)	0.06	0.42		0.06	0.42		0.09	0.23	0.23	0.09	0.23	0.23
Capacity (*c*), veh/h	103	1395		107	1429		282	406	378	282	416	374
Volume-to-Capacity Ratio (*X*)	0.389	0.263		2.017	0.907		0.458	0.582	0.594	0.570	0.270	0.287
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	3.1		17.4	17.2		1.7	5.7	5.5	2.2	2.4	2.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	49.5	20.9		51.6	30.1		47.7	37.7	37.4	48.1	34.8	34.6
Incremental Delay (d_2), s/veh	0.9	0.5		489.0	9.9		0.4	1.4	1.7	1.8	0.1	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.4	21.3		540.6	40.0		48.1	39.2	39.2	49.9	34.9	34.7
Level of Service (LOS)	D	C		F	D		D	D	D	D	C	C
Approach Delay, s/veh / LOS	24.2	C		111.3	F		41.1	D		41.2	D	
Intersection Delay, s/veh / LOS	75.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.43	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	0.82	A	1.73	B	0.97	A	0.80	A

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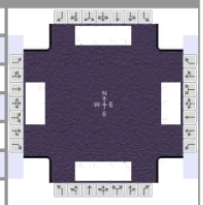
EXHIBIT 4.32
2024 PEAK PM HOUR ANALYSIS (Background Traffic) - Jeanne d'Arc/Innes

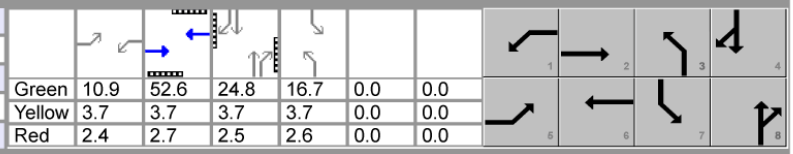
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2024_bak_PM.xus		
Project Description	Innes Road Development Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	145	1314		188	716		173	280	266	441	463	84

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	52.6	24.8	16.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	17.0	59.0	17.0	59.0	23.0	31.0	23.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.1
Queue Clearance Time (g_s), s	13.9		13.9		8.8	27.8	19.7	23.9
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.07	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	158	1428		204	778		188	304	289	479	305	289
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661	1700		1701	1687		1639	1758	1456	1652	1772	1662
Queue Service Time (g_s), s	11.9	53.6		11.9	22.9		6.8	21.8	25.8	17.7	21.7	21.9
Cycle Queue Clearance Time (g_c), s	11.9	53.6		11.9	22.9		6.8	21.8	25.8	17.7	21.7	21.9
Green Ratio (*g/C*)	0.09	0.41		0.09	0.41		0.14	0.20	0.20	0.14	0.20	0.20
Capacity (*c*), veh/h	152	1402		156	1391		446	349	289	450	352	330
Volume-to-Capacity Ratio (*X*)	1.037	1.019		1.312	0.559		0.421	0.872	1.001	1.066	0.868	0.877
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	8.5	27.2		12.8	9.5		2.8	11.5	13.6	11.1	11.4	11.0
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.1	38.2		59.1	29.5		51.5	51.0	52.1	56.2	50.9	50.6
Incremental Delay (d_2), s/veh	83.0	28.8		178.8	1.6		0.2	20.0	53.1	61.1	19.3	21.6
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	142.1	67.0		237.8	31.1		51.7	71.0	105.2	117.2	70.2	72.1
Level of Service (LOS)	F	F		F	C		D	E	F	F	E	E
Approach Delay, s/veh / LOS	74.5	E		74.1	E		79.0	E		91.7	F	
Intersection Delay, s/veh / LOS	79.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.44	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	1.80	B	1.30	A	1.13	A	1.37	A

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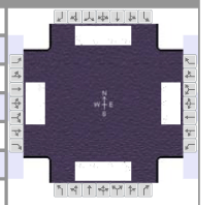
EXHIBIT 4.33
2029 PEAK AM HOUR ANALYSIS (Background Traffic) - Jeanne d'Arc/Innes

HCS Signalized Intersection Results Summary

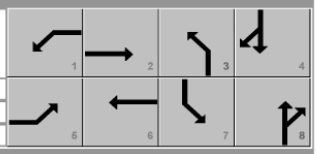
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2029_bak_AM.xus		
Project Description	Innes Road Development Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	39	355		208	1253		125	368	78	155	155	57

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.9	45.6	24.8	8.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	12.0	52.0	12.0	52.0	15.0	31.0	15.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	4.7		8.9		6.4	16.4	7.6	8.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.4
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.04	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	42	386		226	1362		136	249	236	168	118	113
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1647		1701	1687		1600	1730	1613	1600	1772	1594
Queue Service Time (g_s), s	2.7	8.4		6.9	42.9		4.4	14.1	14.4	5.6	6.0	6.4
Cycle Queue Clearance Time (g_c), s	2.7	8.4		6.9	42.9		4.4	14.1	14.4	5.6	6.0	6.4
Green Ratio (*g/C*)	0.06	0.42		0.06	0.42		0.09	0.23	0.23	0.09	0.23	0.23
Capacity (*c*), veh/h	103	1395		107	1429		282	406	378	282	416	374
Volume-to-Capacity Ratio (*X*)	0.410	0.277		2.119	0.953		0.482	0.613	0.624	0.597	0.284	0.301
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	3.3		18.7	19.5		1.8	6.1	5.9	2.3	2.6	2.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	49.6	21.0		51.6	31.1		47.8	38.1	37.7	48.3	34.9	34.7
Incremental Delay (d_2), s/veh	1.0	0.5		533.7	14.9		0.5	2.0	2.4	2.4	0.1	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.6	21.5		585.3	46.1		48.2	40.1	40.1	50.7	35.0	34.8
Level of Service (LOS)	D	C		F	D		D	D	D	D	D	C
Approach Delay, s/veh / LOS	24.4	C		122.8	F		41.9	D		41.6	D	
Intersection Delay, s/veh / LOS	81.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.43	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	0.84	A	1.80	B	1.00	A	0.82	A

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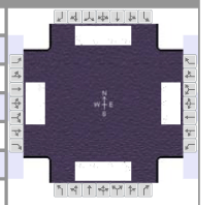
EXHIBIT 4.34
2029 PEAK PM HOUR ANALYSIS (Background Traffic) - Jeanne d'Arc/Innes

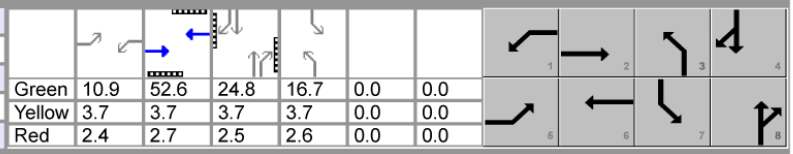
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2029_bak_PM.xus		
Project Description	Innes Road Development Background Traffic				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	152	1377		198	753		182	294	280	464	487	89

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	52.6	24.8	16.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	17.0	59.0	17.0	59.0	23.0	31.0	23.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.1
Queue Clearance Time (g_s), s	13.9		13.9		9.2	27.8	19.7	25.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.10	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	165	1497		215	818		198	320	304	504	322	304
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661	1700		1701	1687		1639	1758	1456	1652	1772	1661
Queue Service Time (g_s), s	11.9	53.6		11.9	24.5		7.2	23.2	25.8	17.7	23.1	23.4
Cycle Queue Clearance Time (g_c), s	11.9	53.6		11.9	24.5		7.2	23.2	25.8	17.7	23.1	23.4
Green Ratio (*g/C*)	0.09	0.41		0.09	0.41		0.14	0.20	0.20	0.14	0.20	0.20
Capacity (*c*), veh/h	152	1402		156	1391		446	349	289	450	352	330
Volume-to-Capacity Ratio (*X*)	1.087	1.068		1.382	0.588		0.443	0.916	1.053	1.121	0.915	0.923
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	9.1	30.2		14.0	10.1		3.0	12.8	14.7	12.3	12.8	12.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.1	38.2		59.1	30.0		51.6	51.5	52.1	56.2	51.5	51.1
Incremental Delay (d_2), s/veh	98.1	44.3		206.8	1.8		0.3	27.5	67.6	79.9	27.2	30.0
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	157.1	82.5		265.8	31.8		51.9	79.0	119.7	136.1	78.8	81.1
Level of Service (LOS)	F	F		F	C		D	E	F	F	E	F
Approach Delay, s/veh / LOS	89.9	F		80.5	F		87.6	F		105.0	F	
Intersection Delay, s/veh / LOS	91.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.44	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	1.86	B	1.34	A	1.17	A	1.42	A

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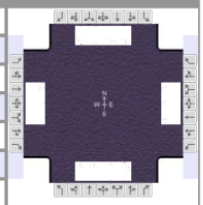
EXHIBIT 4.35
2024 PEAK AM HOUR ANALYSIS (Total Traffic) - Jeanne d'Arc/Innes

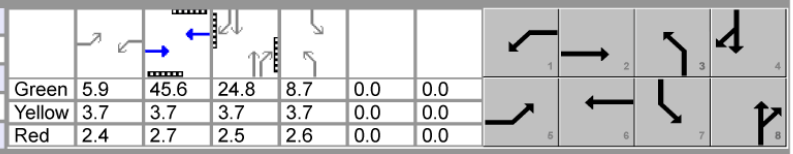
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2024_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	37	343		198	1194		119	350	74	148	148	54

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.9	45.6	24.8	8.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	12.0	52.0	12.0	52.0	15.0	31.0	15.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	4.6		8.9		6.2	15.6	7.3	8.1
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.02	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	40	373		215	1298		129	236	225	161	112	107
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1647		1701	1687		1600	1730	1613	1600	1772	1595
Queue Service Time (g_s), s	2.6	8.1		6.9	39.6		4.2	13.3	13.6	5.3	5.7	6.1
Cycle Queue Clearance Time (g_c), s	2.6	8.1		6.9	39.6		4.2	13.3	13.6	5.3	5.7	6.1
Green Ratio (*g/C*)	0.06	0.42		0.06	0.42		0.09	0.23	0.23	0.09	0.23	0.23
Capacity (*c*), veh/h	103	1395		107	1429		282	406	378	282	416	374
Volume-to-Capacity Ratio (*X*)	0.389	0.267		2.017	0.908		0.458	0.582	0.594	0.570	0.270	0.287
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	3.1		17.4	17.3		1.7	5.7	5.5	2.2	2.4	2.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	49.5	20.9		51.6	30.1		47.7	37.7	37.4	48.1	34.8	34.6
Incremental Delay (d_2), s/veh	0.9	0.5		489.0	10.0		0.4	1.4	1.7	1.8	0.1	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.4	21.4		540.6	40.2		48.1	39.2	39.2	49.9	34.9	34.7
Level of Service (LOS)	D	C		F	D		D	D	D	D	C	C
Approach Delay, s/veh / LOS	24.2	C		111.3	F		41.1	D		41.2	D	
Intersection Delay, s/veh / LOS	75.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.43	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	0.83	A	1.74	B	0.97	A	0.80	A

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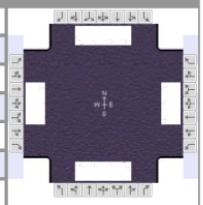
EXHIBIT 4.36
2024 PEAK PM HOUR ANALYSIS (Total Traffic) - Jeanne d'Arc/Innes

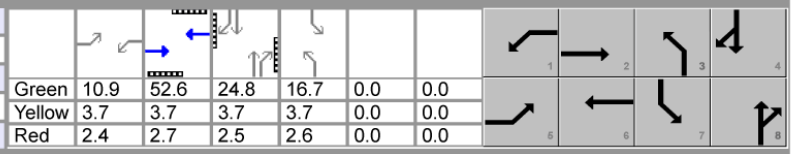
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2024_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	145	1318		188	722		173	280	266	441	463	84

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	52.6	24.8	16.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	17.0	59.0	17.0	59.0	23.0	31.0	23.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.1
Queue Clearance Time (g_s), s	13.9		13.9		8.8	27.8	19.7	23.9
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.07	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	158	1433		204	785		188	304	289	479	305	289
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661	1700		1701	1687		1639	1758	1456	1652	1772	1662
Queue Service Time (g_s), s	11.9	53.6		11.9	23.2		6.8	21.8	25.8	17.7	21.7	21.9
Cycle Queue Clearance Time (g_c), s	11.9	53.6		11.9	23.2		6.8	21.8	25.8	17.7	21.7	21.9
Green Ratio (*g/C*)	0.09	0.41		0.09	0.41		0.14	0.20	0.20	0.14	0.20	0.20
Capacity (*c*), veh/h	152	1402		156	1391		446	349	289	450	352	330
Volume-to-Capacity Ratio (*X*)	1.037	1.022		1.312	0.564		0.421	0.872	1.001	1.066	0.868	0.877
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	8.5	27.4		12.8	9.6		2.8	11.5	13.6	11.1	11.4	11.0
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.1	38.2		59.1	29.6		51.5	51.0	52.1	56.2	50.9	50.6
Incremental Delay (d_2), s/veh	83.0	29.7		178.8	1.7		0.2	20.0	53.1	61.1	19.3	21.6
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	142.1	67.9		237.8	31.2		51.7	71.0	105.2	117.2	70.2	72.1
Level of Service (LOS)	F	F		F	C		D	E	F	F	E	E
Approach Delay, s/veh / LOS	75.2	E		73.9	E		79.0	E		91.7	F	
Intersection Delay, s/veh / LOS	79.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.44	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	1.80	B	1.30	A	1.13	A	1.37	A

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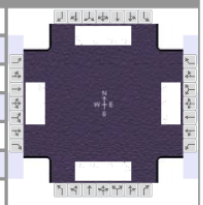
EXHIBIT 4.37
2029 PEAK AM HOUR ANALYSIS (Total Traffic) - Jeanne d'Arc/Innes

HCS Signalized Intersection Results Summary

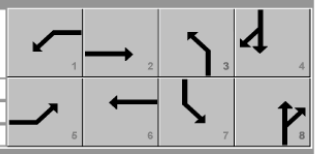
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2029_tot_AM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	39	361		208	1255		125	368	78	155	155	57

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

	EB		WB			
Green	5.9	45.6	24.8	8.7	0.0	0.0
Yellow	3.7	3.7	3.7	3.7	0.0	0.0
Red	2.4	2.7	2.5	2.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	12.0	52.0	12.0	52.0	15.0	31.0	15.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	4.7		8.9		6.4	16.4	7.6	8.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.4
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.04	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	42	392		226	1364		136	249	236	168	118	113
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1647		1701	1687		1600	1730	1613	1600	1772	1594
Queue Service Time (g_s), s	2.7	8.6		6.9	43.0		4.4	14.1	14.4	5.6	6.0	6.4
Cycle Queue Clearance Time (g_c), s	2.7	8.6		6.9	43.0		4.4	14.1	14.4	5.6	6.0	6.4
Green Ratio (*g/C*)	0.06	0.42		0.06	0.42		0.09	0.23	0.23	0.09	0.23	0.23
Capacity (*c*), veh/h	103	1395		107	1429		282	406	378	282	416	374
Volume-to-Capacity Ratio (*X*)	0.410	0.281		2.119	0.954		0.482	0.613	0.624	0.597	0.284	0.301
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	3.3		18.7	19.6		1.8	6.1	5.9	2.3	2.6	2.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	49.6	21.0		51.6	31.1		47.8	38.1	37.7	48.3	34.9	34.7
Incremental Delay (d_2), s/veh	1.0	0.5		533.7	15.2		0.5	2.0	2.4	2.4	0.1	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.6	21.5		585.3	46.3		48.2	40.1	40.1	50.7	35.0	34.8
Level of Service (LOS)	D	C		F	D		D	D	D	D	D	C
Approach Delay, s/veh / LOS	24.4	C		122.9	F		41.9	D		41.6	D	
Intersection Delay, s/veh / LOS	81.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.43	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	0.85	A	1.80	B	1.00	A	0.82	A

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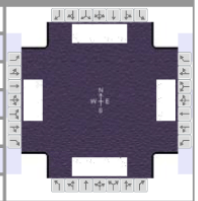
EXHIBIT 4.38
2029 PEAK PM HOUR ANALYSIS (Total Traffic) - Jeanne d'Arc/Innes

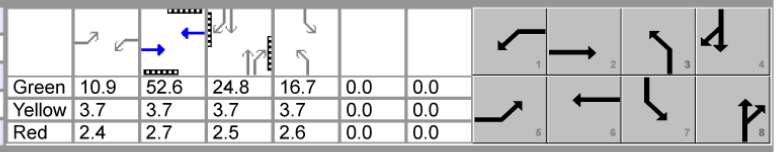
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	12/8/2020	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Innes Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jeanne d'Arc/Innes	File Name	723_2029_tot_PM.xus		
Project Description	Innes Road Development				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	152	1381		198	759		182	294	280	464	487	89

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	52.6	24.8	16.7	0.0	0.0						
Yellow	3.7	3.7	3.7	3.7	0.0	0.0						
Red	2.4	2.7	2.5	2.6	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	17.0	59.0	17.0	59.0	23.0	31.0	23.0	31.0
Change Period, ($Y+R_c$), s	6.1	6.4	6.1	6.4	6.3	6.2	6.3	6.2
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.1
Queue Clearance Time (g_s), s	13.9		13.9		9.2	27.8	19.7	25.4
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.10	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2		1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	165	1501		215	825		198	320	304	504	322	304
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661	1700		1701	1687		1639	1758	1456	1652	1772	1661
Queue Service Time (g_s), s	11.9	53.6		11.9	24.7		7.2	23.2	25.8	17.7	23.1	23.4
Cycle Queue Clearance Time (g_c), s	11.9	53.6		11.9	24.7		7.2	23.2	25.8	17.7	23.1	23.4
Green Ratio (*g/C*)	0.09	0.41		0.09	0.41		0.14	0.20	0.20	0.14	0.20	0.20
Capacity (*c*), veh/h	152	1402		156	1391		446	349	289	450	352	330
Volume-to-Capacity Ratio (*X*)	1.087	1.071		1.382	0.593		0.443	0.916	1.053	1.121	0.915	0.923
Back of Queue (*Q*), ft/ln (50 th percentile)												
Back of Queue (*Q*), veh/ln (50 th percentile)	9.1	30.4		14.0	10.2		3.0	12.8	14.7	12.3	12.8	12.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.1	38.2		59.1	30.1		51.6	51.5	52.1	56.2	51.5	51.1
Incremental Delay (d_2), s/veh	98.1	45.4		206.8	1.9		0.3	27.5	67.6	79.9	27.2	30.0
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	157.1	83.6		265.8	31.9		51.9	79.0	119.7	136.1	78.8	81.1
Level of Service (LOS)	F	F		F	C		D	E	F	F	E	F
Approach Delay, s/veh / LOS	90.9	F		80.3	F		87.6	F		105.0	F	
Intersection Delay, s/veh / LOS	91.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.44	B	2.44	B	2.31	B	2.31	B
Bicycle LOS Score / LOS	1.86	B	1.35	A	1.17	A	1.42	A

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EXHIBIT 4.39
FRANK BENDER/INNES - PLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Frank Bender Street
APPROACHES	All
YEAR	2029
DIRECTION	All
MMLOS MODE	PLOS

	North Approach		South Approach		East Approach		West Approach	
	Comment	Points	Comment	Points	Comment	Points	Comment	Points
5.1 Crossing Distance & Conditions								
Median?	No		No		No		No	
Total Travel Lanes Crossed	3	105	5	72	6	55	7	39
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Permissive	−8	Permissive	−8	Protected	0	Permissive	−8
Right Turn Conflict	Permissive or Yield Control	−5	Permissive or Yield Control	−5	Permissive or Yield Control	−5	Permissive or Yield Control	−5
Right Turns on Red	RTOR Allowed	−3	RTOR Allowed	−3	RTOR Allowed	−3	RTOR Allowed	−3
Leading Ped Interval	No	−2	No	−2	No	−2	No	−2
5.3a Corner Radius	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6
5.3b Right Turn Channel	No Right Turn Channel	−4	No Right Turn Channel	−4	No Right Turn Channel	−4	No Right Turn Channel	−4
5.4 Crosswalk Treatment	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7
TOTAL PETSI SCORE		70		37		28		4
DELAY SCORE								
Cycle length from Signal Timing Plan		130		130		130		130
Delay (sec.)		39		39		38		38
PETSI SCORE		**C**		**E**		**F**		**F**
DELAY SCORE		**D**		**D**		**D**		**D**
OVERALL APPROACH SCORE		**D**		**E**		**F**		**F**

OVERALL INTERSECTION SCORE **F**

EXHIBIT 4.40
VISENEAU/INNES - PLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Viseneau Drive
APPROACHES	All
YEAR	2029
DIRECTION	All
MMLOS MODE	PLOS

	North Approach		South Approach		East Approach		West Approach	
	Comment	Points	Comment	Points	Comment	Points	Comment	Points
5.1 Crossing Distance & Conditions								
Median?	No		No		No		No	
Total Travel Lanes Crossed	2	120	5	72	6	55	7	39
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Permissive	−8	Permissive	−8	Protected	0	Permissive	−8
Right Turn Conflict	Permissive or Yield Control	−5	Permissive or Yield Control	−5	Permissive or Yield Control	−5	Permissive or Yield Control	−5
Right Turns on Red	RTOR Allowed	−3	RTOR Allowed	−3	RTOR Allowed	−3	RTOR Allowed	−3
Leading Ped Interval	No	−2	No	−2	No	−2	No	−2
5.3a Corner Radius	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6
5.3b Right Turn Channel	No Right Turn Channel	−4	No Right Turn Channel	−4	No Right Turn Channel	−4	No Right Turn Channel	−4
5.4 Crosswalk Treatment	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7
TOTAL PETSI SCORE		85		37		28		4
DELAY SCORE								
Cycle length from Signal Timing Plan		130		130		130		130
Delay (sec.)		32		32		38		38
PETSI SCORE		**B**		**E**		**F**		**F**
DELAY SCORE		**D**		**D**		**D**		**D**
OVERALL APPROACH SCORE		**D**		**E**		**F**		**F**

OVERALL INTERSECTION SCORE **F**

EXHIBIT 4.41
JEANNE D'ARC/INNES - PLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Jeanne d'Arc Boulevard
APPROACHES	All
YEAR	2029
DIRECTION	All
MMLOS MODE	PLOS

	North Approach		South Approach		East Approach	120	West Approach	
	Comment	Points	Comment	Points	Comment	Points	Comment	Points
5.1 Crossing Distance & Conditions								
Median?	No		No		No		No	
Total Travel Lanes Crossed	9	6	9	6	8	23	8	23
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Protected	0	Protected	0	Protected	0	Protected	0
Right Turn Conflict	No Right Turn	0	No Right Turn	0	No Right Turn	0	No Right Turn	0
Right Turns on Red	RTOR Prohibited	0	RTOR Prohibited	0	RTOR Prohibited	0	RTOR Prohibited	0
Leading Ped Interval	No	−2	No	−2	No	−2	No	−2
5.3a Corner Radius	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6	> 10m to 15m	−6
5.3b Right Turn Channel	Conventional Right Turn No Receiving Lane	0	Conventional Right Turn No Receiving Lane	0	Conventional Right Turn No Receiving Lane	0	Conventional Right Turn No Receiving Lane	0
5.4 Crosswalk Treatment	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7	Standard Transverse Markings	−7
TOTAL PETSI SCORE		0		0		8		8
DELAY SCORE								
Cycle length from Signal Timing Plan		130		130		130		130
Delay (sec.)		43		43		41		41
PETSI SCORE		**F**		**F**		**F**		**F**
DELAY SCORE		**E**		**E**		**E**		**E**
OVERALL APPROACH SCORE		**F**		**F**		**F**		**F**

OVERALL INTERSECTION SCORE **F**

EXHIBIT 4.42
FRANK BENDER/INNES - BLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Frank Bender Street
APPROACHES	Eastbound–Westbound
YEAR	2029
DIRECTION	All
MMLOS MODE	BLOS

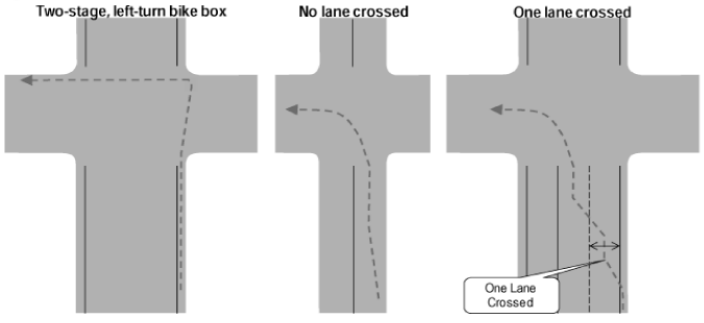
INTERSECTION SCORE **F**

Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Pocket Bike Lanes on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane introduced to the right of the bike lane and ≤ 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	B
	Right-turn lane introduced to the right of the bike lane and > 50 m long, turning speed ≤ 30 km/h (based on curb radii and angle of intersection)	D
	Bike lane shifts to the left of the right-turn lane, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane with any other configurations	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Mixed Traffic on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane 25 to 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane 25 to 50 m long, turning speed > 25 km/h (based on curb radii and angle of intersection)	E
	Right-turn lane longer than 50 m	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	D
	1 lane crossed, 50 km/h	D
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	F
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F

NOT APPLICABLE

NOT APPLICABLE

Left-turn Configurations



Notes:
1. Pocket bike lanes are defined as bike lanes that develop near intersections between vehicular right turn lanes on the right side and vehicular through or left lanes on the left side. All other configurations of bike lanes or separated facility that remain against the edge of the curb/parking lane and require right turning vehicles to yield to through cyclists will not impact the level of traffic stress (i.e. are considered to be LOS A).

EXHIBIT 4.43
VISENEAU/INNES - BLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Viseneau Drive
APPROACHES	Eastbound–Westbound
YEAR	2029
DIRECTION	All
MMLOS MODE	BLOS

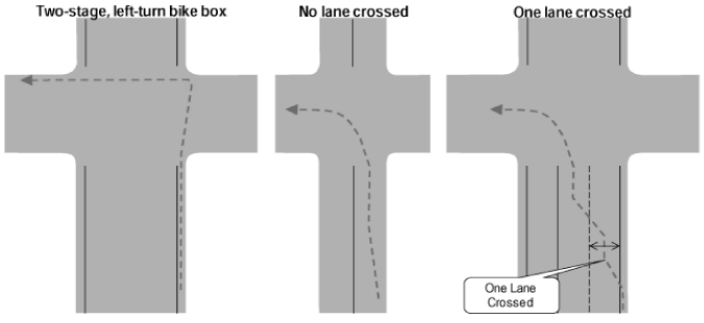
INTERSECTION SCORE **F**

Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Pocket Bike Lanes on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane introduced to the right of the bike lane and ≤ 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	B
	Right-turn lane introduced to the right of the bike lane and > 50 m long, turning speed ≤ 30 km/h (based on curb radii and angle of intersection)	D
	Bike lane shifts to the left of the right-turn lane, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane with any other configurations	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Mixed Traffic on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane 25 to 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane 25 to 50 m long, turning speed > 25 km/h (based on curb radii and angle of intersection)	E
	Right-turn lane longer than 50 m	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	D
	1 lane crossed, 50 km/h	D
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	F
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F

NOT APPLICABLE

NOT APPLICABLE

Left-turn Configurations



Notes:
1. Pocket bike lanes are defined as bike lanes that develop near intersections between vehicular right turn lanes on the right side and vehicular through or left lanes on the left side. All other configurations of bike lanes or separated facility that remain against the edge of the curb/parking lane and require right turning vehicles to yield to through cyclists will not impact the level of traffic stress (i.e. are considered to be LOS A).

EXHIBIT 4.44
JEANNE D'ARC/INNES - BLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Jeanne d'Arc Boulevard
APPROACHES	Eastbound–Westbound
YEAR	2029
DIRECTION	All
MMLOS MODE	BLOS

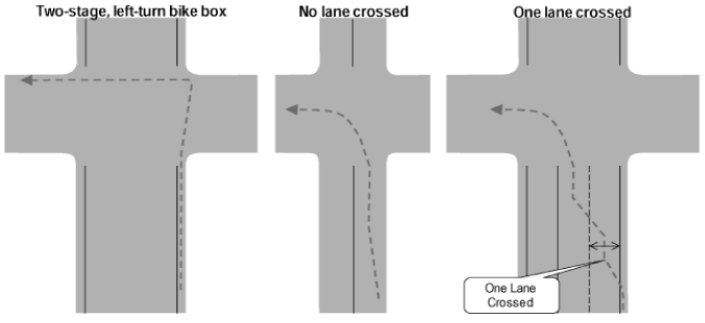
INTERSECTION SCORE **F**

Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Pocket Bike Lanes on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane introduced to the right of the bike lane and ≤ 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	B
	Right-turn lane introduced to the right of the bike lane and > 50 m long, turning speed ≤ 30 km/h (based on curb radii and angle of intersection)	D
	Bike lane shifts to the left of the right-turn lane, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane with any other configurations	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Mixed Traffic on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane 25 to 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane 25 to 50 m long, turning speed > 25 km/h (based on curb radii and angle of intersection)	E
	Right-turn lane longer than 50 m	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	D
	1 lane crossed, 50 km/h	D
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	F
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F

NOT APPLICABLE

NOT APPLICABLE

Left-turn Configurations



Notes:
1. Pocket bike lanes are defined as bike lanes that develop near intersections between vehicular right turn lanes on the right side and vehicular through or left lanes on the left side. All other configurations of bike lanes or separated facility that remain against the edge of the curb/parking lane and require right turning vehicles to yield to through cyclists will not impact the level of traffic stress (i.e. are considered to be LOS A).

EXHIBIT 4.45
FRANK BENDER/INNES - TLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Frank Bender Street
APPROACHES	All
YEAR	2029
MMLOS MODE	TLOS

INTERSECTION SCORE **F**

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec	TSP & short (e.g. <60 sec) to medium (e.g.	C
≤30 sec	60-90 sec) cycle length	D
≤40 sec	TSP & long cycle length (e.g. >90 sec)	E
>40 sec	No TSP & long cycle length (e.g. >90 sec)	F

Note: Delay includes travel time from end of queue to entering the intersection

EXHIBIT 4.46
VISENEAU/INNES - TLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Viseneau Drive
APPROACHES	All
YEAR	2029
MMLOS MODE	TLOS

INTERSECTION SCORE **F**

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec	TSP & short (e.g. <60 sec) to medium (e.g.	C
≤30 sec	60-90 sec) cycle length	D
≤40 sec	TSP & long cycle length (e.g. >90 sec)	E
>40 sec	No TSP & long cycle length (e.g. >90 sec)	F

Note: Delay includes travel time from end of queue to entering the intersection

EXHIBIT 4.47
JEANNE D'ARC/INNES - TLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Jeanne d'Arc Boulevard
APPROACHES	All
YEAR	2029
MMLOS MODE	TLOS

INTERSECTION SCORE **F**

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec	TSP & short (e.g. <60 sec) to medium (e.g.	C
≤30 sec	60-90 sec) cycle length	D
≤40 sec	TSP & long cycle length (e.g. >90 sec)	E
>40 sec	No TSP & long cycle length (e.g. >90 sec)	F

Note: Delay includes travel time from end of queue to entering the intersection

EXHIBIT 4.48
FRANK BENDER/INNES - TkLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Frank Bender Street
APPROACHES	Eastbound–Westbound
YEAR	2029
MMLOS MODE	TkLOS

INTERSECTION SCORE **B**

Exhibit 21 – TkLOS Signalized Intersection Evaluation Table

Effective Corner Radius	One receiving lane on departure from intersection	More than one receiving lane on departure from intersection
< 10m	F	D
10 to 15m	E	B
> 15m	C	A

EXHIBIT 4.49
VISENEAU/INNES - TkLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Viseneau Drive
APPROACHES	Eastbound–Westbound
YEAR	2029
MMLOS MODE	TkLOS

INTERSECTION SCORE **B**

Exhibit 21 – TkLOS Signalized Intersection Evaluation Table

Effective Corner Radius	One receiving lane on departure from intersection	More than one receiving lane on departure from intersection
< 10m	F	D
10 to 15m	E	B
> 15m	C	A

EXHIBIT 4.50
JEANNE D'ARC/INNES - TkLOS INTERSECTION EVALUATION

MAIN STREET	Innes Road
MINOR STREET	Jeanne d'Arc Boulevard
APPROACHES	Eastbound–Westbound
YEAR	2029
MMLOS MODE	TkLOS

INTERSECTION SCORE **B**

Exhibit 21 – TkLOS Signalized Intersection Evaluation Table

Effective Corner Radius	One receiving lane on departure from intersection	More than one receiving lane on departure from intersection
< 10m	F	D
10 to 15m	E	B
> 15m	C	A