RESIDENTIAL DEVELOPMENT
21 HUNTMAR DRIVE
OTTAWA, ONTARIO

TRANSPORTATION IMPACT ASSESSMENT
REVISED

June 14, 2021

D. J. Halpenny & Associates Ltd.
Consulting Transportation Engineers
P. O. Box 774, Manotick, Ontario K4M 1A7

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Prepared for:

NA (Goulbourne) Limited Partnership

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D. J. Halpenny & Associates Ltd.
Consulting Transportation Engineers
P.O. Box 774, Manotick, ON K4M 1A7 - Tel (613) 692-8662 - David@DJHalpenny.com

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INTRODUCTION

An apartment development providing 344 rental units is proposed at 21 Huntmar Drive in Kanata. The development will comprise of two buildings with one access onto Huntmar Drive across from the existing access to the Shoppes at Fairwinds shopping centre.

The Transportation Impact Assessment (TIA) has been prepared which followed the City of Ottawa document, *Transportation Impact Assessment Guidelines (2017)*. Each step was prepared and the TIA document dated February 16, 2021 was submitted with the Site Plan Application.

This Revised document will be a revision to the February 16, 2021 TIA report, and will address the comments by City of Ottawa staff which were listed in the May 10, 2021 memo following the 1st review of the submission documents.

STEP 1 - SCREENING

A Screening Form has been prepared which is included as Exhibit 1.1 in the Appendix. The Screening Form has triggered the requirement to proceed to the Scoping Document stage of the Transportation Impact Assessment. The following will address the requirements of the Scoping Document.

STEP 2 - SCOPING

MODULE 2.1 – Existing and Planned Conditions

Element 2.1.1 – Proposed Development

The proposed residential development is located at 21 Huntmar Drive along the west side of the road across from the Shoppes at Fairwinds shopping centre. The development will be located on a 15,616.6 m^2 parcel of land approximately 210 m north of the intersection of Huntmar Drive and Hazeldean Road. The property is currently

vacant and zoned AM7[1444] “Arterial Mainstreet” which will support the development. Figure 2.1 provides a site location plan of the development.

The residential development will consist of two free-standing apartment buildings. Building A will be a six storey building providing 140 rental apartments at the north portion of the property, and Building B a second six storey building providing 204 rental apartments at the south portion of the property for a total of 344 dwelling units.

The Site Plan proposes 28 surface parking spaces (14 spaces for each building), and a combined underground parking garage with 485 vehicle spaces, for a total of 513 parking spaces for the apartment development. The site will provide 65 visitor parking spaces which will be split between 28 spaces in the surface parking lot and 37 spaces in the underground parking garage. The site will provide bike racks for bicycle parking. A total of 209 bicycle parking spaces will be provided with 185 of the spaces in a secured bike room in the parking garage, and 24 in bike racks provided outside the main entrance to each building in a sheltered area for visitors.

The total apartment development will have one access point onto Huntmar Drive. The access will form the eastbound approach to the existing intersection of Huntmar Drive and the Food Basics access (Shoppes at Fairwinds). The intersection is currently a two-way stop controlled intersection with a stop sign at the westbound approach from Food Basics. Traffic signals and an exclusive northbound left turn lane into the site have been approved under a separate Roadway Modification Approval (RMA) report. The site Access will be 9.0 m in width with one eastbound lane entering and one lane exiting. The exiting lane will comprise of a shared left/through/right turning movement. Figure 2.2 shows a conceptual site plan of the development. Both Building A and Building B of the development are expected to be completed and substantially occupied by the year 2024.

Element 2.1.2 – Existing Conditions

ROADS

The proposed residential development is located at 21 Huntmar Drive. Huntmar Drive is a major collector road under the jurisdiction of the City of Ottawa which links March Road with Hazeldean Road. Huntmar Drive between Hazeldean Road and Maple Grove Road was constructed in 2008. Huntmar Drive between Hazeldean Road and Gallantry Way is a four lane divided road, and a two lane divided road between Gallantry Way and Maple Grove Road. The posted speed limit in the vicinity of the site is 60 km./h., which reduces to 50 km./h. approximately 50 m north of the proposed site Access. Trucks are prohibited along Huntmar Drive between Hazeldean Road and Maple Grove Road. A sidewalk is provided along the east side of the road adjacent to the Shoppes at Fairwinds shopping centre, and along the west side from Hazeldean Road to the site boundary. Sidewalks are provided along both sides of the road north of the site through the residential area. Huntmar Drive is designated as a Spine Route in the City of Ottawa *Transportation Master Plan* (TMP). The roadway provides cycling lanes along both sides of the road. A restaurant exists at the northwest corner of the

FIGURE 2.1
SITE LOCATION PLAN

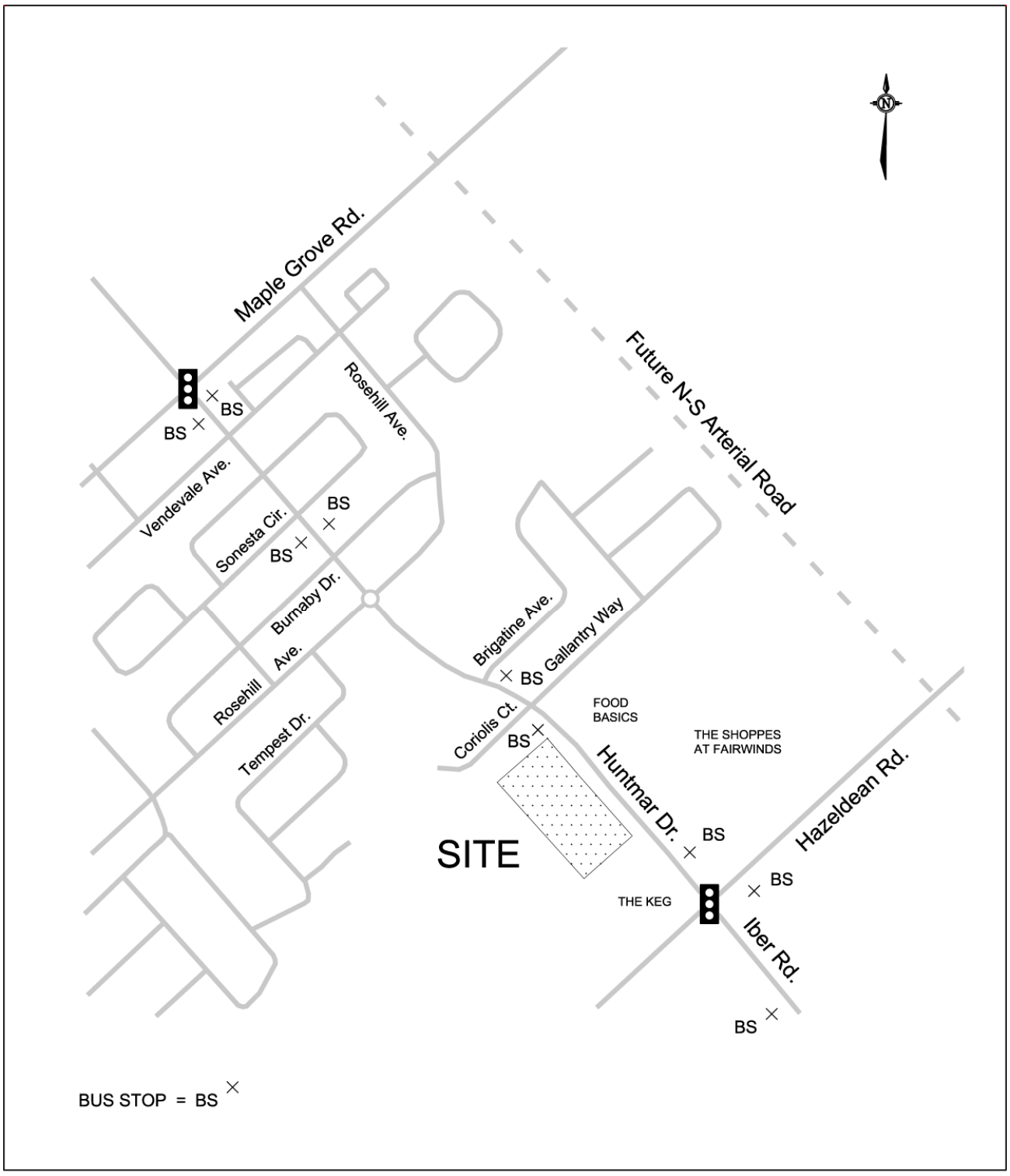

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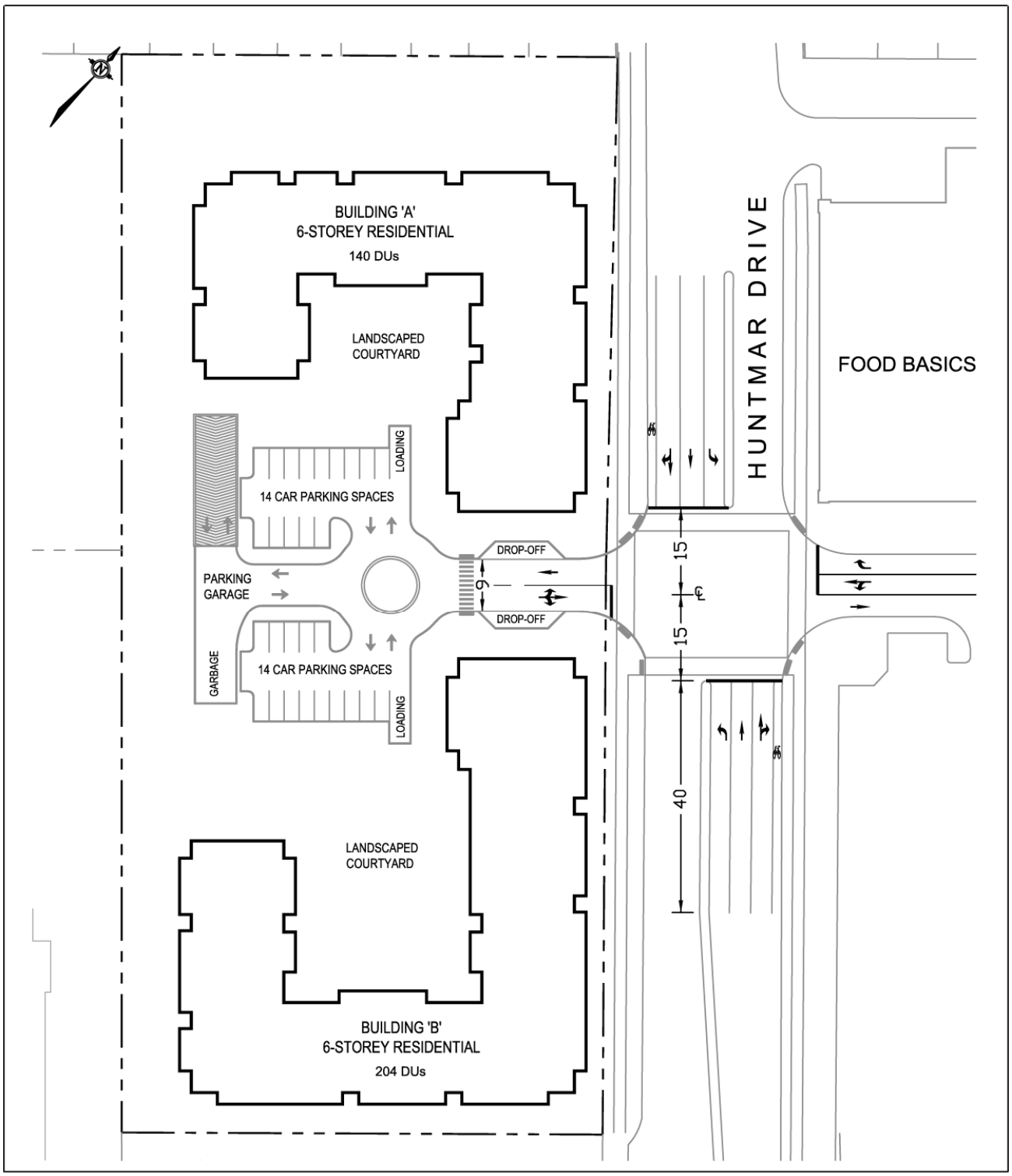
FIGURE 2.2
CONCEPTUAL SITE PLAN



Hazeldean/Huntmar intersection adjacent to the site. The restaurant has two accesses each providing right-in/right-out turning movements, with one onto Huntmar Drive and the second on Hazeldean Road.

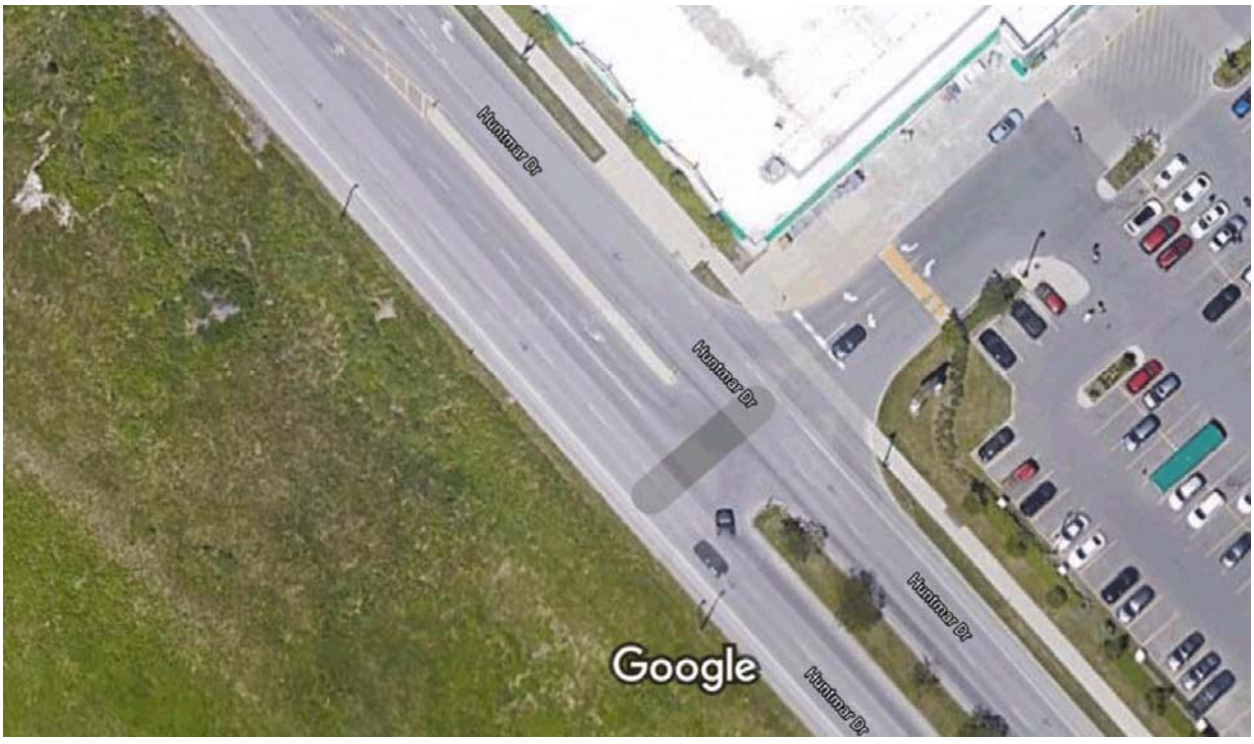
Hazeldean Road is under the jurisdiction of the City of Ottawa and is located 210 m south of the site Access. The road was reconstructed in 2010 to a four lane divided urban arterial road. The road has pedestrian sidewalks along both sides of the road. Hazeldean Road is designated as a Spine Route and provides cycling lanes on both sides of the road. The road has a posted speed limit of 60 km./h.

INTERSECTIONS

The proposed access to the site will form the eastbound approach to the existing "T" intersection to the Food Basics access (Shoppes at Fairwinds). The intersection is currently controlled by a stop sign at the westbound site egress. An RMA report has been submitted and approved by the City of Ottawa for the installation of traffic control signals and a northbound left turn lane at the intersection. Below lists the existing lane configuration to the Food Basics (210 m N of Hazeldean)/Huntmar intersection:

Northbound Huntmar	One shared through/right lane
	One through lane
Southbound Huntmar	One left turn lane (40 m storage)
	Two through lanes
Westbound Food Basics	One right turn lane
	One left turn lane (25 m storage)

INTERSECTION OF HUNTMAR DRIVE AND FOOD BASICS



The proposed residential development is located 210 m north of the intersection of Huntmar Drive and Hazeldean Road. Huntmar Drive forms the southbound approach and Iber Road the northbound approach. The Hazeldean/Huntmar intersection is controlled by traffic signals and was reconstructed under the City of Ottawa Hazeldean Road Widening project in 2010. Below is the existing lane configuration to the Hazeldean/Huntmar intersection:

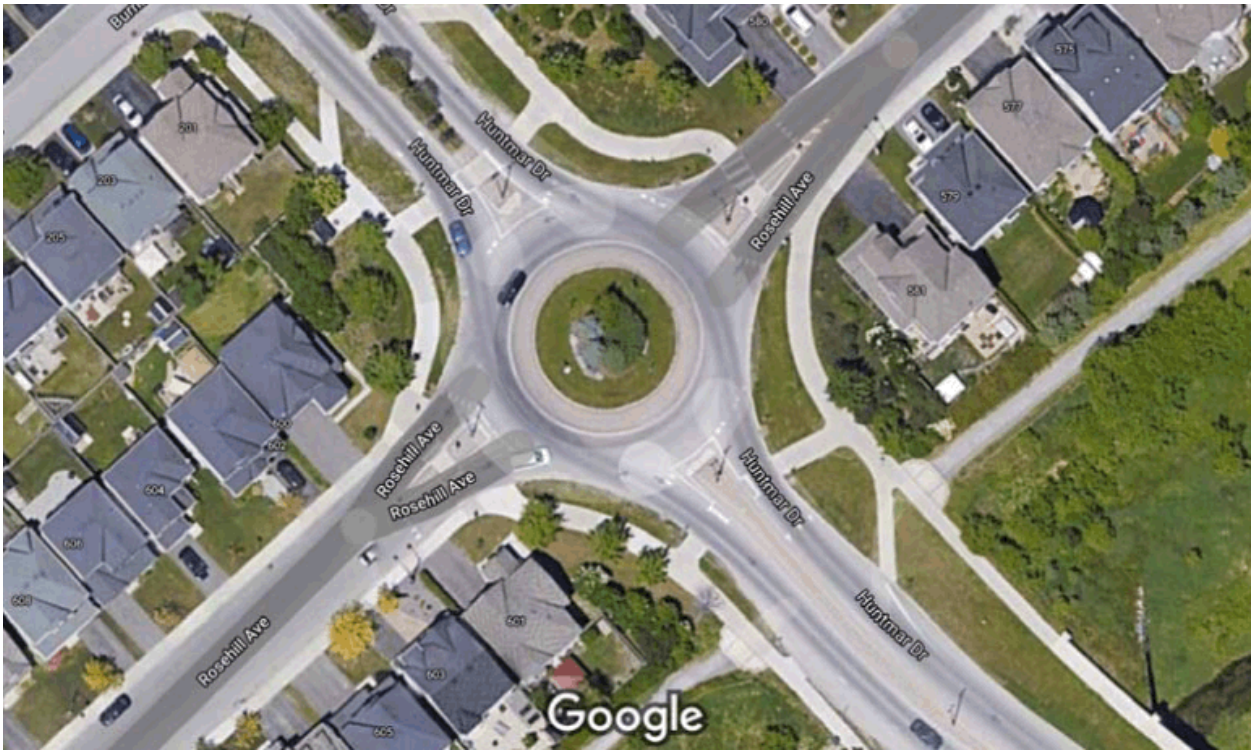
Northbound Iber Road	One left turn lane
	One through lane
	One right turn lane
Southbound Huntmar	One left turn lane (80 m storage)
	One through lane
	One right turn lane (channelized)
Eastbound Hazeldean	Two left turn lanes
	One through lane
	One shared through/right lane
Westbound Hazeldean	Two left turn lanes
	Two through lanes
	One right turn lane (channelized)

INTERSECTION OF HUNTMAR DRIVE AND HAZELDEAN ROAD

The intersection of Rosehill Avenue and Huntmar Drive is located 380 m north of the proposed site Access (existing Shoppes at Fairwinds access). The intersection was constructed in 2008 along with the construction of Huntmar Drive. The Rosehill/Huntmar intersection is a single lane roundabout with Huntmar Drive forming the northbound and southbound approaches, and Rosehill Avenue the eastbound and westbound approaches. The posted speed limit through the roundabout is 30 km./h.

The most recent weekday peak AM and PM hour traffic counts were obtained from the City of Ottawa and are provided in the Appendix as Exhibit 2.1 for the 2016 counts at the intersection of Food Basics/Huntmar, Exhibit 2.2 for the 2019 counts at the intersection of Hazeldean/Huntmar, and Exhibit 2.3 for the 2016 traffic counts at the Rosehill/Huntmar roundabout intersection. The weekday peak hour counts at the intersections within the study area are shown in Figure 2.3. The traffic signal timing plan for the Hazeldean/Huntmar intersection was obtained from the City of Ottawa and is provided as Exhibit 2.4.

INTERSECTION OF ROSEHILL AVENUE AND HUNTMAR DRIVE



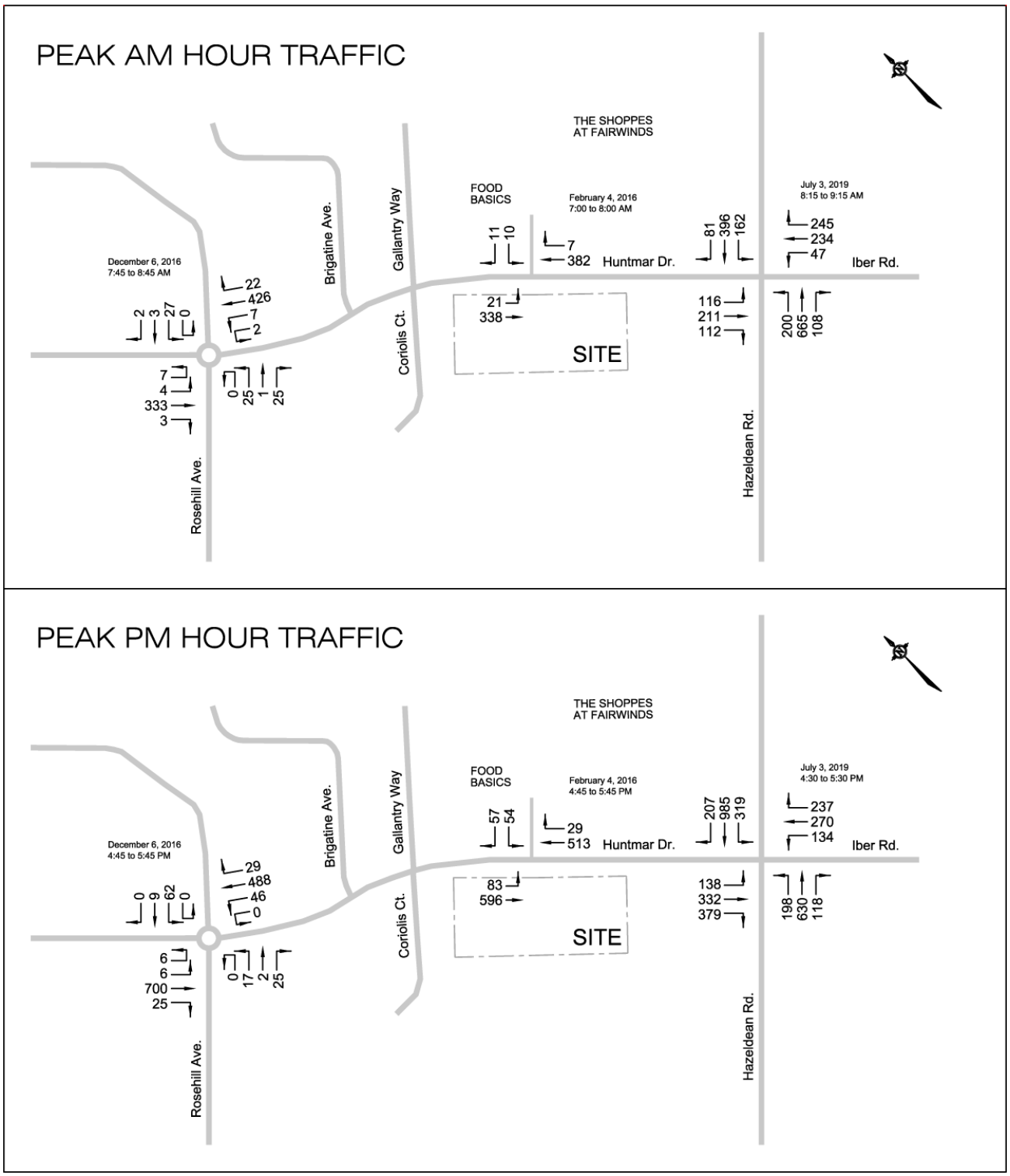
TRANSIT

The site is serviced by OC Transpo Rapid Route 61 which travels along Hazeldean Road and Rapid Route 62 which travels along Huntmar Drive. Weekday peak AM and PM hour Connexion Routes 261 and 263 provide service along Huntmar Drive Monday to Friday during peak periods. All routes have a service schedule of approximately 30 minutes. The route maps are provided as Exhibit 2.5. Bus stops are provided along Huntmar Drive at the far side of the Coriolis/Huntmar intersection approximately 120 m north of the site Access. All bus stops in the area 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.

FIGURE 2.3
PEAK AM AND PM HOUR TRAFFIC COUNTS



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The collision reports were for the Food Basics/Huntmar (210 m N of Hazeldean) and Hazeldean/Huntmar intersections. Reported collisions were also obtained for the Huntmar Drive road segments between Hazeldean Road and the site Access, and between the site Access and Maple Grove Road. Table 2.1 summarizes the collisions by year and type.

TABLE 2.1
COLLISION SUMMARY

YEAR	COLLISION TYPE					TOTAL
	REAR END	ANGULAR	TURNING	SIDESWIPE	OTHER (SMV)	
Huntmar Drive at Food Basics (210m north of Hazeldean Road) Intersection						
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
Hazeldean Road at Huntmar Drive Intersection						
2014	8	2	2	0	1	13
2015	7	2	3	1	0	13
2016	4	1	0	2	0	7
2017	7	1	1	0	0	9
2018	10	1	5	1	0	17
Huntmar Drive Segment between Hazeldean and 210m north of Hazeldean Road						
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
Huntmar Drive Segment between 210m north of Hazeldean Road and Maple Grove Rd.						
2014	0	0	0	0	0	0
2015	1	0	0	0	0	1
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	1	0	1	2

Element 2.1.3 – Planned Conditions

The *Transportation Master Plan 2013* (TMP) has identified the construction of the N-S Arterial Road under Phase 2 (2020-2025) of the Affordable and Network Concept Plans. The N-S Arterial Road would be constructed as a two lane road between Palladium Drive and Fernbank Road.

Under Phase 3 (2026-2031) of the TMP Affordable and Network Concept Plans, Huntmar Drive would also be widened from two lanes to four lanes between the Campeau Drive extension and Maple Grove Road.

The following are proposed or recently developed property within the immediate area of the site:

- Vacant lands on the south side of Hazeldean Road at 5618 Hazeldean Road propose a combination of residential and commercial-mix use with completion expected by 2028.
- A long term care building and a retirement home were constructed in 2019 at 5731 Hazeldean Road west of the site.
- Property at 5754 Hazeldean Road will comprise of retail/office/medical uses along with a pharmacy.
- A residential development is proposed to be constructed east of the Hazeldean/Huntmar intersection at 590 Hazeldean Road.
- A residential subdivision is proposed at 5 Orchard Road located at the southwest corner of Hazeldean Road and Fringewood Drive. Phase 1 occupancy is expected by 2022.
- The Shenkman/Cavanaugh residential subdivision is located at 195 Huntmar Drive between Maple Grove Road and Palladium Drive.

MODULE 2.2 – Study Area and Time Periods

Element 2.2.1 – Study Area

The study area for the residential apartment development was determined to be confined to the site access to the existing Food Basics/Huntmar intersection, the Hazeldean/Huntmar signalized intersection located 210 m south of the site Access, and the Rosehill/Huntmar roundabout located 380 m north of the proposed site Access. The right-in/right-out site access to the Shoppes at Fairwinds located 125 m south of the site and the right-in/right-out access to the Keg restaurant adjacent to the south property line of the site were not examined as they would experience low traffic volumes.

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 period for the analysis would be the weekday peak AM and PM time period of traffic which would occur during the peak hour of the apartment development and the adjacent street traffic when drivers are travelling to and from work.

Element 2.2.3 – Horizon Years

The TIA will address the impact of the site generated trips from the proposed two residential apartment buildings at 21 Huntmar Drive. The horizon year of the study will be the total completion of the development at the year 2024. The analysis will further examine the impact at the year 2029 which represents five years beyond completion.

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	Yes – A mini roundabout will be incorporated into the Site Plan..
	4.1.3 New Street Networks	Yes - Only required for subdivisions.
4.2 Parking	4.2.1 Parking Supply	No – The parking supply will be examined with the supply of parking compared to the required as determined from City By-laws..
	4.2.2 Spillover Parking	Yes - Parking will meet the City of Ottawa By-laws. Spillover parking is not expected due to the long walking distance to nearby on-street parking.
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 – The site will have access onto a major collector road and would not exceed ATM capacity thresholds.
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 apartment development at 21 Huntmar Drive will consist of 344 rental apartment units in two free-standing buildings. Both buildings will be 6 storeys in height and would have one shared access point onto Huntmar Drive. The site Access will form the eastbound approach to the existing intersection to the Shoppes at Fairwinds shopping centre on the east side of Huntmar Drive. The intersection is currently a "T" intersection controlled by a stop sign at the westbound approach. The westbound opposing approach to the site is the exiting lane from the Food Basics.

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 (344 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.

The modal split of trips was determined from the City of Ottawa document, *2011 NCR Household Origin-Destination Survey*, January 2013. The primary travel modal share used the demographic characteristics for the Kanata - Stittsville area (Page 116) for trips. The residential modal share was based on a blend of the "from" and "within" mode shares for the AM peak hour, and the "to" and "within" shares for the PM peak

hour. Table 3.3 presents the mode share summary which is an average of the peak AM and PM hour shares which will be used in the TIA study for the residential land use. The 15 percent mode share for walking was considered reasonable due to the close proximity of the apartments to employment in the surrounding retail shopping area.

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.
344 Dwelling Units	100 veh.	127 veh.	227 per.	289 per.

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	16%	
Transit	13%	Consistent with the 2011 TRANS-National Capital Region Travel Trends report and other TIA studies for development in the area
Bicycle	1%	
Walk	15%	
Total	100%	

OC Transpo provides Rapid Routes 61 and 62 which travel along Hazeldean Road and Huntmar Drive from Stittsville to the Tunney's Pasture Transit Station, and Connexion Routes 261 and 263 which travel along Hazeldean Road from Stittsville to the Tunney's Pasture Transit Station. Bus stops are located along Huntmar Drive at a 120 m walk from the apartment building entrance.

Cycling lanes are provided along both sides of Hazeldean Road and Huntmar Drive.

Pedestrian sidewalks are provided along both sides of Hazeldean Road and Huntmar Drive in the vicinity of the site, with the exception of across the frontage of the site. The Site Plan proposes to construct the sidewalk adjacent to the site as part of the site development.

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 building at 21 Huntmar Drive.

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 site is vacant with no existing development on site which would generate 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	125 per. trips	159 per. trips
Auto Passenger	36 per. trips	46 per. trips
Transit	30 per. trips	38 per. trips
Non-Auto	36 per. trips	46 per. trips
Total Trips	227 per. trips	289 per. trips

Element 3.1.2 – Trip Distribution

The distribution of site generated vehicle trips for the proposed apartment development was determined from the peak hour traffic patterns at the Hazeldean/Huntmar intersection which would comprise mainly of trips to/from work, employment areas and possible destinations of trips, and information provided in other traffic studies for development in the area. The trip pattern was applied to the surrounding roads assuming the shortest and most convenient route. The trip distribution for the residential trips during the weekday peak AM and PM hour is as follows:

To/From the north along Huntmar Drive	30%
To/From the south along Iber Road	10%
To/From the east along Hazeldean Road	50%
To/From the west along Hazeldean Road	10%

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
344 Apartment Units	125	30 (24%)	95 (77%)	159	98 (62%)	61 (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

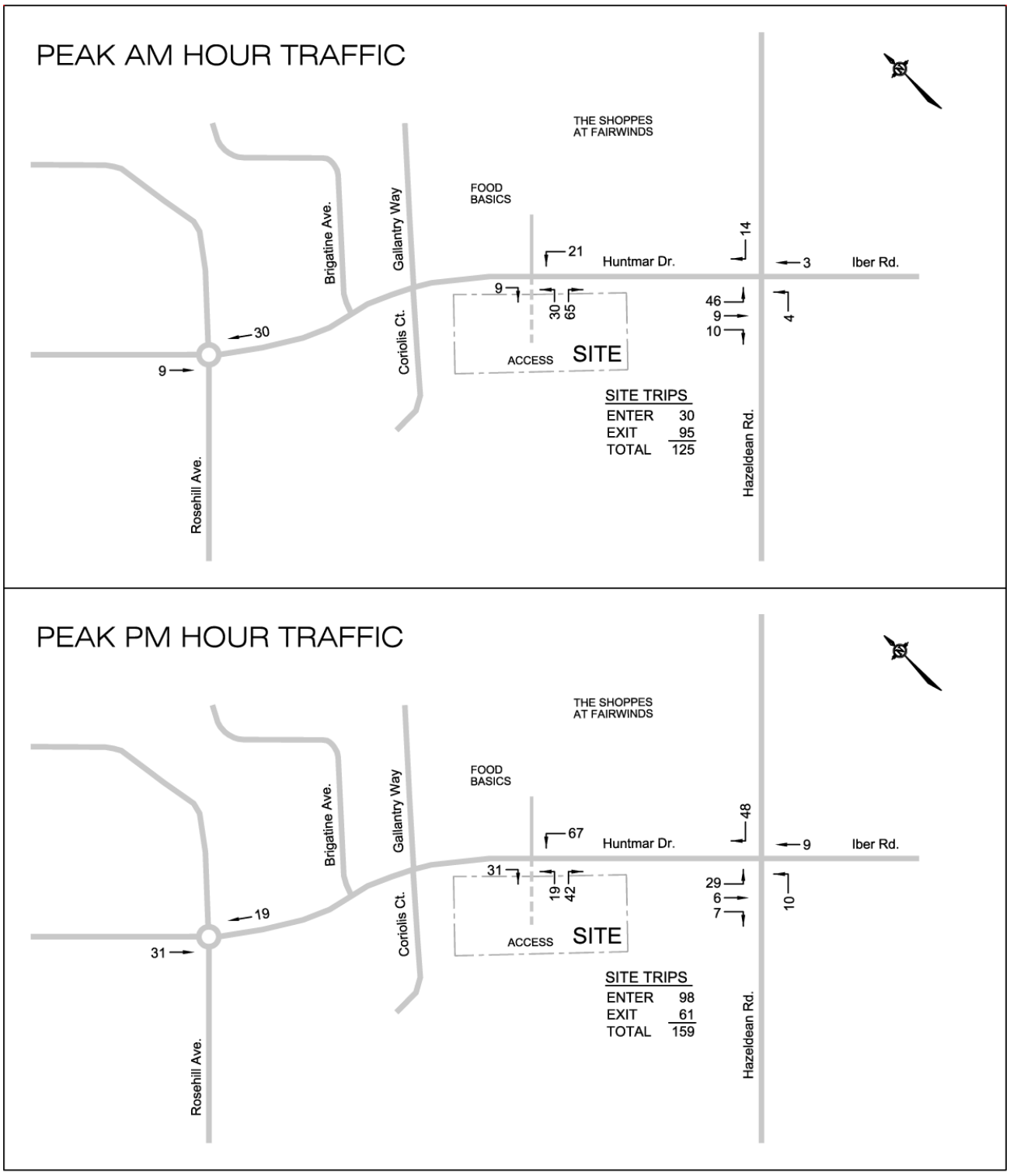
The City of Ottawa *Transportation Master Plan (TMP) 2013* was reviewed to identify transit and roadway projects in the vicinity of the development. The proposed changes to the transportation network are identified in this report under Element 2.1.3 - Planned Conditions. The N-S Arterial Road is a new road linking Palladium Drive to Fernbank Road. The road would have an impact on the network traffic, but it was not considered in the study as is would likely not be constructed by the horizon year of the study. The widening of Huntmar Drive to a four lane road between Campeau Drive and Maple Grove Road is proposed and would improve traffic flow along the north end of Huntmar Drive.

Element 3.2.2 – Background Growth

The 2011-2031 *TRANS Regional Model* was examined for traffic growth along Huntmar Drive and Hazeldean Road. The model showed a drop in peak AM hour traffic over the 20 year period which was attributed the assumption that the N-S Arterial Road would be constructed by 2031.

The growth in background traffic along Huntmar Drive and Hazeldean Road was determined by the examination of historical traffic counts obtained from the City of Ottawa at the Hazeldean/Huntmar intersection between the 2016 and 2019. The

FIGURE 3.1
PEAK AM AND PM HOUR SITE GENERATED TRIPS



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growth in background traffic also considered the growth assumed in traffic studies prepared for other developments in close proximity to the site.

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 the trip trend from the Kanata/Stittsville area has increased at an annual compounded rate of 2.08 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 2.0 percent which is consistent with traffic studies for other development in the area. The 2.0 percent annual increase would translate to the following growth factors which were applied to all approaches to the Hazeldean/Huntmar intersection, and through movements along Huntmar Drive:

Growth Factor at the Access/Huntmar and Rosehill/Huntmar Intersections

2016 → 2024 = 1.172 Completion
2016 → 2029 = 1.294 Completion + 5 Years

Growth Factor at the Hazeldean/Huntmar Intersection

2019 → 2024 = 1.104 Completion
2019 → 2029 = 1.219 Completion + 5 Years

Additional development of the Shoppes at Fairwinds which is not reflected in the 2016 traffic counts consists of "Building 1" which has not been constructed to date and would be located at the northeast corner of Huntmar Drive and the first right-in/right-out access, and "Building 2" which was constructed in 2018 as a fast-food restaurant (Benny & Co.) at the northwest corner of Hazeldean Road and N-S Arterial Road. The expected traffic from the two buildings on site was determined in the *Shoppes at Fairwinds, 5649 and 5705 Hazeldean Road TIS Addendum – 2*. The background traffic also includes the trips from additional development on the shopping centre site as documented in the *Community Retail Development, 5707 Hazeldean Road* TIA prepared by this firm.

Element 3.2.3 – Other Developments

Other development in the area which would contribute to the increase in background traffic is the following:

- The development of vacant land is proposed on the south side of Hazeldean Road at 5618 Hazeldean Road. The Kizell Development is a combination of residential and commercial-mix use with completion expected by 2028. The TIA study for the development has assigned site generated trips to/from the east along Hazeldean Road and has assumed the extension of Robert Grant Avenue and N-S Arterial Road by the horizon year of the study. A small volume of trips were assigned to/from the west along Hazeldean Road.

- A long term care facility and a retirement home has been recently constructed at 5731 Hazeldean Road west of the site. The type of use would generate a small volume of trips during the peak AM and PM hours, but were included as additional background traffic.
- Property at 5754 Hazeldean Road will comprise of retail/office/medical uses along with a pharmacy. The trips are assigned to/from the east along Hazeldean Road and to/from the north along Huntmar Drive past the site.
- The development at 590 Hazeldean Road is a residential development located east of Huntmar Drive. The expected site generated trips were added to the background traffic.
- A residential subdivision is proposed at 5 Orchard Road located at the southwest corner of Hazeldean Road and Fringewood Drive. Phase 1 occupancy is expected by 2022 and would comprise of 74 housing units.
- The Shenkman/Cavanaugh residential subdivision is located at 195 Huntmar Drive between Maple Grove Road and Palladium Drive. The development is approximately 1.5 km north of the Shoppes at Fairwinds shopping centre. Although a large residential development, the TIS for the project has assigned a small volume of trips south along Huntmar Drive past the site.

The growth in background traffic is the sum of the 2.0 percent annual average growth rate applied to all approaches of the Hazeldean/Huntmar intersection and through movements along Huntmar Drive, plus the additional traffic generated by proposed developments in close proximity to 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.

MODULE 3.3 - Demand Rationalization

Huntmar Drive was constructed in 2008 with the capacity to handle the anticipated future traffic. Hazeldean Road was widened in 2010 to a four lane divided roadway in the vicinity of the site in order to handle future development in the area. 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 construction of the N-S Arterial Road, which is assumed to be constructed by 2031 as documented in the TMP, would reduce the traffic along Huntmar Drive and Hazeldean Road which would increase the available capacity to the roads.

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

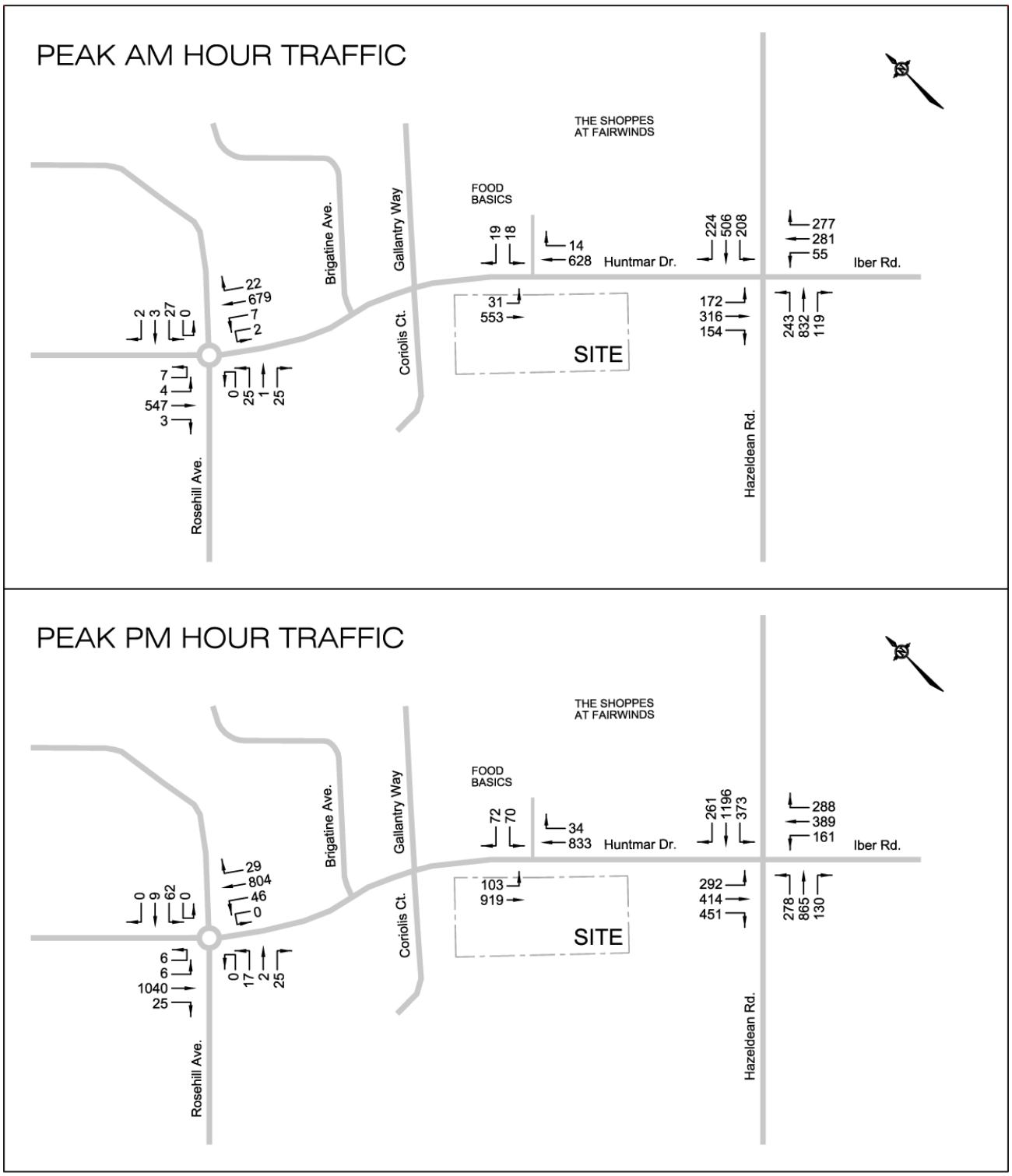


FIGURE 3.3
2029 PEAK AM AND PM HOUR BACKGROUND TRAFFIC

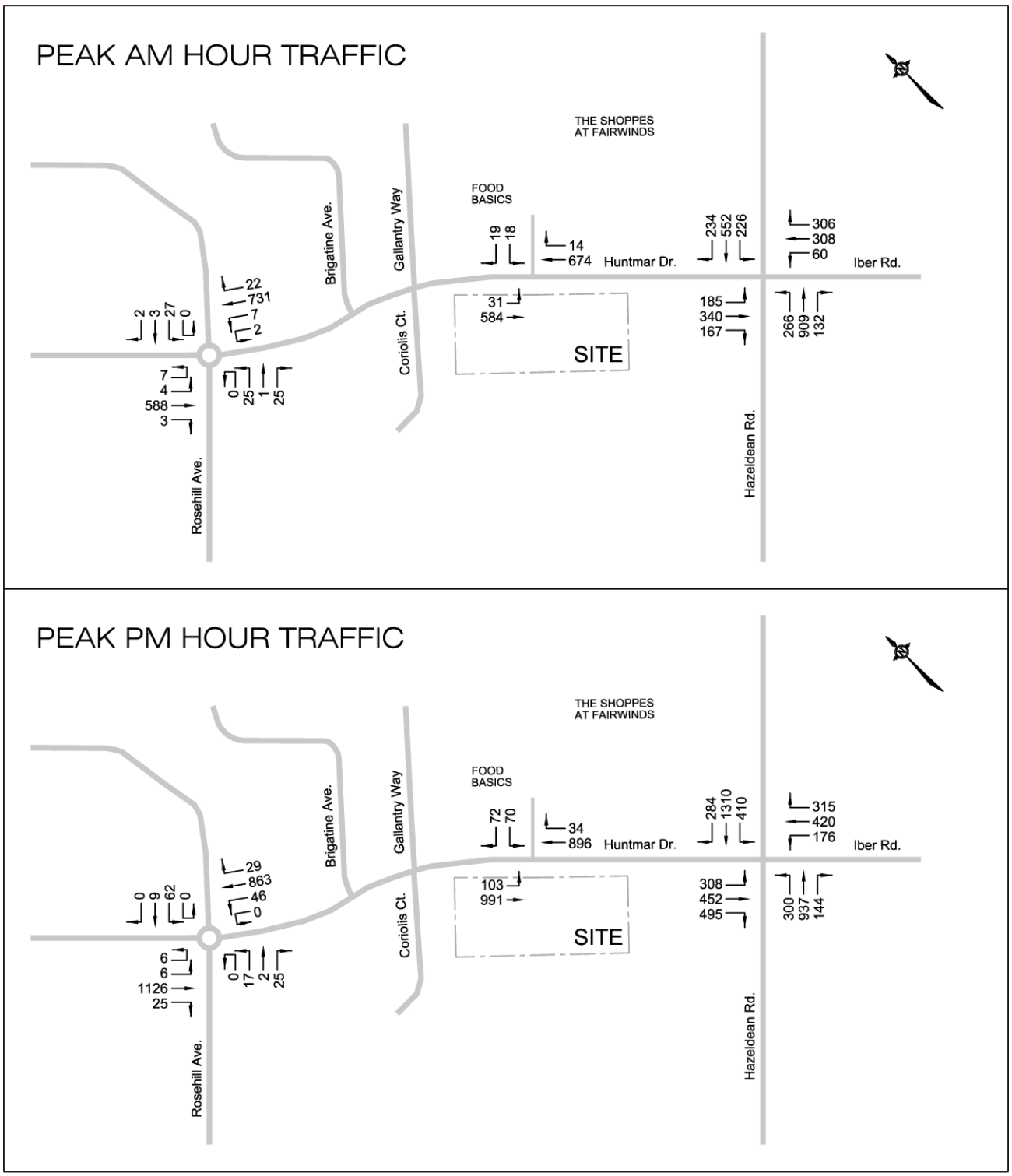
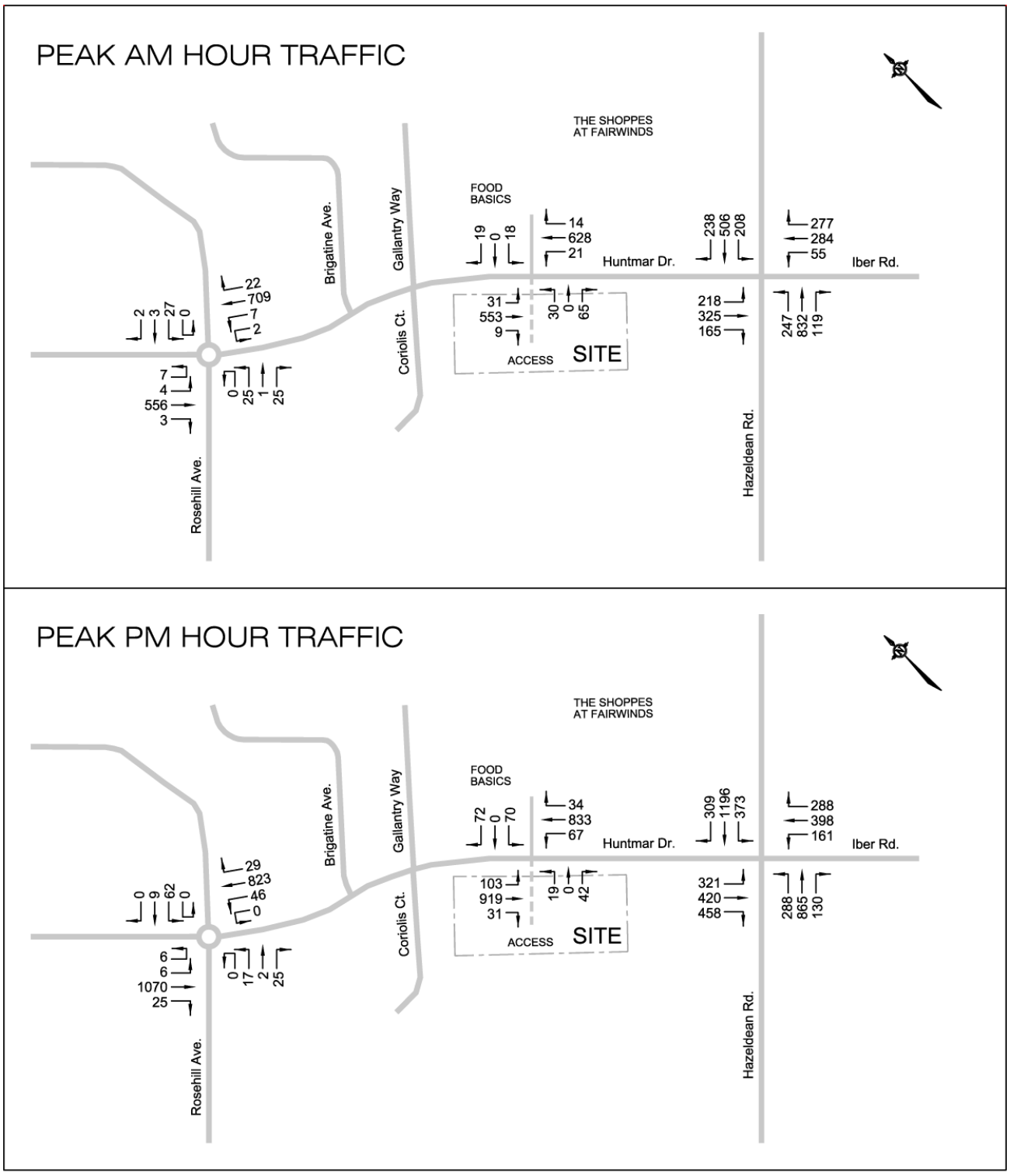
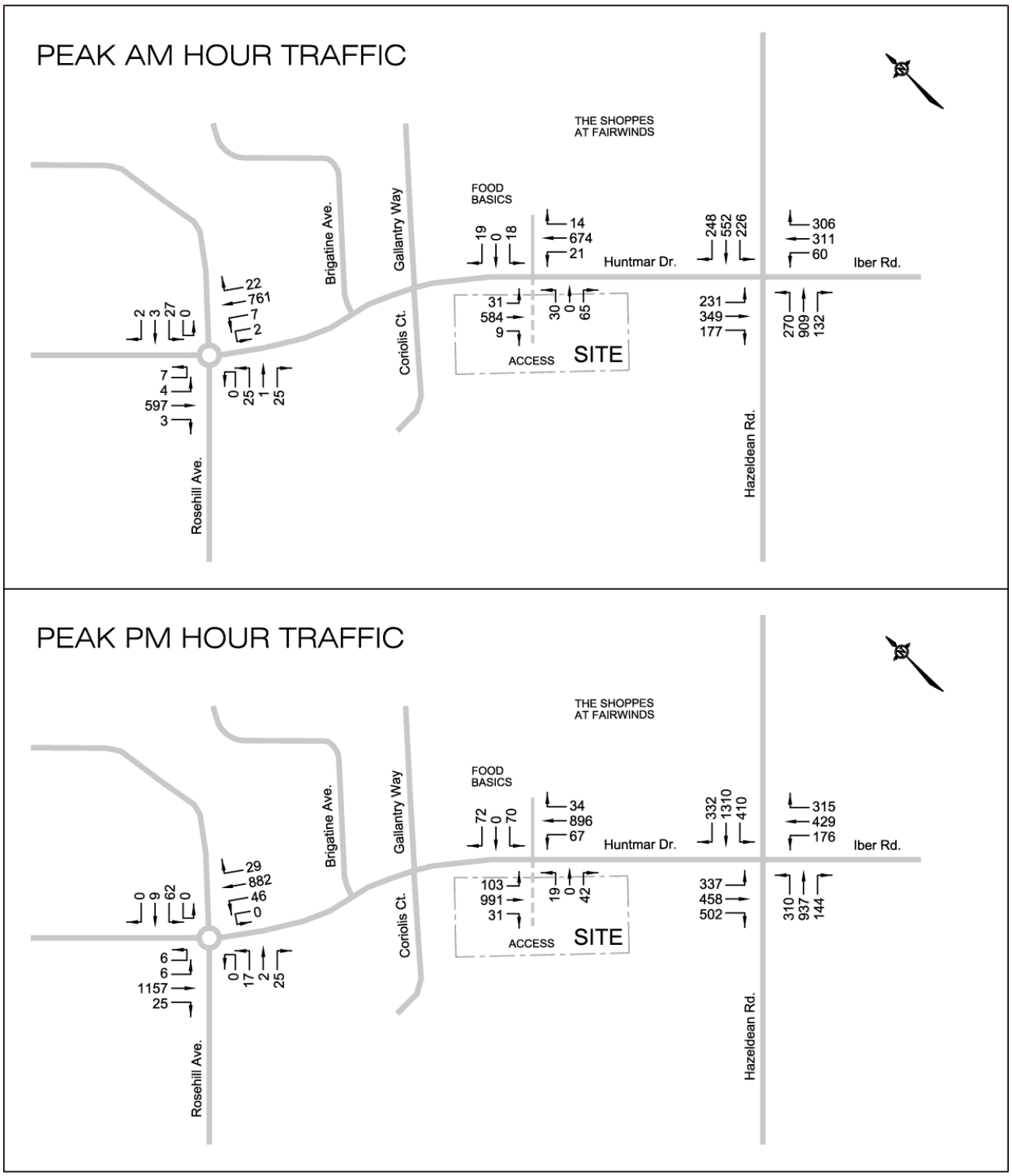


FIGURE 3.4
2024 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

FIGURE 3.5
2029 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

STEP 4 – ANALYSIS

MODULE 4.1 – Development Design

Element 4.1.1 – Design for Sustainable Modes

The apartment development will contain a total of 513 vehicle parking spaces which will consist of 28 surface spaces and 485 spaces in an underground parking garage. Of the total available spaces, 65 spaces will be designated for visitors.

The site will provide parking for bicycles on site for residents and visitors of the apartment building. The parking and storage of bicycles will be accommodated in a secured bike room in the parking garage, with bike racks provided in sheltered areas at the main entrance to each apartment building for visitors. A total of 209 bicycle parking spaces will be provided.

The internal pathway through the development will be extended to link with the City of Ottawa pathway west of the site (adjacent to Poole Creek).

The apartment development will be serviced by OC Transpo Rapid Route 61 which travels along Hazeldean Road and Rapid Route 62 which travels along Huntmar Drive. Weekday peak AM and PM hour Connexion Routes 261 and 263 provides service along Huntmar Drive Monday to Friday during peak periods. The transit routes provide far side bus stops at the intersection of Coriolis Court and Huntmar Drive which are located approximately 120 m north of the site. Pedestrian sidewalks are provided along both sides of Huntmar Drive with a street crossing at the proposed signalized intersection at the site Access which would provide a safe and direct walk from the apartment entrances to the bus stops. The location of the stops is shown in Figure 2.1.

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 is located adjacent to the street with surface parking at the rear
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☒ The entrances are located along the driveway entrance close 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 at a walk distance of approximately 120 m
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 along the driveway in close proximity 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)*	☒
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)*	☒ All walkways are wide with TWSI and depressed curbs allowing accessible movement through the site
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)*	☒ Both Huntmar Dr. and Hazeldean Rd. are designated as Spine Roads in the TMP, and both roads provides cycling lanes. A pathway is proposed linking the site's internal pathways to the municipal pathway west of the site (adjacent to Poole Creek)
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 a major collector 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	☒ Huntmar Dr. and Hazeldean Rd. have 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 bicycle parking spaces in the garage with bike racks at building entrances
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☒
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☒ The number of bike storage spaces meet City By-laws
	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)*	☐ Bike parking and storage will be provided in a secured room in the underground parking garage
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	☒ A drop off will be provided along the access at the entrance to each apartment building
	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 517 surface and garage parking spaces meeting the By-law requirements
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐ 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 access to Huntmar Drive by way of a proposed signalized intersection. The access will have a width of 9.0 m with two drop off areas for small service vehicles along each side of the access at the entrance to the buildings. A loading area for larger service or moving trucks is provided near the main entrance within the site.

A mini roundabout is proposed along the site access road at the entrances to the surface parking lots. The roundabout will improve the circulation of traffic within the parking lot and allow vehicles at the drop off to easily exit the site.

Garbage containers will be kept in an isolated area at the rear of the site near the ramp to the underground parking garage. The garbage trucks would empty the containers at the garbage area which would have sufficient width to drive in and turn around.

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 site will provide 28 surface parking spaces and 485 parking spaces in an underground parking garage for a total of 513 vehicular parking spaces. The City of Ottawa parking By-laws require the site to provide 482 parking spaces.

In addition to the required parking as determined from the City By-laws, parking demand was examined utilizing the parking documented in the Institute of Transportation Engineers (ITE) Parking Generation, 3rd Edition manual. The parking demand was determined for Land Use: 222 - High-Rise Apartment land use category. The calculation used an Average Peak Period Parking Demand of 1.37 vehicles per dwelling unit during a weekday in a non-urban location. For a 344 unit apartment development, the ITE Average Peak Period Parking Demand was 471 parking spaces. The parking demand calculation determined that the supply of parking spaces was similar to that of the City By-laws, and the number of spaces provided on the Site Plan would meet the average peak period parking demand.

Element 4.2.2 – Spillover Parking

Exempt as determined in the Scoping Document.

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 apartment complex would consist of Huntmar Drive which borders the east side of the site. Huntmar Drive in the vicinity of the site is designated as a major collector road with a posted speed limit of 60 km./h. past the site, which reduces to 50 km./h. approximately 50 m north of the site Access onto Huntmar Drive.

The multi-modal level of service for the Huntmar Drive street segment between Hazeldean Road and Rosehill Avenue 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 Huntmar Drive street segment.

PEDESTRIAN LEVEL OF SERVICE (PLOS)

There are sidewalks along both sides of Huntmar Drive with the exception of across the frontage of the site which will be completed as part of the development. The sidewalks are 2.0 m in width with a 2.0 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
Huntmar Drive	Hazeldean Road to Rosehill Avenue	E	Exhibit 4.1

BICYCLE LEVEL OF SERVICE (BLOS)

Huntmar Drive is a major collector road which is designated as a Spine Route in the TMP. The road has a posted speed limit of 60 km,/h. past the site, reducing to 50 km./h. at approximately the north property limit of the site. A cycling lane of 2.0 m width is provided along both sides of Huntmar Drive. Table 4.2 presents the level of service for the Huntmar Drive street segment with the analysis sheets provided in the Appendix. The

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

Street	Segment	Level of Service	Analysis
Huntmar Drive	Hazeldean Road to Rosehill Avenue	D	Exhibit 4.2

TRANSIT LEVEL OF SERVICE (TLOS)

OC Transpo provides service along Huntmar Drive past the site with bus stops located approximately 120 m north of the site at the Coriolis/Huntmar intersection. Connexion Routes 261 and 263 travel by the site with a destination of the Tunney's Pasture Transit Station to the east, and Rapid Route 62 to the Eagleson Park and Ride and Tunney's Pasture Transit Station. Table 4.3 presents the level of service along the Huntmar Drive street segment between Hazeldean Road and Rosehill Avenue. The analysis sheets are provided in the Appendix.

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

Street	Segment	Level of Service	Analysis
Huntmar Drive	Hazeldean Road to Rosehill Avenue	D	Exhibit 4.3

TRUCK LEVEL OF SERVICE (TkLOS)

The truck LOS was not determined as truck travel is prohibited along Huntmar Drive between Hazeldean Road and Maple Grove Road.

Traffic collisions along the Huntmar Drive street segment between Hazeldean Road and Maple Grove Road are shown in Table 2.1 in Element 2.1.2. Over the five year period between January 1, 2014 and December 31, 2018, 3 collisions were recorded along the Huntmar Drive road segment. The pattern of collisions did not identify any measures which could be taken to reduce the number of collisions.

The Huntmar Drive road segment was analyzed to determine the level of service which was compared to the MMLOS targets for pedestrians, bicycles, and transit. Truck travel is prohibited along Huntmar Drive between Hazeldean Road and Maple Grove Road, therefore the truck level of service for the road segment was not examined. The calculated Level of Service (LOS) as shown in Tables 4.1 to 4.3 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 4.4 summarizes the MMLOS results for the road segments and targets.

TABLE 4.4
MULTI-MODAL (MMLOS) SEGMENT SUMMARY TABLE - Street Segment

STREET SEGMENT	Level of Service (LOS) – 2029				
	Pedestrian	Bicycle	Transit	Auto	Truck
Calculated Huntmar Dr.	E	D	D	-	N/A
Target	C	C	D	-	N/A

Street Segment - Huntmar Drive between Hazeldean Road and Rosehill Avenue

The pedestrian LOS did not meet the target due to the speed and volume of traffic along Huntmar Drive. Lowering the posted speed limit and increasing the boulevard width would increase the PLOS to meet target.

The bicycle LOS target was not met because of the speed of traffic along Huntmar Drive. Lowering the posted speed limit along Huntmar Drive would allow the BLOS to meet target.

MODULE 4.4 – Access Intersection Design

Element 4.4.1 – Location and Design of Access

The Site will have one full movement access which will form the eastbound approach to the existing access to the Shoppes at Fairwinds shopping centre (Food Basics) and Huntmar Drive. The existing intersection is currently a “T” intersection controlled by a stop sign at the westbound Food Basics approach. Under a separate project, the intersection will be modified to a four approach intersection controlled by traffic signals. The intersection, which will be referred to as the Access/Huntmar intersection in this report, will have the following lane configuration:

Northbound Huntmar	One shared through/right lane
	One through lane
	One left turn lane
Southbound Huntmar	One left turn lane (40 m storage)
	One through lane
	One shared through/right lane
Eastbound Site Access	One shared left/through/right lane
Westbound Food Basics	One right turn lane
	One shared left/through lane

There is a private driveway on the east side of Huntmar Drive located 75 m north of the Access. The driveway would be used by delivery trucks servicing the retail stores of the Shoppes at Fairwinds shopping centre. The driveway is at the rear of the stores and would only be used by service vehicles.

South of the Access is a driveway on the west side of Huntmar Drive located 100 m from the Access, and a driveway on the east side located 120 m from the Access. Both driveways would be restricted to right-in/right-out turning movements which would be controlled by the center median along Huntmar Drive.

Element 4.4.2 – Intersection Control

The site Access will form the eastbound approach to the existing intersection to Food Basics at the Shoppes at Fairwinds shopping centre and Huntmar Drive. The intersection is currently controlled by a stop sign at the westbound Food Basics approach. Traffic counts which were obtained from the City of Ottawa and taken on Thursday February 4, 2016 and Saturday February 6, 2016 determined that the peak hour of the traffic entering and exiting the Food Basics westbound approach occurred on a Saturday. The peak hour of traffic at the proposed eastbound approach of the residential development would peak during the weekday hours along with the background traffic along Huntmar Drive. For this reason, the TIA has established the time period for analysis as the weekday peak AM and PM hours for the 21 Huntmar Drive residential development.

A Roadway Modification Approval (RMA) report dated May 1, 2013 was prepared for the expected roadway modifications at the intersection of the site Access. The report assumed a commercial/retail development at the 21 Huntmar Drive property and proposed the installation of traffic signals and an exclusive northbound left turn lane along Huntmar Drive. The RMA report was approved by the City under delegated authority. Exhibit 4.4 provides the RMA report.

The Transportation Impact Study, Addendum - 2 dated March 7, 2016 was prepared by this firm for the Shoppes at Fairwinds at 5649 and 5705 Hazeldean Road. The TIS examined the operation of the Food Basics/Huntmar intersection using the 8-hour counts taken on Saturday February 6, 2016 and the existing “T” lane configuration. The traffic signal warrant analysis determined that the intersection met 86 percent of the warrants for the Saturday 2016 counts. The findings of the intersection analysis lead North American Corporation to propose the installation of traffic control signals and roadway modifications to the median which would support the intended commercial/retail development at 21 Huntmar Drive.

A traffic signal warrant analysis was completed for the intersection of the Access (Food Basics) and Huntmar Drive using the weekday traffic for the 21 Huntmar Drive development. The analysis assumed the expected traffic and intersection geometry at the year 2029. The warrant analysis determined that the intersection met 49 percent of the warrants due to the volume of traffic at the eastbound and westbound approaches (minor road). The 2029 traffic signal warrant analysis is provided as Exhibit 4.5. It is likely that following the development of the site and conducting an 8-hour Saturday traffic signal warrant analysis, the intersection may achieve the warrants for the installation of traffic signals. The intersection analysis has therefore assumed traffic signals and an exclusive northbound left turn lane as proposed in the RMA report to be constructed as part of the 21 Huntmar Drive development.

Element 4.4.3 – Intersection Design

The analysis of the Access/Huntmar, Hazeldean/Huntmar and Rosehill/Huntmar intersections were completed for all modes using the *Multi-Modal Level of Service (MMLOS) Guidelines* and the *Highway Capacity Manual (HCM) 2010* except for the Truck LOS as Huntmar Drive prohibits truck travel in the vicinity of the site. Each mode will be addressed in the following sections:

VEHICLE LEVEL OF SERVICE (LOS) – Intersection Capacity Analysis

The analysis of the intersections will use the *Highway Capacity Software, Version 7.8.5,* which uses the capacity analysis procedure as documented in the *Highway Capacity Manual (HCM) 2010 and HCM 6th Edition*.

For unsignalized intersections and roundabouts, 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

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 Huntmar Drive Intersection

The intersection of the site Access and Hazeldean Road was analyzed as a traffic signal controlled intersection with an exclusive northbound Huntmar Drive left turn lane.

The intersection will have the following lane configuration which was discussed in more detail in Element 4.4.1:

Northbound Huntmar	One shared through/right lane
	One through lane
	One left turn lane
Southbound Huntmar	One left turn lane (40 m storage)
	One through lane
	One shared through/right lane
Eastbound Site Access	One shared left/through/right lane
Westbound Food Basics	One right turn lane
	One shared left/through lane

The intersection was analyzed as a signalized intersection with a signal cycle of 100 seconds and a protected northbound and southbound left turn phase for the exclusive northbound and southbound left turn movements.

The analysis was performed for the expected traffic during the weekday peak AM and PM hours at the completion of the development in 2024. The analysis determined that all lane movements functioned at a Level of Service (LOS) "A" during the peak AM and PM hours. Table 4.5 summarizes the peak AM and PM hour operation of the intersection with the analysis sheets provided in the Appendix as Exhibit 4.6 and 4.7.

TABLE 4.5
ACCESS/HUNTMAR INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR *2024 Total* (2029 Total)		WEEKDAY PEAK PM HOUR *2024 Total* (2029 Total)	
	LOS	v/c Ratio	LOS	v/c Ratio
EB Lt/Through/Rt	*A* (A)	*0.383* (0.383)	*A* (A)	*0.244* (0.244)
WB Left/Through	*A* (A)	*0.075* (0.075)	*A* (A)	*0.279* (0.279)
WB Right	*A* (A)	*0.093* (0.093)	*A* (A)	*0.353* (0.353)
NB Left	*A* (A)	*0.027* (0.027)	*A* (A)	*0.109* (0.114)
NB Through	*A* (A)	*0.358* (0.384)	*A* (A)	*0.486* (0.521)
NB Right	*A* (A)	*0.359* (0.384)	*A* (A)	*0.486* (0.521)
SB Left	*A* (A)	*0.045* (0.047)	*A* (A)	*0.173* (0.180)
SB Through	*A* (A)	*0.313* (0.331)	*A* (A)	*0.532* (0.572)
SB Right	*A* (A)	*0.314* (0.331)	*A* (A)	*0.532* (0.572)
Total	*A* (A)	*0.242* (0.257)	*A* (A)	*0.399* (0.427)

For the expected traffic at the year 2029 which represents five years beyond completion of the project, all approach movements would continue to function at a LOS “A” during the peak AM and PM hours. The analysis sheets are provided as Exhibits 4.8 and 4.9, with a summary of the operation of the intersection shown in Table 4.5.

A left turn lane storage analysis determined the northbound Huntmar Drive left turn movement would require 26 m of vehicular storage for the 2029 peak PM hour. The proposed road geometry will provide a minimum of 40 m of storage.

The eastbound site exit movement would comprise of one lane providing left/through/right lane movements. The lane should provide 26 m of vehicular storage, with the Site Plan providing a clear throat distance of 28 m. The TAC document, *Geometric Design Guide for Canadian Roads*, suggests a 25 m clear throat distance onto a collector road.

The Access/Huntmar intersection would function at an acceptable level of service with the intersection modifications proposed in the 2013 RMA report which will be completed under a separate project.

Hazeldean Road and Huntmar Drive Intersection

The intersection of Hazeldean Road and Huntmar Drive was reconstructed in 2010 from a two lane road to a four lane road under the Hazeldean Road Widening project. Traffic counts taken on July 3, 2019 were obtained from the City of Ottawa along with a traffic signal timing plan. The operational analysis was conducted for the 2019 peak AM hour which determined that all lane movements functioned at an acceptable level of service as shown in Table 4.6. During the peak PM hour, all lane movements functioned at an acceptable level of service with the exception of the westbound Hazeldean Road through movement which functioned at a LOS “F”. The analysis sheets are provided as Exhibit 4.10 for the peak AM hour and 4.11 for the peak PM hour.

The intersection was examined for the expected 2024 background traffic (not including expected site generated trips) and using the existing lane configuration and traffic signal timing plan. The analysis determined that all lane movements functioned at an acceptable level of service during the peak AM hour as shown in Table 4.6. During the 2024 peak PM hour background traffic, the lane movements which were below acceptable were the southbound left (LOS “F”), westbound through (LOS “F”), and eastbound through and right turn movements (LOS “E”). The lower level of service for the 2024 background traffic was due to the increasing traffic from proposed development which would not include the site generated trips. The analysis sheets are provided as Exhibit 4.12 for the peak AM hour and Exhibit 4.13 for the peak PM hour.

The 2029 background traffic was analyzed with the operation of the intersection summarized in Table 4.6 and the analysis work sheet provided as Exhibit 4.14 for the peak AM hour and Exhibit 4.15 for the peak PM hour.

The analysis for the 2024 total traffic including the trips from the 21 Huntmar Drive residential apartments determined that the intersection operated at the same peak AM and PM hour level of service as the 2024 background traffic, with a small reduction in the v/c ratio. Table 4.6 summarized the operation of the intersection with Exhibits 4.16 and 4.17 providing the analysis sheets.

TABLE 4.6
HAZELDEAN/HUNTMAR INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR 2019 Existing **2024 Background** *2024 Total* ***2029 Background*** (2029 Total)		WEEKDAY PEAK PM HOUR 2019 Existing **2024 Background** *2024 Total* ***2029 Background*** (2029 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left	A **A** *A* ***A*** (A)	0.163 **0.215** *0.219* ***0.244*** (0.248)	A **A** *A* ***A*** (A)	0.286 **0.401** *0.416* ***0.433*** (0.447)
EB Through	A **B** *B* ***C*** (C)	0.563 **0.690** *0.690* ***0.756*** (0.756)	C **E** *E* ***F*** (F)	0.739 **0.979** *0.979* ***1.063*** (1.063)
EB Right	A **B** *B* ***C*** (C)	0.563 **0.691** *0.691* ***0.757*** (0.757)	C **E** *E* ***F*** (F)	0.741 **0.979** *0.979* ***1.065*** (1.065)
WB Left	A **A** *A* ***A*** (A)	0.230 **0.340** *0.340* ***0.396*** (0.396)	A **A** *A* ***A*** (A)	0.408 **0.549** *0.549* ***0.604*** (0.604)
WB Through	A **A** *A* ***B*** (B)	0.470 **0.601** *0.601* ***0.656*** (0.656)	F **F** *F* ***F*** (F)	1.000 **1.214** *1.214* ***1.330*** (1.330)
NB Left	A **A** *A* ***A*** (A)	0.096 **0.135** *0.138* ***0.155*** (0.158)	A **A** *A* ***A*** (B)	0.347 **0.497** *0.504* ***0.595*** (0.604)
NB Through	A **A** *A* ***B*** (B)	0.476 **0.572** *0.578* ***0.627*** (0.633)	A **C** *C* ***D*** (D)	0.542 **0.780** *0.799* ***0.843*** (0.861)
NB Right	A **A** *A* ***A*** (A)	0.341 **0.358** *0.358* ***0.428*** (0.428)	A **A** *A* ***A*** (A)	0.281 **0.356** *0.356* ***0.420*** (0.420)
SB Left	A **A** *A* ***A*** (B)	0.291 **0.475** *0.605* ***0.540*** (0.679)	A **F** *F* ***F*** (F)	0.376 **1.041** *1.171* ***1.191*** (1.335)
SB Through	A **B** *B* ***B*** (C)	0.429 **0.643** *0.661* ***0.692*** (0.710)	B **D** *D* ***E*** (E)	0.666 **0.831** *0.843* ***0.907*** (0.919)
Total	A **A** *A* ***A*** (A)	0.354 **0.470** *0.481* ***0.526*** (0.534)	A **C** *C* ***D*** (D)	0.575 **0.788** *0.799* ***0.868*** (0.879)

The examination of the 2029 total traffic which includes the site trips determined that the intersection operated at an acceptable level of service during the peak AM hour. During the peak PM hour the southbound left turn movement functioned at a LOS “F”, southbound through at a LOS “E”, westbound through at a LOS “F”, eastbound through at a LOS “F” and eastbound right at a LOS “F”. Table 4.6 summarized the operation of the intersection with the analysis sheets provided as Exhibit 4.18 for the peak AM hour and 4.19 for the peak PM hour.

A comparison between the 2024 background and 2024 total traffic showed that the addition of the site generated trips would have a minor impact on the operation of the intersection resulting in a decrease in the traffic volume to capacity of the intersection. The low level of service would be attributed to proposed development which is not related to that of the proposed apartment development at 21 Huntmar Drive.

The City of Ottawa Transportation Master Plan has identified a corridor for the construction of a new N-S Arterial Road. The roadway would be located adjacent to the east limit of the Shoppes at Fairwinds site and under Phase 2 (2020-2025) in the TMP. The road would be constructed from Palladium Drive to Abbott Street E connecting to Robert Grant Avenue. The N-S Arterial Road would provide service for the existing and future development south of Hazeldean Road, and would improve the level of service of the intersection.

Rosehill Avenue and Huntmar Drive Intersection

Huntmar Drive was constructed in 2008 as a major collector road. Huntmar Drive has a four lane divided cross section between Hazeldean Road and Gallantry Way, and a two lane divided cross section between Gallantry Way and Maple Grove Road. Trucks are prohibited along Huntmar Drive between Hazeldean Road and Maple Grove Road.

The intersection of Rosehill Avenue and Huntmar Drive is controlled by a single lane roundabout. Traffic counts taken on December 6, 2016 were obtained from the City of Ottawa. The 2016 operational analysis determined that the intersection would operate at an acceptable level of service during both the peak AM and PM hours. Table 4.7 summarized the operation of the intersection with the analysis sheets provided as Exhibit 4.20 for the peak AM hour and Exhibit 4.21 the peak PM hour.

TABLE 4.7
ROSEHILL/HUNTMAR INTERSECTION – LOS & Approach Delay

INTERSECTION APPROACH	**WEEKDAY PEAK AM HOUR** 2016 Existing **2024 Background** *2024 Total* ***2029 Background*** (2029 Total)		**WEEKDAY PEAK PM HOUR** 2016 Existing **2024 Background** *2024 Total* ***2029 Background*** (2029 Total)	
	LOS	**Delay (sec.)**	**LOS**	**Delay (sec.)**
EB Right	A **A** *A* ***A*** (A)	4.5 **5.8** *5.9* ***6.1*** (6.2)	A **B** *B* ***B*** (B)	7.2 **10.9** *11.3* ***12.1*** (12.6)
WB Right	A **A** *A* ***A*** (A)	4.8 **6.5** *6.7* ***6.9*** (7.1)	A **A** *A* ***A*** (A)	6.0 **8.9** *9.1* ***9.6*** (9.8)
NB Right	A **A** *B* ***B*** (B)	6.3 **9.5** *10.1* ***10.5*** (11.1)	A **B** *B* ***C*** (C)	7.4 **13.2** *13.7* ***15.1*** (15.9)
SB Right	A **A** *A* ***A*** (A)	5.3 **7.5** *7.6* ***8.0*** (8.1)	B **E** *E* ***F*** (F)	12.1 **39.1** *45.5* ***59.6*** (68.7)
Total Intersection	A **A** *A* ***A*** (A)	5.8 **8.5** *8.8* ***9.2*** (9.6)	A **D** *D* ***E*** (E)	9.8 **26.5** *30.1* ***38.2*** (43.5)

At the year 2024 using the background traffic (not including site generated trips), the intersection operated at an acceptable level of service during the peak AM hour as shown in Table 4.7. During the peak PM hour which includes future development, all approaches would function at an acceptable level of service with the exception of the southbound approach which would function at a LOS “E”. Exhibit 4.22 and 4.23 show the analysis of the intersection operation during the peak AM and PM hours.

The year 2029 background traffic analysis is provided in Table 4.7 and in the Appendix as Exhibit 4.24 for the peak AM hour and Exhibit 4.25 for the peak PM hour. During the peak PM hour the southbound approach was determined to function at a LOS “F”.

Following the development of the site, the 2024 analysis including site trips determined that the intersection would operate at the same level of service as the 2024 background analysis. With no change in level of service, the 21 Huntmar Drive residential development was determined to result in a minor impact on the operation of the intersection. Table 4.7 summarizes the operation of the intersection with the analysis sheets for the peak AM and PM hours provided as Exhibits 4.26 and Exhibit 4.27.

At the year 2029 which represents five years beyond the completion of the development, the intersection would operate at an acceptable level of service during the peak AM hour as shown in Table 4.7. During the peak PM hour all approaches would function at an acceptable level of service with the exception of the southbound approach which would function at a LOS “F”. The analysis sheets are provided in the Appendix as Exhibit 4.24 for the peak AM hour Exhibit 4.29 for the peak PM hour.

The low level of service of the southbound approach during the peak PM hour is attributed to the increasing background traffic. The construction of the N-S Arterial Road would reduce the traffic and improve the level of service along Huntmar Drive, shifting the background traffic from a collector road to an arterial road.

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*. The multi-modal level of service for intersections was examined for the signalized Hazeldean/Huntmar intersection, and for the Access/Huntmar intersection which will have traffic signals installed by the completion of the development in 2024.

There are sidewalks with boulevards along both sides of Huntmar Drive and Hazeldean Road, with the exception of across the frontage of the site which will be constructed as part of the proposed development. Both the Access/Huntmar and Hazeldean/Huntmar intersections provide pedestrian crosswalks at all intersection approaches. Table 4.8 presents the level of service for the two existing intersections, with the analysis sheets provided in the Appendix.

TABLE 4.8
PEDESTRIAN LEVEL OF SERVICE (PLOS) – Intersection

Intersection	Level of Service	Analysis
Access and Huntmar Drive	D	Exhibit 4.30
Hazeldean Road and Huntmar Drive	F	Exhibit 4.31

BICYCLE LEVEL OF SERVICE (BLOS)

The bicycle level of service (BLOS) was determined for the two signalized intersections. There are dedicated cycling lanes along Hazeldean Road and Huntmar Drive with both roads identified as Spine Routes in the City of Ottawa TMP. Table 4.9 presents the level of service for the intersections with the analysis sheets provided in the Appendix.

TABLE 4.9
BICYCLE LEVEL OF SERVICE (BLOS) – Intersection

Intersection	Level of Service	Analysis
Access and Huntmar Drive	E	Exhibit 4.32
Hazeldean Road and Huntmar Drive	F	Exhibit 4.33

TRANSIT LEVEL OF SERVICE (TLOS)

OC Transpo provides transit service along Huntmar Drive with Connexion Routes 261 and 263 which travel past the site with destinations at Tunney's Pasture Transit Station. Bus stops are located at a 120 m walk to the Coriolis/Huntmar intersection. Rapid Route 62 travels along Huntmar Drive past the site and Rapid Route 61 travels along Hazeldean Road with bus stops at the Hazeldean/Huntmar intersection. Hazeldean Road between Eagleson Road and Stittsville Main Street is identified in the TMP as a Transit Priority Corridor (isolated measures). Table 4.10 presents the level of service at the intersections which was determined from the evaluation tables provided in the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. The analysis sheets are provided in the Appendix.

TABLE 4.10
TRANSIT LEVEL OF SERVICE (TLOS) – Intersection

Intersection	Level of Service	Analysis
Access and Huntmar Drive	C	Exhibit 4.34
Hazeldean Road and Huntmar Drive	E	Exhibit 4.35

MODULE 4.5 – Transportation Demand Management

Element 4.5.1 – Context for TDM

The site is located along a major collector road in close proximity to a four lane divided arterial road. Land uses in close proximity to the site would be commercial/retail across Huntmar Drive from the site and along Hazeldean road south of the site. North of the site the land use is predominately residential.

The TIA study has determined the mode share of site trips based on the 2011 Trans-OD Survey report for the Kanata-Stittsville area, and compared the mode share to other similar studies in the area. With the operational analysis of the adjacent intersections determining that the level of service remained the same when comparing the 2024 background traffic to that of the 2024 total traffic (including site trips), a slightly higher than expected number of site trips would result in a minor impact on the adjacent roads and would not trigger the need for additional TDM measures to be implemented.

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	☐
	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)	☒ Senior routes are provided along Hazeldean Road by Route 301 and Route 303 to shopping areas
	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)*	☒ Will consider
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

The site is well served by OC Transpo bus routes. With the number of expected transit person trips to be low, it would be doubtful if the number of site generated transit trips would determine the need to provide additional capacity to the existing transit routes.

Element 4.7.2 – Transit Priority

Transit priority measures are already in place along Hazeldean Road. The transit priority measures would reduce transit travel time and increases reliability along Hazeldean Road. Huntmar Drive is a major collector road through a predominantly residential area and would not require transit priority measures.

The intersection of the site access and Huntmar Drive is proposed to be controlled by traffic signals. The intersection is a minor intersection resulting in a minor delay and impact on transit along Huntmar Drive.

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 will comprise of the Access/Huntmar, Hazeldean/Huntmar and Rosehill/Huntmar intersections. A traffic signal warrant

analysis was performed for the Access/Hazeldean intersection using weekday traffic counts. The analysis (Exhibit 4.5) determined that the intersection did not meet the weekday warrants, but previous studies determined that the intersection was close to meeting the Saturday warrants using the February 6, 2016 traffic counts. For this reason, a RMA report was prepared and approved for the installation of traffic signals along with a northbound Huntmar Drive exclusive left turn lane. The intersection modifications will be completed prior to the completion of the apartment development and were assumed for the analysis of the intersection.

The intersection of Hazeldean Road and Huntmar Drive already has traffic signals.

The intersection of Rosehill Avenue and Huntmar Drive is currently controlled by a single lane roundabout.

Element 4.9.2 – Intersection Design

The intersections examined within the study area would comprise of the site access onto Huntmar Drive which consists of the proposed eastbound approach to the existing Food Basics/Huntmar intersection, and the Hazeldean/Huntmar and Rosehill/Huntmar intersections. 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 4.11 for the expected 2029 traffic at the two signalized intersections. The operation of the Rosehill/Huntmar roundabout intersection was discussed in detail in Element 4.4.3 and will be addressed below with the signalized intersections. The capacity analysis has followed the procedure documented in the HCM.

The calculated Level of Service (LOS) as shown in Tables 4.8 to 4.10 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 4.11 summarizes the MMLOS results for the three intersections and targets.

TABLE 4.11
MULTI-MODAL (MMLOS) INTERSECTION SUMMARY TABLE - Intersection

INTERSECTION	Level of Service (LOS) – 2029			
	Pedestrian	Bicycle	Transit	Auto
CALCULATED				
Access/Huntmar	D	E	C	A
Hazeldean/Huntmar	F	F	E	D
TARGET	C	C	D	D

The following section discusses the calculated 2029 operation of the intersections and the factors for why they have not met targets for all modes.

Access/Huntmar Intersection

The site access will form the new eastbound approach to the existing access to Food Basics. The analysis was completed assuming that the intersection would be controlled by traffic signals, and have an exclusive northbound Huntmar Drive left turn lane.

Auto LOS - Utilizing the expected 2029 traffic, all approaches functioned at an acceptable level of service (LOS). No roadway or intersection modifications are recommended beyond that proposed in the previously approved RMA.

Pedestrian PLOS - The PLOS did not meet target due to the number of lanes crossed.

Bicycle BLOS - 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 Huntmar Drive. A reduction in the posted speed (operating speed) would improve the PLOS.

Transit TLOS - The intersection met the TLOS target.

Hazeldean/Huntmar Intersection

Auto LOS - During the 2029 peak AM hour, the level of service was acceptable at all intersection approach movements. During the peak PM hour, the eastbound through and right movements, westbound through movement, and southbound left and through movements did not achieve an acceptable level of service. This was due to the growing background traffic. The construction of the N-S Arterial Road would decrease the traffic along Huntmar Drive (major collector road) and traffic along Hazeldean Road.

Pedestrian PLOS - The PLOS did not meet target due to the number of lanes crossed by pedestrians, and the crossing delay due to the crossing distance and signal cycle.

Bicycle BLOS - 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.

Transit TLOS - The TLOS was not met due to the length of the traffic signal cycle.

Rosehill/Huntmar Intersection

Auto LOS - The intersection of Rosehill Avenue and Huntmar Drive is a single lane roundabout. An operational analysis determined that for the 2029 peak AM hour traffic, the southbound, eastbound and westbound approaches functioned at a LOS ”A” and northbound approach at a LOS “B”. During the 2029 peak PM hour the northbound approach functioned at a LOS “C”, southbound at a LOS “F”, eastbound at a LOS “B” and westbound at a LOS “A”. The low LOS at the southbound approach is attributed to

the growing background traffic from development in the Kanata-Stittsville area. The level of service would be improved by the construction of the N-S Arterial Road.

SUMMARY

A Site Plan has been prepared for the development of a 15,616.6 m^2 parcel of land at 21 Huntmar Drive in the community of Kanata. The site is located approximately 210 m north of the intersection of Huntmar Drive and Hazeldean Road. The Site Plan proposes the land to be developed as a residential use.

The site proposal would contain two free-standing apartment buildings which would provide 344 rental apartments. Both buildings will be 6 storeys in height and would contain both surface parking and an underground parking garage. The site would have one access onto Huntmar Drive which will form the eastbound approach to the existing intersection which provides access to Food Basics and other retail. The development is expected to be completed and occupied by the year 2024.

The Transportation Impact Assessment report has established a study area which includes the site access onto Huntmar Drive, and the intersections of Hazeldean/Huntmar and Rosehill/Huntmar. 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 Huntmar Drive segment and the intersections within the study area. The transportation analysis has determined the following:

1. The proposed residential development would consist of two buildings which provide 344 rental apartments. The total development is expected to generate 30 vehicle trips arriving and 95 vehicle trips departing during the weekday peak AM hour, and 98 vehicle trips arriving and 61 vehicle trips departing during the weekday peak PM hour.

2. The development would provide 28 surface parking spaces and 485 spaces in an underground parking garage for a total of 513 parking spaces. The number of parking spaced provided meets City of Ottawa By-laws.

3. The Site Plan provides bicycle racks in a secured bike room in the underground parking garage. Bike racks will also be provided at the entrance to each building for use by visitors. The site will provide racks for the storage of 209 bicycles which meets City of Ottawa By-laws.

4. The site will have one access point onto Huntmar Drive. The access will form the eastbound approach to the existing intersection providing access to Food Basics. The intersection is currently a “T” intersection with Huntmar Drive forming the northbound and southbound approaches, and Food Basics access the westbound approach. The intersection is controlled by a stop sign at the Food Basics approach. With the increasing background traffic due to development in the area both residential and retail, the owners of the Shoppes at Fairwinds have

proposed to install traffic signals at the intersection of Food Basics and Huntmar Drive to accommodate the Saturday traffic, plus a northbound Huntmar Drive left turn lane to provide access to future development on the west side of Huntmar Drive. A Road Modification Approval (RMA) report has been prepared in 2013 for the work, and has received City of Ottawa approval under delegated authority for the works (Exhibit 4.4). Figure 4.1 shows a plan of the roadway modifications which includes the installation of traffic signals and the construction of a northbound left turn lane which would require the center median along Huntmar Drive to be reconstructed as a 1.5 m concrete median between the Access intersection and the Hazeldean/Huntmar intersection.

5. The MMLOS analysis of the Huntmar Drive street segment between Hazeldean Road and Rosehill Avenue 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 Huntmar Drive. The site would have a minor impact on the level of service of the road segment.

6. The analysis of the site Access (Food Basics) and Huntmar Drive intersection determined that the PLOS and BLOS targets were not met due to the number of roadway lanes, distance travelled by pedestrians crossing the road, the number of lanes crossed by cyclists making left turns, and speed of traffic. The Auto LOS was determined to be acceptable for the peak AM and PM hour traffic at 2029.

   The PLOS and BLOS did not meet target at the Hazeldean/Huntmar intersection due to the number of roadway lanes, distance travelled by pedestrians crossing the road, and number of lanes crossed by cyclists making left turns, and speed of traffic. The TLOS did not meet the transit target due to the traffic signal cycle delay. The 2029 Auto LOS was acceptable during the peak AM hour, but was low during the peak PM hour at the southbound, eastbound and westbound approaches. Construction of the N-S Arterial Road would improve the peak hour operation of the intersection.

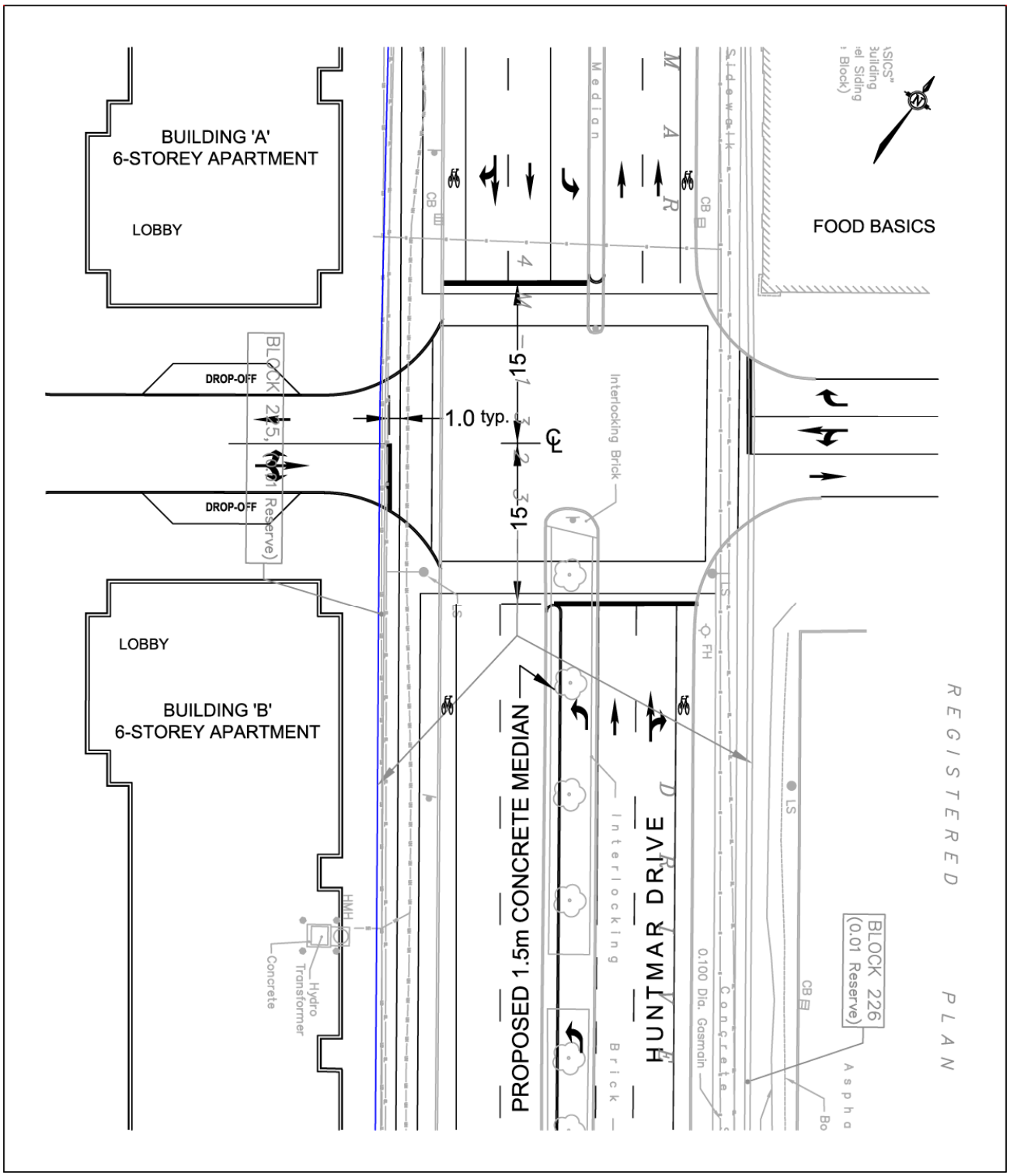
   The 2029 Auto LOS at the Rosehill/Huntmar intersection determined that the intersection functioned at an acceptable level of service during the peak AM hour, but during the peak PM hour the southbound approach functioned at a low level of service due to increasing background traffic. The construction of the N-S Arterial Road would reduce traffic and increase the level of service.

Prepared by:

David J. Halpenny

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

FIGURE 4.1
ROADWAY MODIFICATIONS COMPLETED UNDER THE RMA



NOT TO SCALE

APPENDIX

SCREENING FORM

TRAFFIC COUNTS

TRAFFIC SIGNAL TIMING PLAN

OC TRANSPO BUS ROUTE MAPS

TRAFFIC SIGNAL WARRANT ANALYSIS

2013 RMA REPORT

MMLOS ROAD SEGMENT AND INTERSECTION ANALYSIS

EXHIBIT 1.1
SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	**21 Huntmar Drive, Ottawa**
Description of Location	Residential Development
Land Use Classification	"AM7[1444]" Zoning – Arterial Mainstreet
Development Size (units)	344 rental apartment units
Development Size (m^2)	15,616.8 m^2 Lot Area
Number of Accesses and Locations	1 access onto Huntmar Drive
Phase of Development	One Phase of development - Two 6-storey buildings
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	332 units

	Yes	No
344 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.

. 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
2016 PEAK AM HOUR TRAFFIC COUNTS - FOOD BASICS/HUNTMAR INTERSECTION

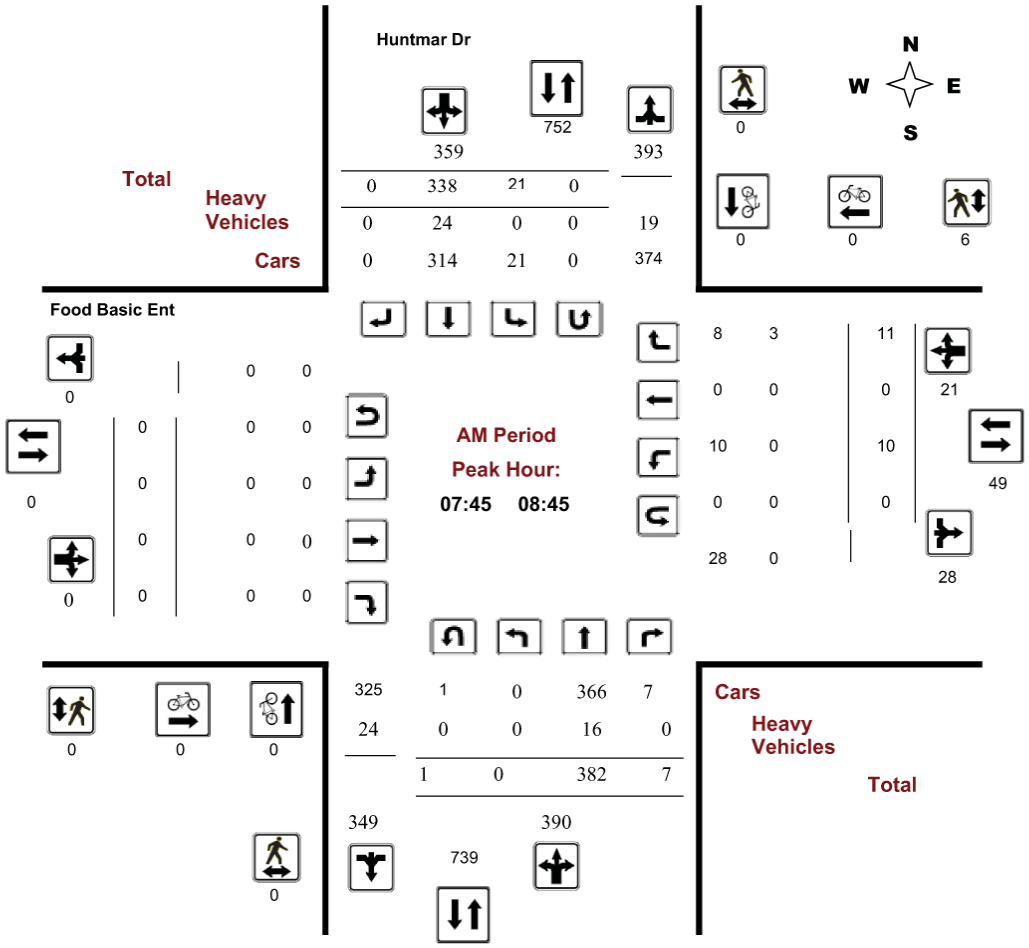
Public Works - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

Huntmar Dr 210M North of Hazeldean Rd @ Food Basic Ent

Survey Date: Thursday, February 04, 2016 **WO No:** 35693

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



Comments HAZELDEAN RD 210M NORTH OF HUNTMAR DR @ FOD BASIC ENT

2016 PEAK PM HOUR TRAFFIC COUNTS - FOOD BASICS/HUNTMAR INTERSECTION

Public Works - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

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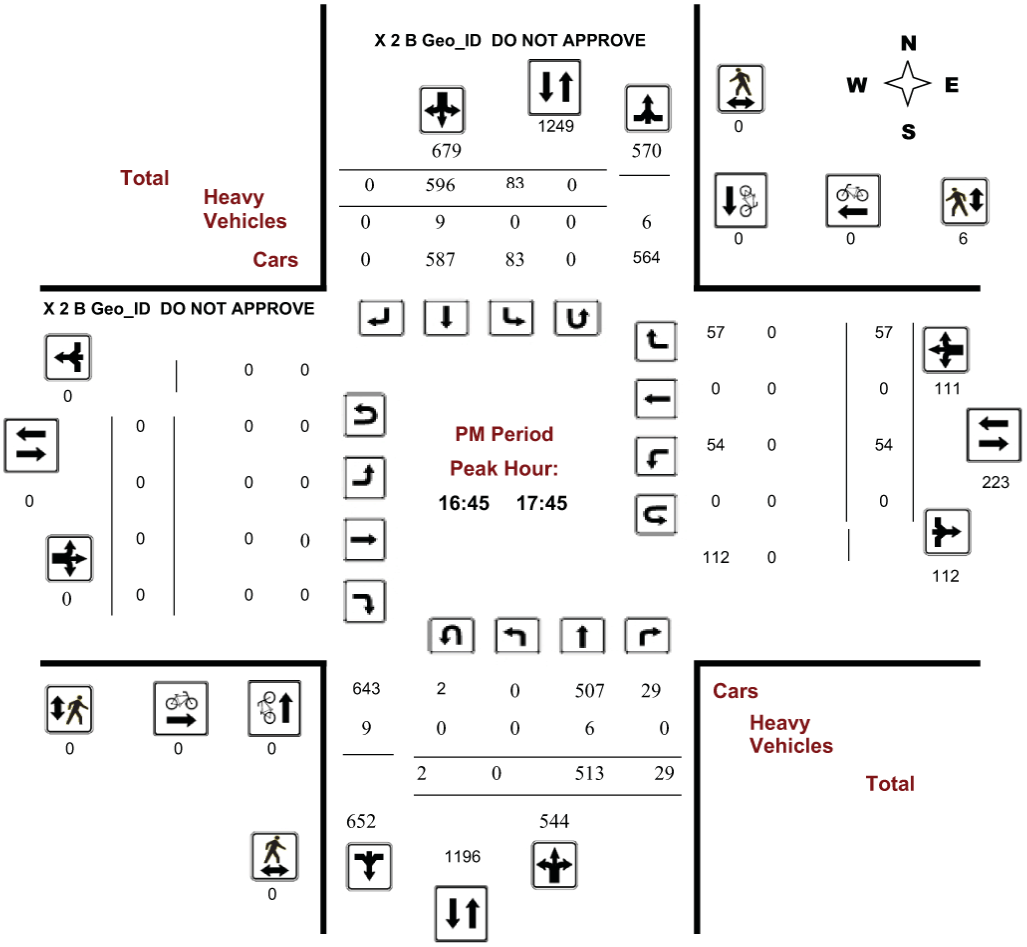


Comments HAZELDEAN RD 210M NORTH OF HUNTMAR DR @ FOD BASIC ENT

EXHIBIT 2.2
2019 PEAK AM HOUR TRAFFIC COUNTS - HAZELDEAN/HUNTMAR INTERSECTION

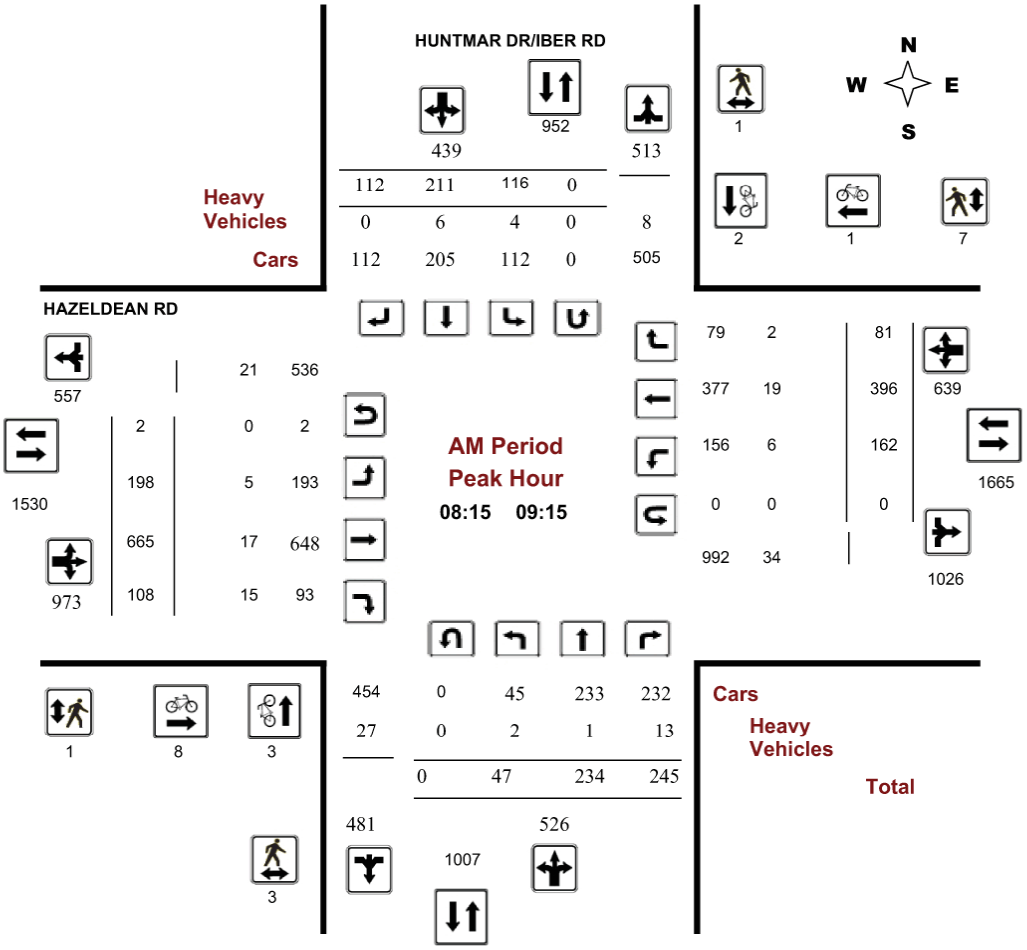
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HAZELDEAN RD @ HUNTMAR DR/IBER RD

Survey Date: Wednesday, July 03, 2019 **WO No:** 38687

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



Comments

2019 PEAK PM HOUR TRAFFIC COUNTS - HAZELDEAN/HUNTMAR INTERSECTION

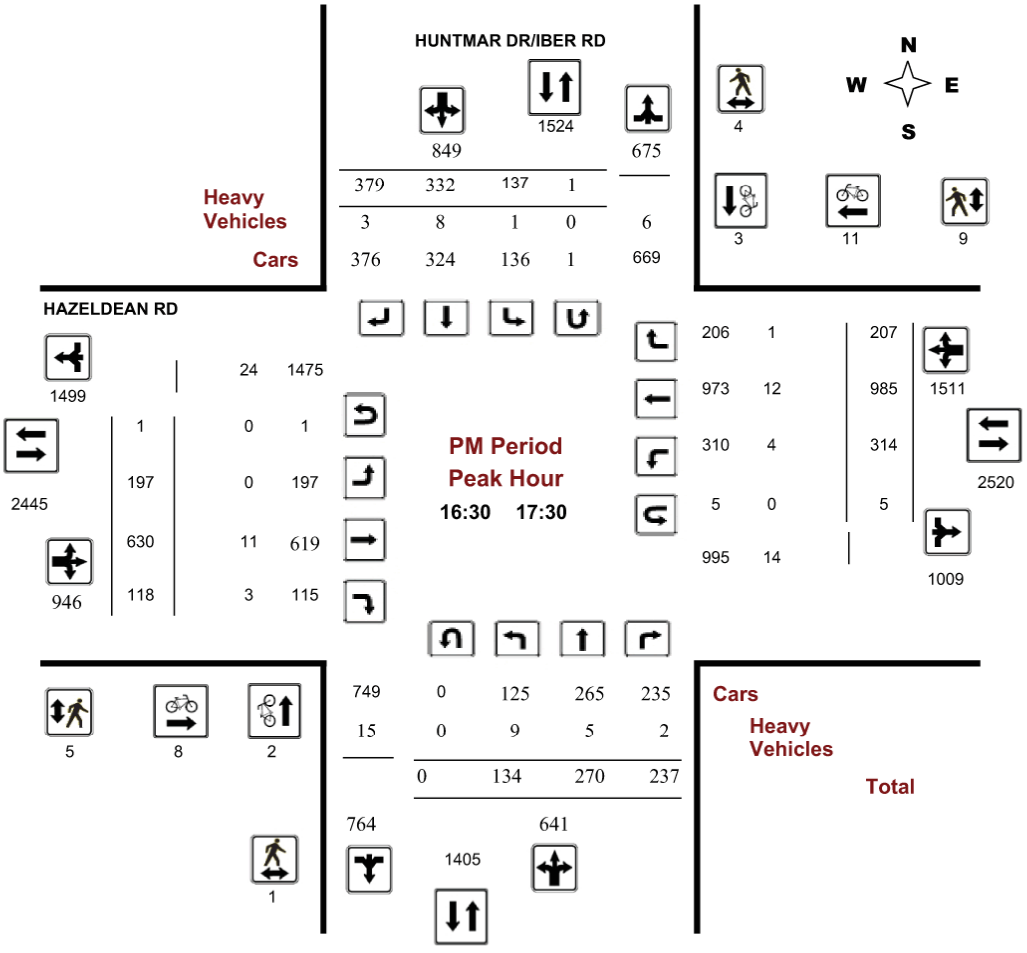
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HAZELDEAN RD @ HUNTMAR DR/IBER RD

Survey Date: Wednesday, July 03, 2019 **WO No:** 38687

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



Comments

EXHIBIT 2.3
2016 PEAK AM HOUR TRAFFIC COUNTS - ROSEHILL/HUNTMAR INTERSECTION

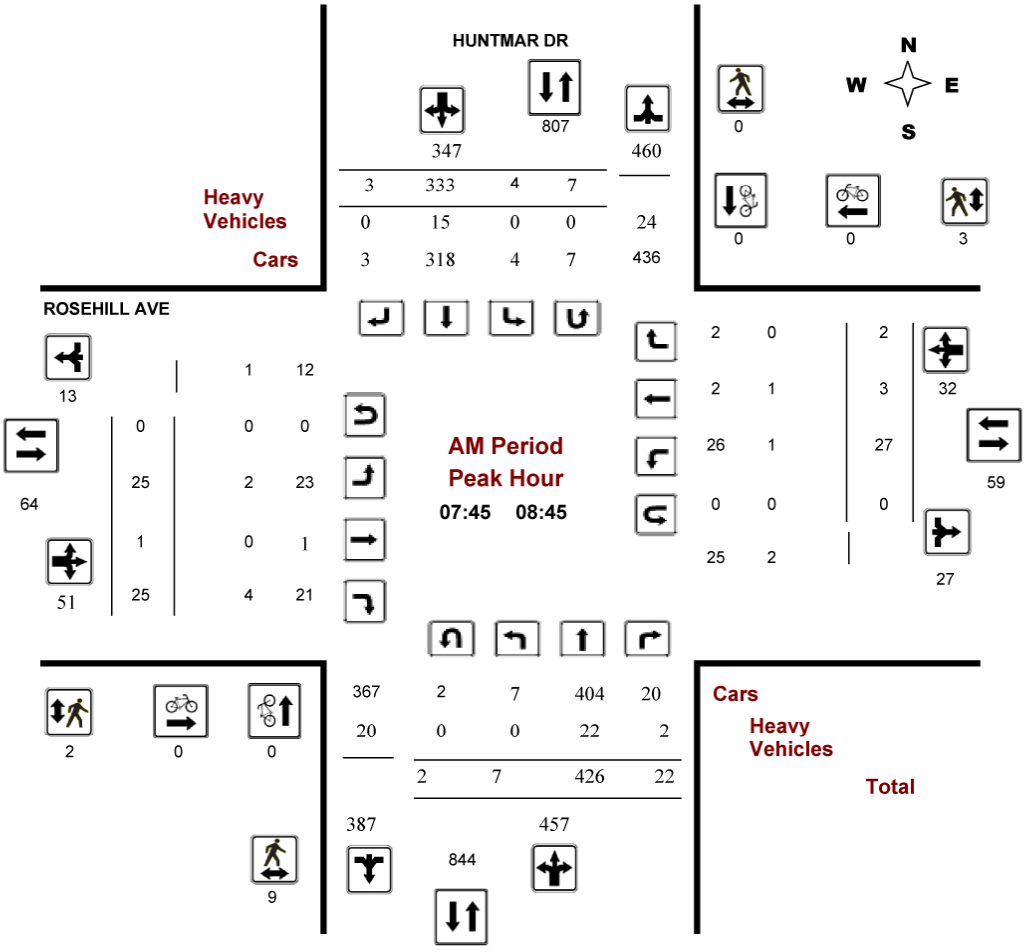
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROSEHILL AVE @ HUNTMAR DR

Survey Date: Tuesday, December 06, 2016 **WO No:** 36579

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



Comments

2016 PEAK PM HOUR TRAFFIC COUNTS - ROSEHILL/HUNTMAR INTERSECTION

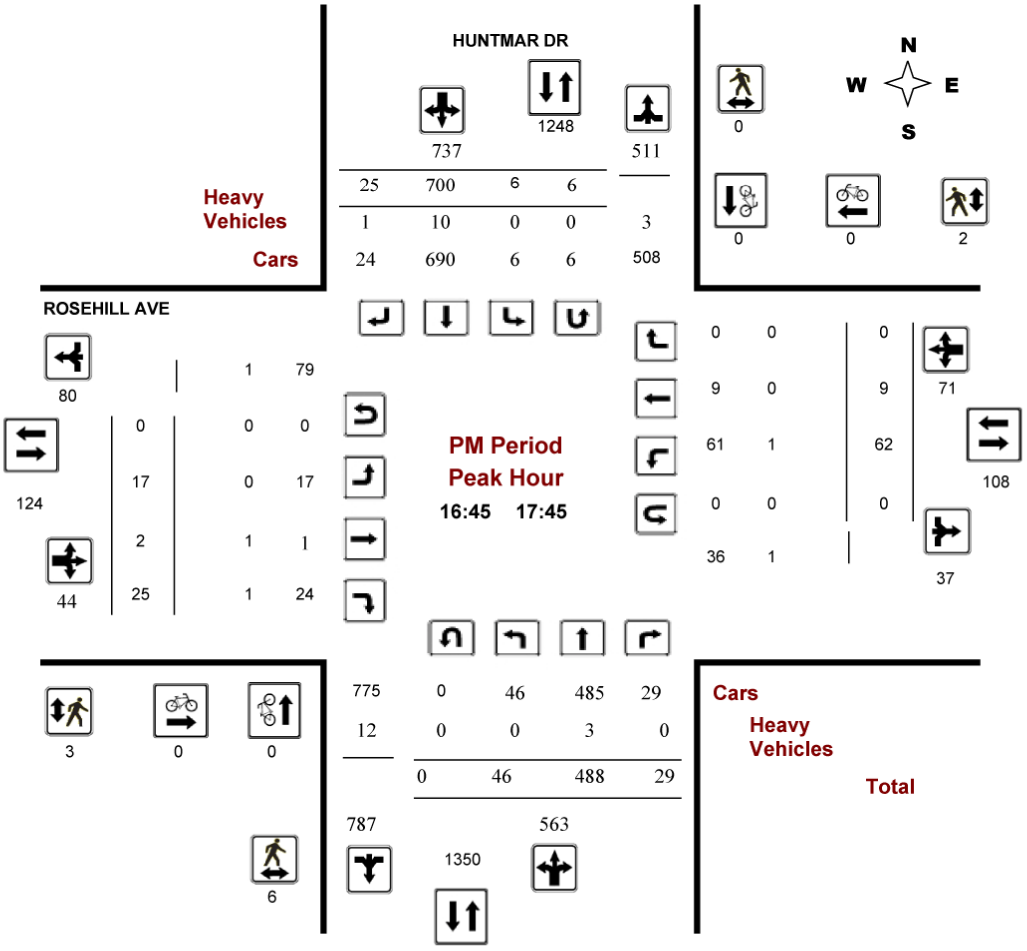
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROSEHILL AVE @ HUNTMAR DR

Survey Date: Tuesday, December 06, 2016 **WO No:** 36579

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



Comments

EXHIBIT 2.4
TRAFFIC SIGNAL TIMING PLAN - HAZELDEAN/HUNTMAR INTERSECTION

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

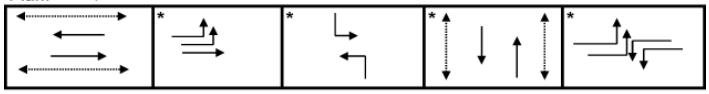
Intersection:	**Main:**	Hazeldean	**Side:**	Huntmar/Iber	
Controller:	MS-3200			**TSD:**	6508
Author:	M. Anderson			**Date:**	29-Apr-2019

Existing Timing Plans†

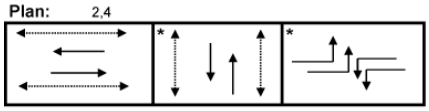
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Weekend 5	*Walk*	*DW*	*A+R*
Cycle	115	100	120	100	110			
Offset	62	48	32	X	32			
EB Thru	49	43	44	43	38	7	23	3.7+2.6
WB Thru	37	43	44	43	38	7	23	3.7+2.6
EB Left (fp)	12	-	-	-	-	-	-	3.7+2.8
NB Left	12	-	12	-	-	-	-	3.7+2.6
SB Left	12	-	12	-	14	-	-	3.7+2.6
NB Thru	40	42	42	42	40	7	26	3.7+2.9
SB Thru	40	42	42	42	54	7	26	3.7+2.9
EB Left (fp)	14	15	22	15	18	-	-	3.7+2.8
WB Left (fp)	14	15	22	15	18	-	-	3.7+2.8

Phasing Sequence‡

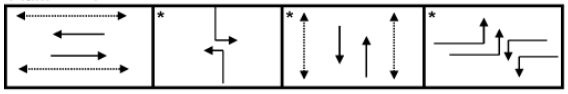
Plan: 1



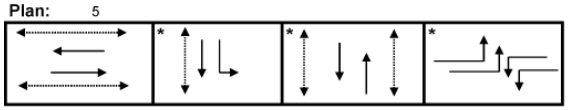
Plan: 2,4



Plan: 3



Plan: 5



Schedule

Weekday

Time	Plan
0:10	4
6:30	1
9:30	2
15:00	3
19:00	2
23:00	4

Saturday

Time	Plan
0:10	4
9:00	2
9:30	5
17:00	2
22:30	4

Sunday

Time	Plan
0:10	4
8:00	2
10:30	5
17:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

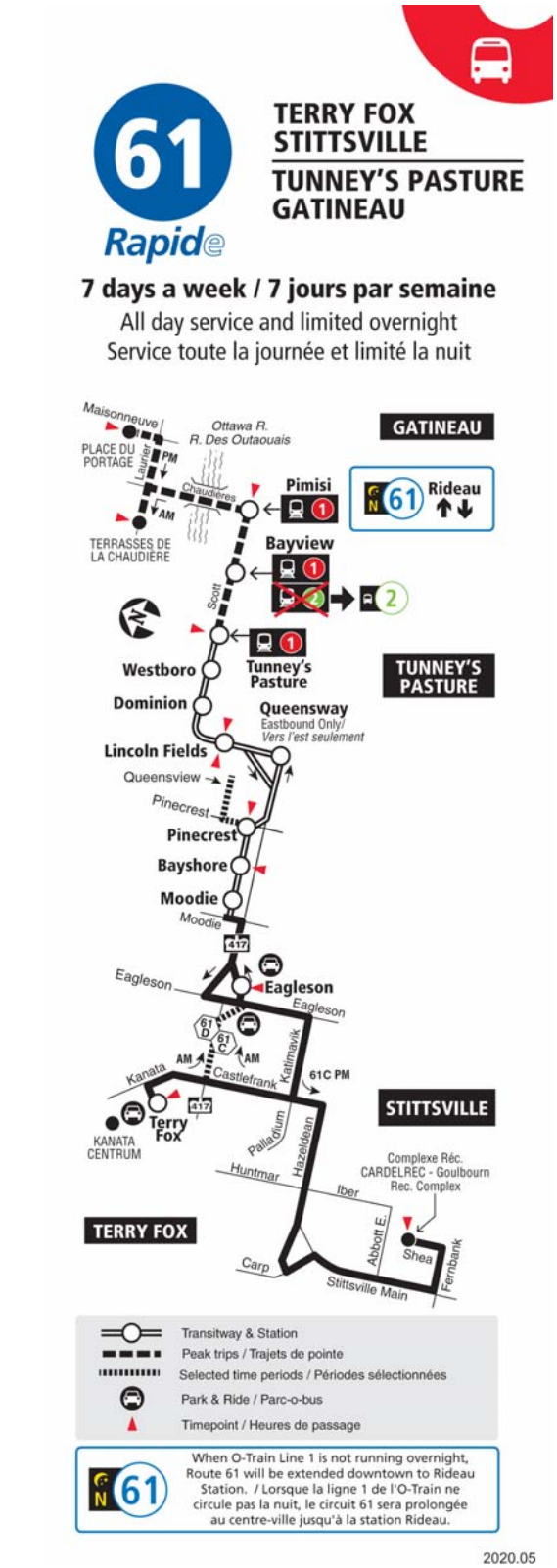
Asterisk (*) Indicates actuated phase

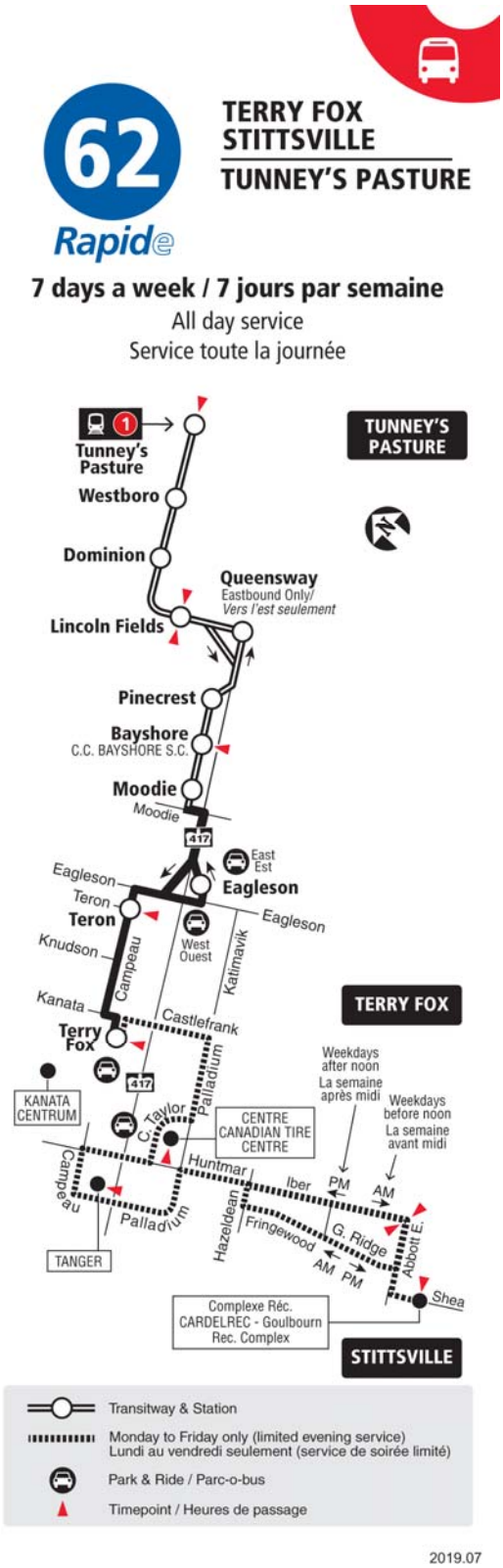
(fp): Fully Protected Left Turn

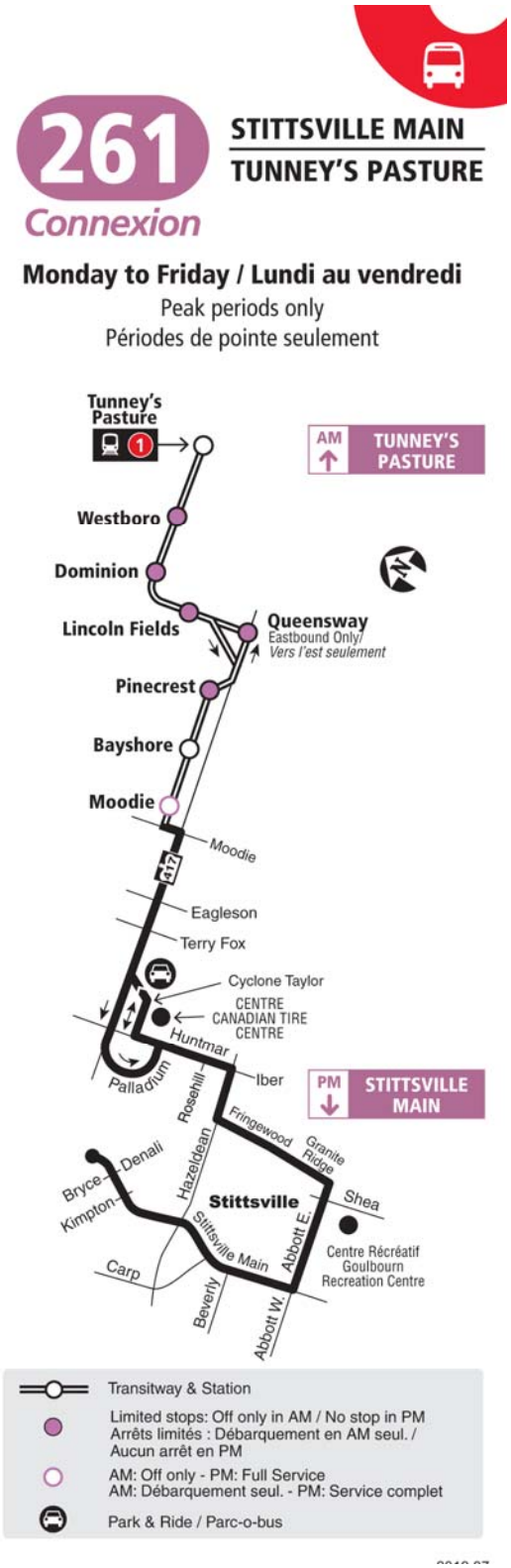
◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

EXHIBIT 2.5
OC TRANSPO ROUTE MAPS






261
STITTSVILLE MAIN
TUNNEY'S PASTURE
Connexion
Monday to Friday / Lundi au vendredi
Peak periods only
Périodes de pointe seulement
Tunney's Pasture
AM
TUNNEY'S PASTURE
Westboro
Dominion
Lincoln Fields
Queensway
Eastbound Only/
Vers l'est seulement
Pinecrest
Bayshore
Moodie
Moodie
417
Eagleson
Terry Fox
Cyclone Taylor
CENTRE
CANADIAN TIRE
CENTRE
Huntmar
Palladium
Iber
PM
STITTSVILLE MAIN
Rosehill
Fringewood
Granite Ridge
Hazeldean
Denali
Bryce
Kimpton
Stittsville
Shea
Stittsville Main
Abbott E.
Carp
Centre Récréatif
Goulbourn
Recreation Centre
Beverly
Abbott W.
Transitway & Station
Limited stops: Off only in AM / No stop in PM
Arrêts limités : Débarquement en AM seul. /
Aucun arrêt en PM
AM: Off only - PM: Full Service
AM: Débarquement seul. - PM: Service complet
Park & Ride / Parc-o-bus

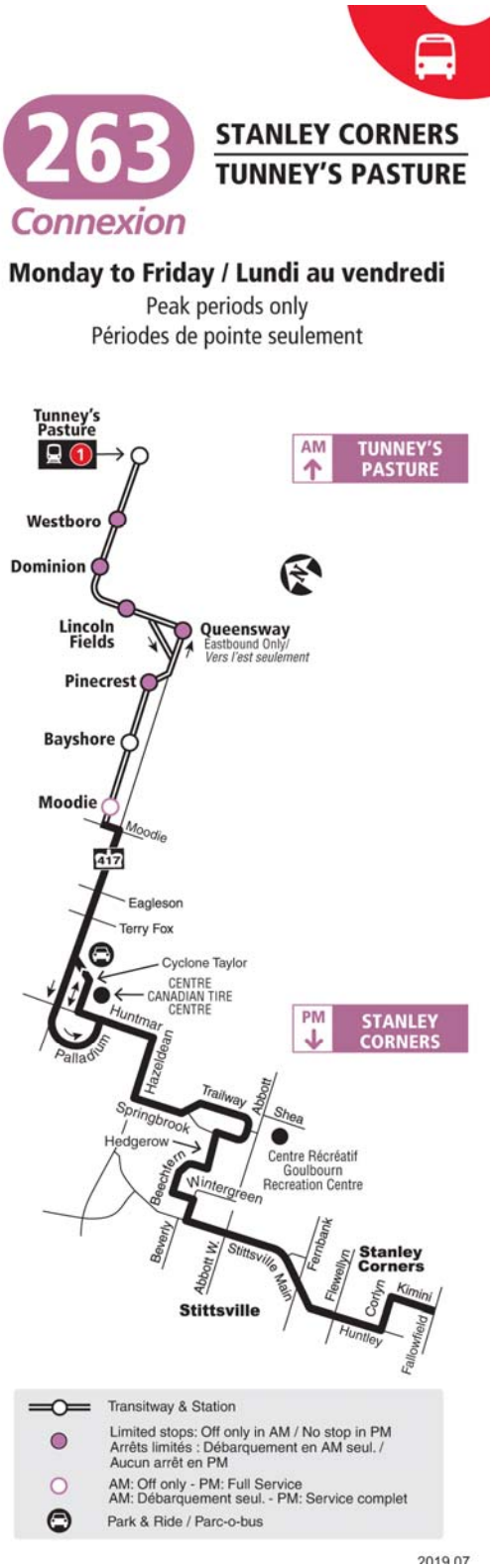

263
STANLEY CORNERS
TUNNEY'S PASTURE
Connexion
Monday to Friday / Lundi au vendredi
Peak periods only
Périodes de pointe seulement
Tunney's Pasture
AM
TUNNEY'S PASTURE
Westboro
Dominion
Lincoln Fields
Queensway
Eastbound Only/
Vers l'est seulement
Pinecrest
Bayshore
Moodie
Moodie
417
Eagleson
Terry Fox
Cyclone Taylor
CENTRE
CANADIAN TIRE
CENTRE
Huntmar
Palladium
PM
STANLEY CORNERS
Hazeldean
Springbrook
Trailway
Abbott
Shea
Hedgerow
Centre Récréatif
Goulbourn
Recreation Centre
Beechtern
Wintergreen
Beverly
Abbott W.
Stittsville Main
Fernbank
Flewellyn
Stanley Corners
Corlyn
Kimini
Stittsville
Huntley
Fallowfield
Transitway & Station
Limited stops: Off only in AM / No stop in PM
Arrêts limités : Débarquement en AM seul. /
Aucun arrêt en PM
AM: Off only - PM: Full Service
AM: Débarquement seul. - PM: Service complet
Park & Ride / Parc-o-bus

EXHIBIT 4.1
HUNTMAR DRIVE - PLOS STREET SEGMENT EVALUATION

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Rosehill Avenue
YEAR	2029
DIRECTION	Northbound–Southbound
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
HUNTMAR DRIVE - BLOS STREET SEGMENT EVALUATION

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Rosehill Avenue
YEAR	2029
DIRECTION	Northbound–Southbound
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
HUNTMAR DRIVE - TLOS STREET SEGMENT EVALUATION

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Rosehill Avenue
YEAR	2029
DIRECTION	Northbound–Southbound
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
2013 RMA REPORT

CITY OF OTTAWA

ROAD MODIFICATION
APPROVAL UNDER DELEGATED AUTHORITY

DATE: 1 May 2013

RMA-2012-DRI-035

SUBJECT

- Modifications to Huntmar Drive, 200 metres north of Hazeldean Road to accommodate a new commercial development; developer- North American (Goulbourn) Corporation.

LOCATION

- Huntmar Drive, 200 metres north of Hazeldean Road, Ward 6, see Attachment 1.

PURPOSE

- The purpose of the proposed modifications is to signalize the access of the new development on Huntmar Drive, 200 metres north of Hazeldean Road, to accommodate the new site-generated traffic.

BACKGROUND

- The proposed commercial development site is located on Huntmar Drive, 200 metres north of Hazeldean Road. The site is bounded by undeveloped lands to the east, residential lands to the north and west and Hazeldean Road to the south. The proposed development is comprised of retail and grocery stores.

EXISTING CONDITIONS

- **Road Cross-Sections**
  Huntmar Drive – 4-lane, urban, divided collector road.
- **Street Lighting**
  Huntmar Drive – Present on east and west sides.
- **Traffic Control**
  The intersection of Huntmar Drive/Iber Road and Hazeldean Road is controlled by a traffic control signal.
- **Speed Limits**
  Huntmar Drive – Posted at 60 kph from Hazeldean Road to Gallantry Way and transitioning to 50 kph north of Gallantry Way.
- **Pedestrians**
  There are sidewalks present on the east side of Huntmar Drive. During an 8-hour period on Monday, 23 July 2012 at the intersection of Huntmar Drive/Iber Road and Hazeldean Road, 8 pedestrians crossed in the north-south direction and 19 pedestrians crossed in the east-west direction.
- **Cycling**
  Huntmar Drive has designated cycling lanes on both east and west sides. During the same 8-hour survey mentioned above, 9 cyclists were observed travelling in the north-south direction and 18 cyclists were observed travelling in the east-west direction.

- **Transit**
  Bus routes 96A (regular), 261 (express) and 263 (express) currently serve Huntmar Drive in this area.
- **Highest Hourly Volume**
  During the same 8-hour survey mentioned above, between 4:00 pm and 5:00 pm, 185 northbound and 364 southbound vehicles were recorded on Huntmar Drive just north of Hazeldean Road.
- **Heavy Vehicles**
  Huntmar Drive is not designated as a truck route. Heavy vehicles comprised 4.8% and 5.5% of the total traffic in the northbound and southbound directions, respectively, during the same 8-hour survey mentioned above.
- **Collision History**
  For the period from 1 January 2007 to 1 January 2012 (5 years) on Huntmar Drive between Gallantry Way and Hazeldean Road:
  Huntmar Drive, Hazeldean Road to Gallantry Way – Total = 2, comprised of 2 single vehicle.

PROJECTED VOLUMES

- Based on the Transportation Assessment prepared by D.J. Halpenny & Associates Ltd. in February 2012 , the following volumes will be generated by the proposed development:
  (a) Weekday PM Peak Hour – 654 inbound and 667 outbound.
  (b) Saturday Peak Hour – 842 inbound and 784 outbound.
- Based on the same assessment mentioned above, the following volumes will be generated by the proposed development at the intersection of Huntmar Drive and the signalized site access, 200 metres north of Hazeldean Road:
  (c) Weekday PM Peak Hour – 212 inbound and 219 outbound.
  (d) Saturday Peak Hour – 259 inbound and 244 outbound.

PROPOSED ROAD MODIFICATIONS

- It must be emphasized that the following road modifications (see Attachment 2) are conceptual and intended only to illustrate the proposed function. The approval of any detailed design of the road modifications stemming from this report will be subject to the City's design review process.

  The specific modifications being proposed are as follows:
  - New traffic control signal on Huntmar Drive, 200 metres north of Hazeldean Road.
  - New northbound left-turn lane on Huntmar Drive at access located 200 metres north of Hazeldean Road.
  - New sidewalk on the west side of Huntmar Drive.
  - New access leg (west).

MODIFICATION OUTCOMES – BENEFIT AND IMPACTS

- **Pedestrians**
  The proposed sidewalks will allow pedestrians to safely access the proposed retail development.

- **Cyclists**
  The proposed cycling lanes will allow cyclists to safely navigate Huntmar Drive and access the retail development.
- **Transit**
  No changes are proposed to the existing transit infrastructure.
- **Vehicles**
  The proposed traffic signal and left-turn lane will allow vehicles to safely and efficiently access the retail development. The proposed right-turn lane will transition the two northbound lanes from Hazeldean Road to one lane at Gallantry Way.
- **Adjacent Land Uses**
  No negative impacts are anticipated for the lands adjacent to the proposed road modifications.

PROJECTED IMPLEMENTATION DATES

- This is a privately funded project in which the property owner will establish the construction schedule. It is understood that the developer wishes to start work in Spring 2013. The traffic control signal will be installed once the Ministry of Transportation of Ontario traffic signal warrants are met.

TOTAL ESTIMATED CONSTRUCTION COSTS

- The total estimated cost for the proposed road modifications, which includes construction, engineering, and contingencies, is $350,000.

FINANCIAL COMMENTS

- There is no cost to the City for the proposed modifications listed in the previous sections estimated at $350,000 (construction, engineering, and contingencies).
- North American (Goulbourn) Corporation must provide financial guarantees acceptable to the City of Ottawa to cover the above-noted roadwork.
- Total additional annual operating costs are estimated to be $2,200 (surface operations at $2,000, signs and pavement markings at $200) and will be requested in the year following completion of construction.
- North American (Goulbourn) Corporation will be required to enter into a Road Modification Agreement with the City of Ottawa, which will include but not be limited to, North American (Goulbourn) Corporation funding of all costs associated with the design and construction of the above-noted road modifications.
- Prior to construction, North American (Goulbourn) Corporation will be required to enter into a Traffic Signal Agreement with the City, which will include but not limited to the funding of all costs associated with the design, installation and maintenance of the traffic control signal. Annual signal maintenance costs estimated at $10,024 in 2013 will be the responsibility of North American (Goulbourn) Corporation until the Ministry of Transportation of Ontario traffic signal warrants are met and City Council approves the assumption of these costs, at which time, funds will be requested in the City's operating budget for the following year.
- Annual signal maintenance costs estimated above will be the responsibility of North American (Goulbourn) Corporation only if the installation of the traffic control signal occurs prior to the Ministry of Transportation of Ontario traffic signal warrants being met.

COMPLIANCE WITH TRANSPORTATION MASTER PLAN

- The proposed road modifications comply with Section 6.4 Road Design, of the Transportation Master Plan.

CONSULTATIONS

- The proposed road modifications were advertised on the City's website from 4 January 2013 until 18 January 2013 with a deadline for public input on 25 January 2013.
- Preliminary approval of the proposed road modifications was granted by the Program Manager of Design Review and Implementation on 24 April 2013.
- Via e-mail on 24 April 2013, Councillor Qadri was given five business days to advise of his concurrence or non-concurrence with the Manager of Development Review (Suburban Services) having delegated authority to approve the proposed roadway modifications.
- Via e-mail on 24 April 2013, Councillor Qadri provided his concurrence with the Manager of Development Review (Suburban Services) having delegated authority to approve the proposed roadway modifications.

RESULTS OF ADVERTISING

- No comments were received as a result of the online advertisement.

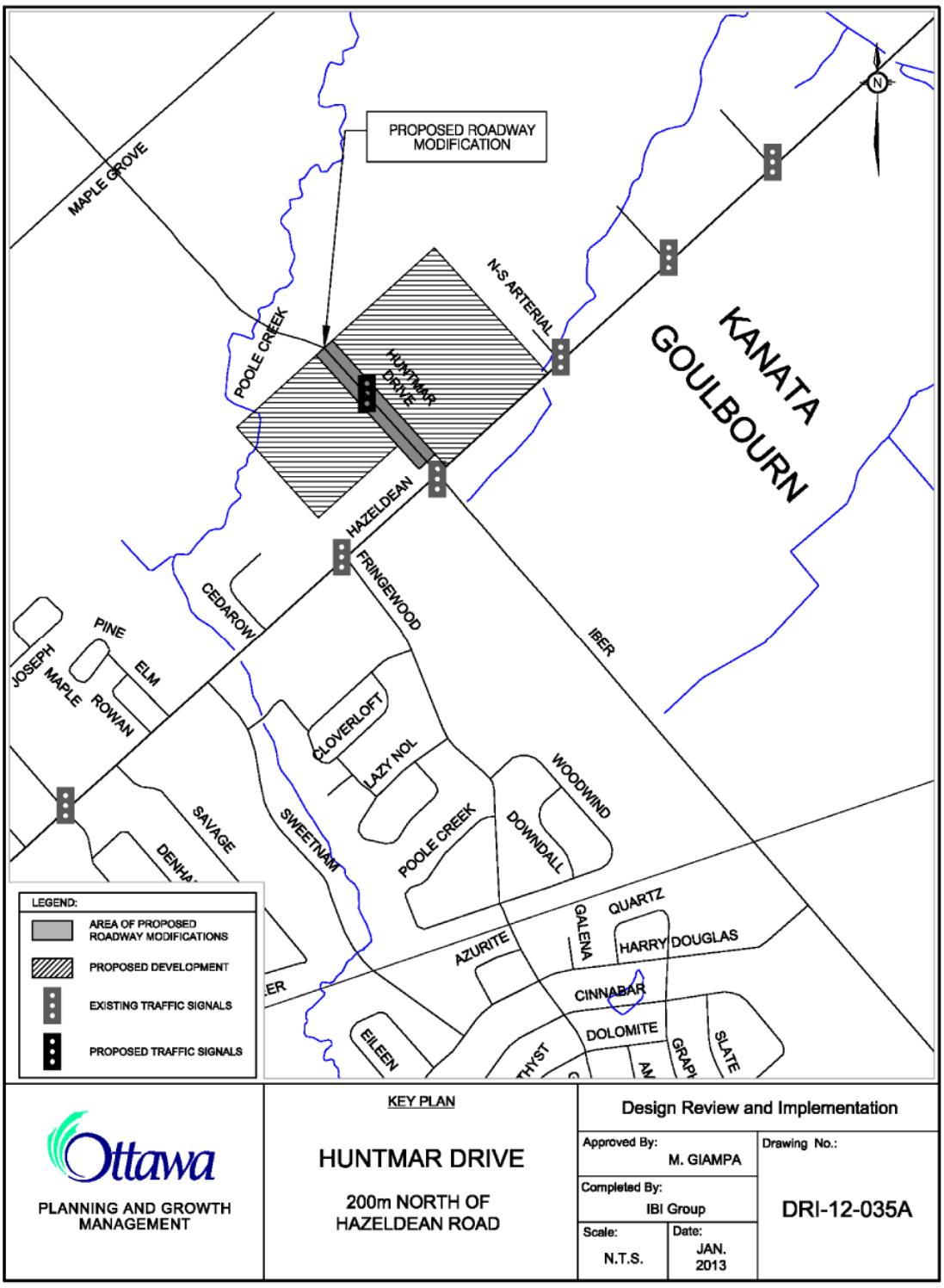
CURRENT STATUS

- Final approval was granted by the Manager of Development Review (Suburban Services) on 30 April 2013.

ATTACHMENTS

- Attachment 1 – Key Plan DRI-2012-035A
- Attachment 2 – Proposed Road Modifications DRI-2012-035B

KEY PLAN (DRI-2012-035A) **ATTACHMENT 1**



PROPOSED ROAD MODIFICATIONS (DRI-2012-035B) **ATTACHMENT 2**

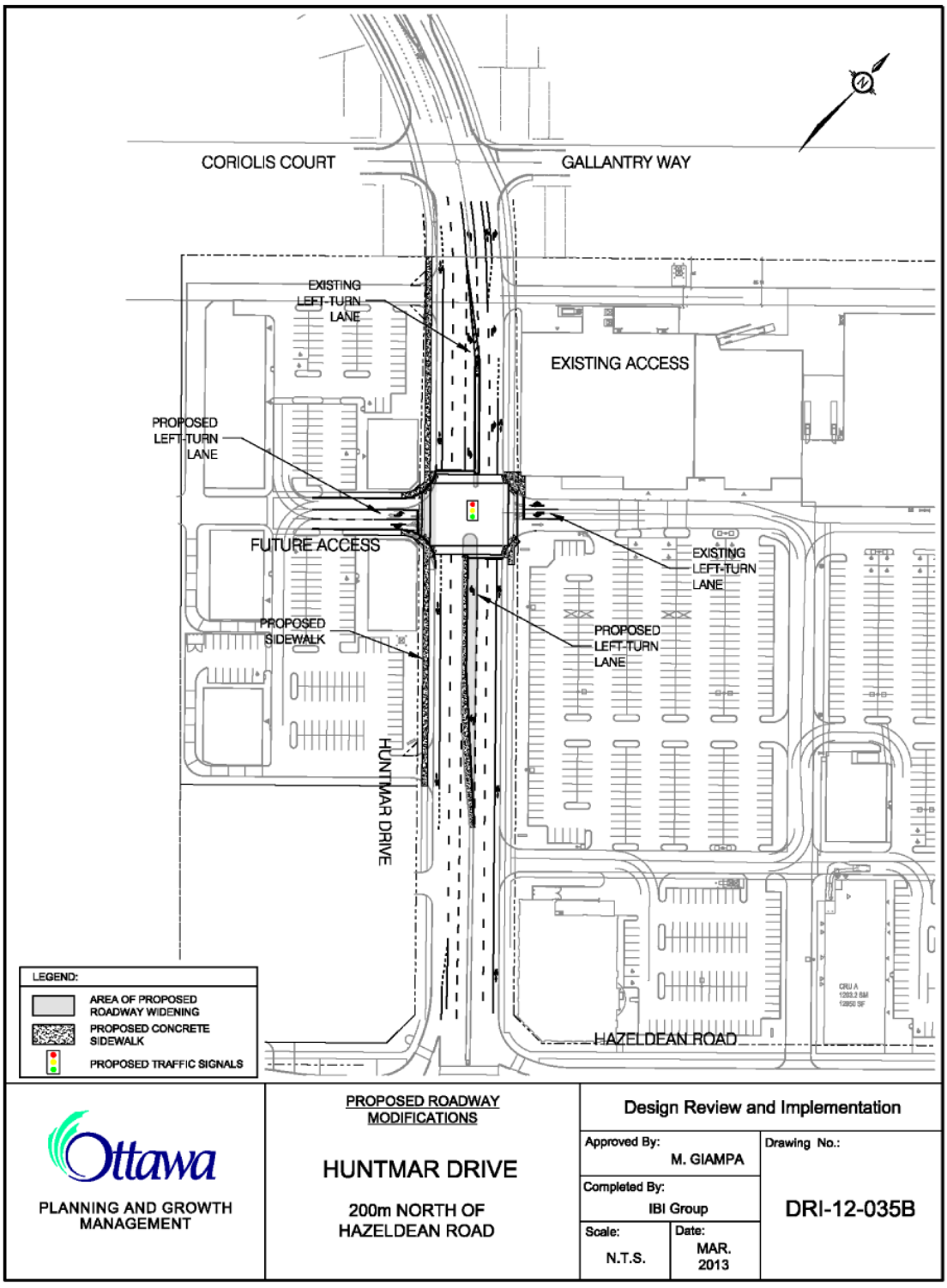


EXHIBIT 4.5
TRAFFIC SIGNAL WARRANT ANALYSIS (Weekday 2029) – Site Access/Huntmar

MINIMUM WARRANTS FOR INSTALLATION OF TRAFFIC SIGNAL USING PROJECTED VOLUME

Location Site Access (Food Basics) and Huntmar Drive **of**
(Roadway) **(Intersecting Road)**

Municipality City of Ottawa **Projected Volume** Year 2029

WARRANT	DESCRIPTION	MINIMUM REQUIREMENT FOR 2 LANE HIGHWAYS		COMPLIANCE		
		2. FREE FLOW	3. RESTRICT. FLOW	SECTIONAL NUMBER	SECTIONAL %	4. ENTIRE %
1. VEHICULAR VOLUME	1. A. Vehicle volume all approaches (Average hour)	480	~~720~~ 900	948	100	(49%)
	B. Vehicle volume, along minor roads, (Average hour)	120	(170)	84	49	
2. DELAY TO CROSS TRAFFIC	1. A. Vehicle volume, along artery (Average hour)	480	900 ~~720~~	863	96	45%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads, (Average hour)	50	(75)	34	45	

Projected Average Hour - Use the sum of the AM and PM Peak volumes divided by 4

NOTES:

1. Vehicle volume warrants (1A) and (2A) for intersections of roadways having two or more moving lanes in one direction, should be 25% higher than the values given above.

2. Warrant values for free flow apply when the 85 percentile speed of artery traffic equals or exceeds 70 Km/h or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000.

3. Warrant values for restricted flow apply to large urban communities when the 85 percentile speed of artery traffic does not exceed 70 Km/h.

4. The lowest sectional percentage governs the entire Warrant.

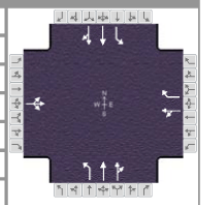
5. For "T" intersections the warrant values for minor road should be increased by 50 % (Warrant 1B only).

6. The crossing volumes are defined as:
   (a) Left turns from both minor road approaches
   (b) The heaviest through volume from the minor road
   (c) 50% of the heavier left turn movement from major road when both of the following are met:
      (i) the left turn volume > 120 vph.
      (ii) the left turn volume plus the opposing volume > 720 vph.
   (d) Pedestrians crossing the major road.

EXHIBIT 4.6
2024 PEAK AM HOUR ANALYSIS (Total Traffic) - Access/Huntmar

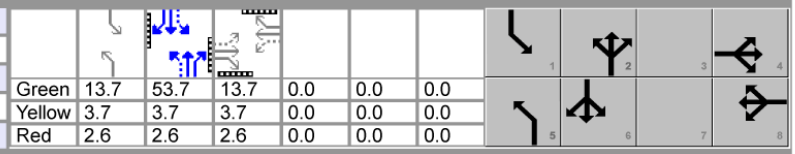
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	1/7/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Huntmar Drive	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Access/Huntmar	File Name	724_2024-tot-AM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	0	65	18	0	19	21	628	14	31	553	9

Signal Information			
Cycle, s	100.0	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	53.7	13.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.7	0.0	0.0	0.0
Red	2.6	2.6	2.6	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		20.0		20.0	20.0	60.0	20.0	60.0
Change Period, ($Y+R_c$), s		6.3		6.3	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		8.1		3.4	2.2		2.3	
Green Extension Time (g_e), s		0.1		0.2	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.08		0.00	0.00		0.00	

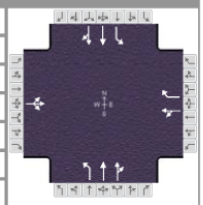
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		103			20	21	23	350	348	34	306	305
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1512			1280	1510	1714	1786	1771	1714	1786	1775
Queue Service Time (g_s), s		2.0			0.0	1.2	0.2	11.0	11.1	0.3	9.4	9.4
Cycle Queue Clearance Time (g_c), s		6.1			1.4	1.2	0.2	11.0	11.1	0.3	9.4	9.4
Green Ratio (*g/C*)		0.15			0.15	0.15	0.84	0.55	0.55	0.84	0.55	0.55
Capacity (*c*), veh/h		270			260	222	857	977	969	741	977	971
Volume-to-Capacity Ratio (*X*)		0.383			0.075	0.093	0.027	0.358	0.359	0.045	0.313	0.314
Back of Queue (*Q*), ft/ln (50 th percentile)		57.5			10.3	10.9	0.8	111.2	109.6	2.8	94	92.9
Back of Queue (*Q*), veh/ln (50 th percentile)		2.3			0.4	0.4	0.0	4.4	4.4	0.1	3.7	3.7
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Uniform Delay (d_1), s/veh		38.9			37.0	36.9	2.0	13.0	12.8	3.9	12.6	12.4
Incremental Delay (d_2), s/veh		0.3			0.0	0.1	0.0	1.0	1.0	0.0	0.8	0.8
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
Control Delay (*d*), s/veh		39.3			37.0	37.0	2.0	14.0	13.8	3.9	13.5	13.2
Level of Service (LOS)		D			D	D	A	B	B	A	B	B
Approach Delay, s/veh / LOS	39.3	D		37.0	D		13.5	B		12.9	B	
Intersection Delay, s/veh / LOS	15.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.30	B	2.30	B	1.89	B	1.67	B
Bicycle LOS Score / LOS	0.66	A	0.55	A	1.08	A	1.02	A

EXHIBIT 4.7
2024 PEAK PM HOUR ANALYSIS (Total Traffic) - Access/Huntmar

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	1/7/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Huntmar Drive	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Access/Huntmar	File Name	724_2024-tot-PM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	19	0	42	70	0	72	67	833	34	103	919	31

Signal Information			
Cycle, s	100.0	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	53.7	13.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.7	0.0	0.0	0.0
Red	2.6	2.6	2.6	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		20.0		20.0	20.0	60.0	20.0	60.0
Change Period, (*Y+R c*), s		6.3		6.3	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (*g s*), s		5.7		7.0	2.7		3.1	
Green Extension Time (*g e*), s		0.3		0.2	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.01		0.05	0.00		0.00	

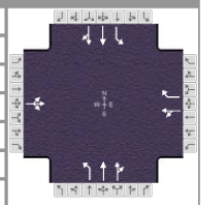
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		66			76	78	73	475	468	112	519	513
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1524			1367	1510	1714	1786	1760	1714	1786	1764
Queue Service Time (*g s*), s		0.0			1.3	4.7	0.7	16.4	16.4	1.1	18.6	18.6
Cycle Queue Clearance Time (*g c*), s		3.7			5.0	4.7	0.7	16.4	16.4	1.1	18.6	18.6
Green Ratio (*g/C*)		0.15			0.15	0.15	0.84	0.55	0.55	0.84	0.55	0.55
Capacity (*c*), veh/h		271			273	222	667	977	963	645	977	965
Volume-to-Capacity Ratio (*X*)		0.244			0.279	0.353	0.109	0.486	0.486	0.173	0.532	0.532
Back of Queue (*Q*), ft/ln (50 th percentile)		35.9			41.8	42.9	5.6	166.3	162.8	15.9	189.4	185.8
Back of Queue (*Q*), veh/ln (50 th percentile)		1.4			1.7	1.7	0.2	6.6	6.5	0.6	7.5	7.4
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00	0.00	0.04	0.00	0.00	0.12	0.00	0.00
Uniform Delay (*d 1*), s/veh		38.0			38.5	38.4	3.8	14.2	14.0	6.1	14.7	14.5
Incremental Delay (*d 2*), s/veh		0.2			0.2	0.4	0.0	1.7	1.8	0.0	2.1	2.1
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
Control Delay (*d*), s/veh		38.1			38.7	38.7	3.8	16.0	15.7	6.1	16.8	16.6
Level of Service (LOS)		D			D	D	A	B	B	A	B	B
Approach Delay, s/veh / LOS	38.1	D		38.7	D		15.0	B		15.6	B	
Intersection Delay, s/veh / LOS	17.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.30	B	2.30	B	1.89	B	1.67	B
Bicycle LOS Score / LOS	0.60	A	0.74	A	1.33	A	1.43	A

EXHIBIT 4.8
2029 PEAK AM HOUR ANALYSIS (Total Traffic) - Access/Huntmar

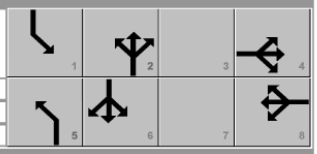
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	1/7/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Huntmar Drive	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Access/Huntmar	File Name	724_2029-tot-AM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	0	65	18	0	19	21	674	14	31	584	9

Signal Information			
Cycle, s	100.0	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	53.7	13.7	0.0	0.0	0.0
Yellow	3.7	3.7	3.7	0.0	0.0	0.0
Red	2.6	2.6	2.6	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		20.0		20.0	20.0	60.0	20.0	60.0
Change Period, (*Y+R c*), s		6.3		6.3	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (*g s*), s		8.1		3.4	2.2		2.3	
Green Extension Time (*g e*), s		0.1		0.2	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.08		0.00	0.00		0.00	

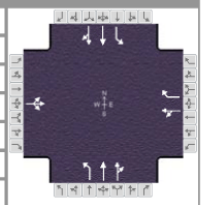
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		103			20	21	23	375	373	34	323	321
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1512			1280	1510	1714	1786	1772	1714	1786	1776
Queue Service Time (*g s*), s		2.0			0.0	1.2	0.2	12.1	12.1	0.3	10.0	10.0
Cycle Queue Clearance Time (*g c*), s		6.1			1.4	1.2	0.2	12.1	12.1	0.3	10.0	10.0
Green Ratio (*g/C*)		0.15			0.15	0.15	0.84	0.55	0.55	0.84	0.55	0.55
Capacity (*c*), veh/h		270			260	222	839	977	970	719	977	971
Volume-to-Capacity Ratio (*X*)		0.383			0.075	0.093	0.027	0.384	0.384	0.047	0.331	0.331
Back of Queue (*Q*), ft/ln (50 th percentile)		57.5			10.3	10.9	0.8	121.3	119.8	3	100.5	99.3
Back of Queue (*Q*), veh/ln (50 th percentile)		2.3			0.4	0.4	0.0	4.8	4.8	0.1	4.0	4.0
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Uniform Delay (*d 1*), s/veh		38.9			37.0	36.9	2.0	13.2	13.0	4.2	12.8	12.5
Incremental Delay (*d 2*), s/veh		0.3			0.0	0.1	0.0	1.1	1.2	0.0	0.9	0.9
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
Control Delay (*d*), s/veh		39.3			37.0	37.0	2.0	14.4	14.1	4.2	13.7	13.4
Level of Service (LOS)		D			D	D	A	B	B	A	B	B
Approach Delay, s/veh / LOS	39.3	D		37.0	D		13.9	B		13.1	B	
Intersection Delay, s/veh / LOS	15.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.30	B	2.30	B	1.89	B	1.67	B
Bicycle LOS Score / LOS	0.66	A	0.55	A	1.12	A	1.05	A

EXHIBIT 4.9
2029 PEAK PM HOUR ANALYSIS (Total Traffic) - Access/Huntmar

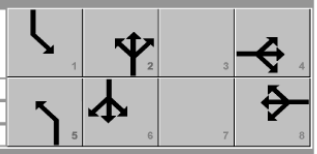
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	1/7/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Huntmar Drive	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Access/Huntmar	File Name	724_2029-tot-PM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	19	0	42	70	0	72	67	896	34	103	991	31

Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End	Green	13.7	53.7	13.7	0.0	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7	3.7	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	2.6	2.6	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		20.0		20.0	20.0	60.0	20.0	60.0
Change Period, ($Y+R_c$), s		6.3		6.3	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		5.7		7.0	2.7		3.1	
Green Extension Time (g_e), s		0.3		0.2	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.01		0.05	0.00		0.00	

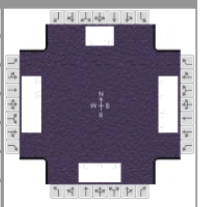
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		66			76	78	73	509	502	112	558	552
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1524			1367	1510	1714	1786	1762	1714	1786	1766
Queue Service Time (g_s), s		0.0			1.3	4.7	0.7	18.1	18.1	1.1	20.6	20.6
Cycle Queue Clearance Time (g_c), s		3.7			5.0	4.7	0.7	18.1	18.1	1.1	20.6	20.6
Green Ratio (*g/C*)		0.15			0.15	0.15	0.84	0.55	0.55	0.84	0.55	0.55
Capacity (*c*), veh/h		271			273	222	640	977	964	623	977	966
Volume-to-Capacity Ratio (*X*)		0.244			0.279	0.353	0.114	0.521	0.521	0.180	0.572	0.572
Back of Queue (*Q*), ft/ln (50 th percentile)		35.9			41.8	42.9	6.9	183.8	180.1	17.8	210.9	207.1
Back of Queue (*Q*), veh/ln (50 th percentile)		1.4			1.7	1.7	0.3	7.3	7.2	0.7	8.4	8.3
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00	0.00	0.05	0.00	0.00	0.14	0.00	0.00
Uniform Delay (d_1), s/veh		38.0			38.5	38.4	4.3	14.6	14.3	6.7	15.2	14.9
Incremental Delay (d_2), s/veh		0.2			0.2	0.4	0.0	2.0	2.0	0.1	2.4	2.5
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
Control Delay (*d*), s/veh		38.1			38.7	38.7	4.3	16.6	16.4	6.8	17.6	17.4
Level of Service (LOS)		D			D	D	A	B	B	A	B	B
Approach Delay, s/veh / LOS	38.1	D		38.7	D		15.7	B		16.5	B	
Intersection Delay, s/veh / LOS	18.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.30	B	2.30	B	1.89	B	1.67	B
Bicycle LOS Score / LOS	0.60	A	0.74	A	1.38	A	1.50	A

EXHIBIT 4.10
2019 PEAK AM HOUR ANALYSIS (Traffic Counts) - Hazeldean/Huntmar

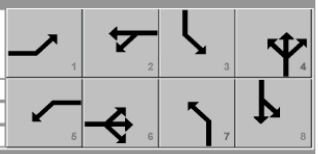
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2019-ex-AM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	200	665	108	162	396		47	234	245	116	211	

Signal Information					EB			WB			NB			SB		
Cycle, s	115.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	On	Green	7.5	5.5		30.7	5.7	33.4	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.7	3.7		3.7	3.7	3.7	0.0					
				Red	2.8	2.8		2.6	2.6	2.9	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	26.0	49.0	14.0	37.0	12.0	40.0	12.0	40.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	5.4		5.6		3.9	15.4	6.7	13.9
Green Extension Time (g_e), s	0.4	0.0	0.1	0.0	0.0	1.2	0.0	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	0.00	1.00	0.00

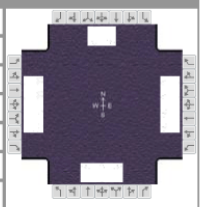
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	217	432	408	176	430		51	254	152	126	229	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1662	1613	1660		1661	1786	1493	1701	1786	
Queue Service Time (g_s), s	3.4	21.1	21.1	3.6	12.4		1.9	13.4	9.1	4.7	11.9	
Cycle Queue Clearance Time (g_c), s	3.4	21.1	21.1	3.6	12.4		1.9	13.4	9.1	4.7	11.9	
Green Ratio (*g/C*)	0.58	0.44	0.44	0.46	0.28		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	1334	767	725	765	915		534	534	447	433	534	
Volume-to-Capacity Ratio (*X*)	0.163	0.563	0.563	0.230	0.470		0.096	0.476	0.341	0.291	0.429	
Back of Queue (Q), ft/ln (50 th percentile)	29.7	234.2	217.3	33.8	133.4		18.2	145.1	82.1	46	128.7	
Back of Queue (Q), veh/ln (50 th percentile)	1.2	9.1	8.7	1.3	5.2		0.7	5.8	3.3	1.8	5.1	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.05	0.00	0.00	0.07	0.00		0.08	0.00	0.39	0.18	0.00	
Uniform Delay (d_1), s/veh	11.7	26.7	24.2	19.3	35.0		16.7	33.3	31.5	19.5	32.8	
Incremental Delay (d_2), s/veh	0.0	3.0	3.1	0.1	1.7		0.0	0.2	0.2	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	11.7	29.6	27.4	19.4	36.8		16.7	33.6	31.6	19.6	33.0	
Level of Service (LOS)	B	C	C	B	D		B	C	C	B	C	
Approach Delay, s/veh / LOS	25.1	C		31.7	C		31.0	C		28.2	C	
Intersection Delay, s/veh / LOS	28.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.13	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.36	A	0.99	A	1.24	A	1.07	A

EXHIBIT 4.11
2019 PEAK PM HOUR ANALYSIS (Traffic Counts) - Hazeldean/Huntmar

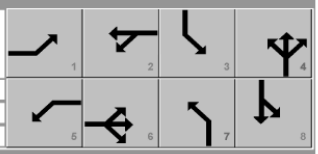
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2019-ex-PM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	198	630	118	319	985		134	270	237	138	332	

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.5	37.7		5.7	35.4	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.6		2.6	2.9	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	22.0	44.0	22.0	44.0	12.0	42.0	12.0	42.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	5.5		8.0		8.0	18.4	8.0	23.2
Green Extension Time (g_e), s	0.3	0.0	0.5	0.0	0.0	1.4	0.0	1.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.02		1.00	0.00	1.00	0.02

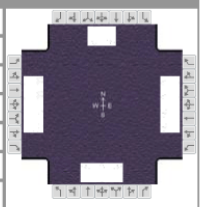
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	215	419	394	347	1071		146	293	127	150	361	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1649	1613	1660		1661	1786	1492	1701	1786	
Queue Service Time (g_s), s	3.5	25.5	25.5	6.0	38.7		6.0	16.4	7.8	6.0	21.2	
Cycle Queue Clearance Time (g_c), s	3.5	25.5	25.5	6.0	38.7		6.0	16.4	7.8	6.0	21.2	
Green Ratio (*g/C*)	0.58	0.32	0.32	0.58	0.32		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	753	567	532	850	1071		420	542	452	399	542	
Volume-to-Capacity Ratio (*X*)	0.286	0.739	0.741	0.408	1.000		0.347	0.542	0.281	0.376	0.666	
Back of Queue (Q), ft/ln (50 th percentile)	31.1	308.1	284.8	53.8	502.1		58.7	180.4	70.2	59.2	238.9	
Back of Queue (Q), veh/ln (50 th percentile)	1.2	12.0	11.4	2.1	19.5		2.3	7.2	2.8	2.3	9.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.06	0.00	0.00	0.11	0.00		0.26	0.00	0.33	0.23	0.00	
Uniform Delay (d_1), s/veh	20.3	36.6	36.2	19.2	40.7		20.3	35.2	31.8	21.5	36.9	
Incremental Delay (d_2), s/veh	0.1	8.4	9.0	0.1	27.5		0.2	0.6	0.1	0.2	2.5	
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	
Control Delay (*d*), s/veh	20.4	45.0	45.2	19.3	68.1		20.5	35.8	32.0	21.7	39.4	
Level of Service (LOS)	C	D	D	B	E		C	D	C	C	D	
Approach Delay, s/veh / LOS	39.9	D		56.2	E		31.0	C		34.2	C	
Intersection Delay, s/veh / LOS	44.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.34	A	1.66	B	1.42	A	1.33	A

EXHIBIT 4.12
2024 PEAK AM HOUR ANALYSIS (Background) - Hazeldean/Huntmar

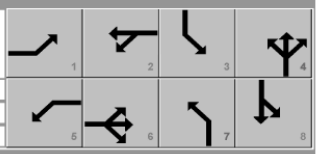
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2024-bak-AM.xus		
Project Description	21 Huntmar Drive Apartments (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	243	832	119	208	506		55	281	277	172	316	

Signal Information												
Cycle, s	115.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	7.5	5.5	30.7	5.7	33.4	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.7	3.7	3.7	3.7	3.7	0.0		
				Red	2.8	2.8	2.6	2.6	2.9	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	26.0	49.0	14.0	37.0	12.0	40.0	12.0	40.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	6.2		6.7		4.2	18.6	9.3	21.2
Green Extension Time (g_e), s	0.5	0.0	0.0	0.0	0.0	1.5	0.0	1.4
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	0.01	1.00	0.02

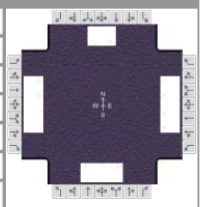
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	264	530	504	226	550		60	305	160	187	343	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1671	1613	1660		1661	1786	1493	1701	1786	
Queue Service Time (g_s), s	4.2	28.0	28.0	4.7	16.5		2.2	16.6	9.7	7.3	19.2	
Cycle Queue Clearance Time (g_c), s	4.2	28.0	28.0	4.7	16.5		2.2	16.6	9.7	7.3	19.2	
Green Ratio (*g/C*)	0.58	0.44	0.44	0.46	0.28		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	1226	767	730	665	915		441	534	447	394	534	
Volume-to-Capacity Ratio (*X*)	0.215	0.690	0.691	0.340	0.601		0.135	0.572	0.358	0.475	0.643	
Back of Queue (Q), ft/ln (50 th percentile)	36.7	316.5	295.2	44.1	179.8		21.4	182.7	86.8	71.3	214.5	
Back of Queue (Q), veh/ln (50 th percentile)	1.5	12.4	11.8	1.7	7.0		0.8	7.3	3.5	2.8	8.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.07	0.00	0.00	0.09	0.00		0.09	0.00	0.41	0.27	0.00	
Uniform Delay (d_1), s/veh	12.6	28.9	26.1	21.4	36.6		17.9	34.5	31.6	21.3	35.4	
Incremental Delay (d_2), s/veh	0.0	5.0	5.3	0.1	2.9		0.1	0.9	0.2	0.3	2.1	
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	12.6	33.9	31.4	21.5	39.5		18.0	35.4	31.8	21.6	37.4	
Level of Service (LOS)	B	C	C	C	D		B	D	C	C	D	
Approach Delay, s/veh / LOS	28.6	C		34.2	C		32.3	C		31.8	C	
Intersection Delay, s/veh / LOS	31.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.13	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.56	B	1.13	A	1.35	A	1.36	A

EXHIBIT 4.13
2024 PEAK PM HOUR ANALYSIS (Background) - Hazeldean/Huntmar

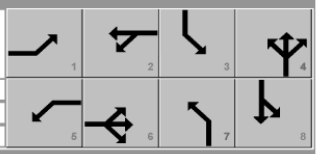
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2024-bak-PM.xus		
Project Description	21 Huntmar Drive Apartments (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	278	865	130	373	1196		161	389	288	292	414	

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.5	37.7		5.7	35.4	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.6		2.6	2.9	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	22.0	44.0	22.0	44.0	12.0	42.0	12.0	42.0
Change Period, (*Y+R c*), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	7.0		10.8		9.3	27.9	15.0	30.2
Green Extension Time (*g e*), s	0.5	0.0	0.5	0.0	0.0	1.5	0.0	1.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.01		0.30		1.00	0.23	1.00	0.49

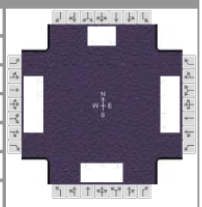
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	302	555	527	405	1300		175	423	161	317	450	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1667	1613	1660		1661	1786	1492	1701	1786	
Queue Service Time (*g s*), s	5.0	37.5	37.5	8.8	38.7		7.3	25.9	10.1	13.0	28.2	
Cycle Queue Clearance Time (*g c*), s	5.0	37.5	37.5	8.8	38.7		7.3	25.9	10.1	13.0	28.2	
Green Ratio (*g/C*)	0.58	0.32	0.32	0.58	0.32		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	753	567	538	738	1071		352	542	452	305	542	
Volume-to-Capacity Ratio (*X*)	0.401	0.979	0.979	0.549	1.214		0.497	0.780	0.356	1.041	0.831	
Back of Queue (Q), ft/ln (50 th percentile)	45	536.7	501.6	65.1	799.9		72.3	305.9	91.2	266.2	342.9	
Back of Queue (Q), veh/ln (50 th percentile)	1.8	21.0	20.1	2.5	31.0		2.8	12.1	3.6	10.6	13.6	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.08	0.00	0.00	0.13	0.00		0.31	0.00	0.43	1.02	0.00	
Uniform Delay (*d 1*), s/veh	20.7	40.7	40.3	26.7	40.7		22.8	38.6	32.6	28.3	39.4	
Incremental Delay (*d 2*), s/veh	0.1	32.9	34.0	0.5	105.1		0.4	6.6	0.2	62.8	9.9	
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	20.8	73.6	74.3	27.2	145.7		23.2	45.2	32.8	91.1	49.3	
Level of Service (LOS)	C	E	E	C	F		C	D	C	F	D	
Approach Delay, s/veh / LOS	62.3	E		117.6	F		37.5	D		66.6	E	
Intersection Delay, s/veh / LOS	79.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.49	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.63	B	1.89	B	1.74	B	1.75	B

EXHIBIT 4.14
2029 PEAK AM HOUR ANALYSIS (Background) - Hazeldean/Huntmar

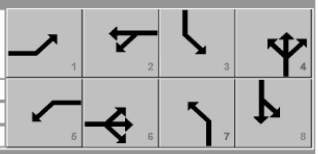
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2029-bak-AM.xus		
Project Description	21 Huntmar Drive Apartments (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	266	909	132	226	552		60	308	306	185	340	

Signal Information					EB			WB			NB			SB		
Cycle, s	115.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.5	5.5		30.7	5.7		33.4		0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7		3.7		0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.8		2.6	2.6		2.9		0.0			



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	26.0	49.0	14.0	37.0	12.0	40.0	12.0	40.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	6.6		7.1		4.4	20.6	10.0	23.0
Green Extension Time (g_e), s	0.6	0.0	0.0	0.0	0.0	1.6	0.0	1.5
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	0.02	1.00	0.06

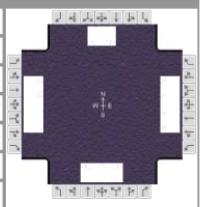
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	289	580	552	246	600		65	335	191	201	370	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1670	1613	1660		1661	1786	1493	1701	1786	
Queue Service Time (g_s), s	4.6	31.9	32.0	5.1	18.4		2.4	18.6	11.8	8.0	21.0	
Cycle Queue Clearance Time (g_c), s	4.6	31.9	32.0	5.1	18.4		2.4	18.6	11.8	8.0	21.0	
Green Ratio (*g/C*)	0.58	0.44	0.44	0.46	0.28		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	1185	767	729	620	915		421	534	447	372	534	
Volume-to-Capacity Ratio (*X*)	0.244	0.756	0.757	0.396	0.656		0.155	0.627	0.428	0.540	0.692	
Back of Queue (Q), ft/ln (50 th percentile)	40.4	366.7	343	48.3	201.2		23.5	206.9	106.4	78.7	238.6	
Back of Queue (Q), veh/ln (50 th percentile)	1.6	14.3	13.7	1.9	7.8		0.9	8.2	4.3	3.1	9.5	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.07	0.00	0.00	0.10	0.00		0.10	0.00	0.51	0.30	0.00	
Uniform Delay (d_1), s/veh	13.1	30.2	27.3	23.0	37.2		18.4	35.2	32.4	22.1	36.0	
Incremental Delay (d_2), s/veh	0.0	6.8	7.2	0.2	3.7		0.1	1.8	0.2	0.9	3.2	
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	13.1	37.0	34.5	23.1	40.9		18.4	36.9	32.6	23.0	39.2	
Level of Service (LOS)	B	D	C	C	D		B	D	C	C	D	
Approach Delay, s/veh / LOS	31.2		C	35.7		D	33.5		C	33.5		C
Intersection Delay, s/veh / LOS	33.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.13	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.66	B	1.19	A	1.46	A	1.43	A

EXHIBIT 4.15
2029 PEAK PM HOUR ANALYSIS (Background) - Hazeldean/Huntmar

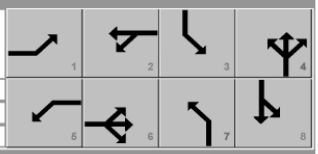
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2029-bak-PM.xus		
Project Description	21 Huntmar Drive Apartments (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	300	937	144	410	1310		176	420	315	308	452	

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.5	37.7		5.7	35.4	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.6		2.6	2.9	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	22.0	44.0	22.0	44.0	12.0	42.0	12.0	42.0
Change Period, (*Y+R c*), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	7.8		12.4		10.1	30.7	15.0	33.7
Green Extension Time (*g e*), s	0.5	0.0	0.4	0.0	0.0	1.3	0.0	0.6
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.02		1.00		1.00	0.62	1.00	1.00

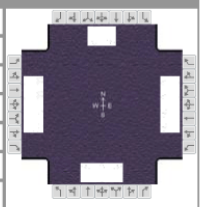
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	326	603	572	446	1424		191	457	190	335	491	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1666	1613	1660		1661	1786	1492	1701	1786	
Queue Service Time (*g s*), s	5.8	38.7	38.7	10.4	38.7		8.1	28.7	12.2	13.0	31.7	
Cycle Queue Clearance Time (*g c*), s	5.8	38.7	38.7	10.4	38.7		8.1	28.7	12.2	13.0	31.7	
Green Ratio (*g/C*)	0.58	0.32	0.32	0.58	0.32		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	753	567	537	738	1071		321	542	452	281	542	
Volume-to-Capacity Ratio (*X*)	0.433	1.063	1.065	0.604	1.330		0.595	0.843	0.420	1.191	0.907	
Back of Queue (Q), ft/ln (50 th percentile)	49	641.2	599.9	73.7	991.1		83.6	352.5	110.2	347.3	414.4	
Back of Queue (Q), veh/ln (50 th percentile)	1.9	25.0	24.0	2.9	38.4		3.2	14.0	4.4	13.8	16.4	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.09	0.00	0.00	0.15	0.00		0.36	0.00	0.52	1.34	0.00	
Uniform Delay (*d 1*), s/veh	22.2	40.7	40.7	28.6	40.7		24.3	39.6	33.4	29.5	40.6	
Incremental Delay (*d 2*), s/veh	0.1	55.6	57.4	1.0	154.9		2.1	11.0	0.2	115.6	18.6	
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	22.3	96.3	98.1	29.6	195.5		26.4	50.5	33.6	145.1	59.2	
Level of Service (LOS)	C	F	F	C	F		C	D	C	F	E	
Approach Delay, s/veh / LOS	80.9	F		156.0	F		41.2	D		94.0	F	
Intersection Delay, s/veh / LOS	104.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.49	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.73	B	2.03	B	1.87	B	1.85	B

EXHIBIT 4.16
2024 PEAK AM HOUR ANALYSIS (Total) - Hazeldean/Huntmar

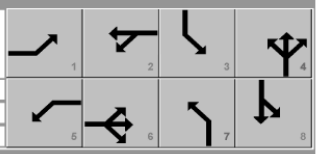
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2024-tot-AM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	247	832	119	208	506		55	284	277	218	325	

Signal Information					EB			WB			NB			SB		
Cycle, s	115.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.5	5.5		30.7	5.7		33.4		0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7		3.7		0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.8		2.6	2.6		2.9		0.0			



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	26.0	49.0	14.0	37.0	12.0	40.0	12.0	40.0
Change Period, (*Y+R c*), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	6.2		6.7		4.2	18.8	11.6	21.9
Green Extension Time (*g e*), s	0.5	0.0	0.0	0.0	0.0	1.5	0.0	1.4
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	0.01	1.00	0.03

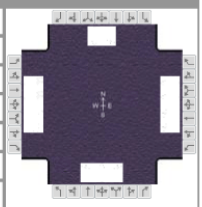
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	268	530	504	226	550		60	309	160	237	353	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1671	1613	1660		1661	1786	1493	1701	1786	
Queue Service Time (*g s*), s	4.2	28.0	28.0	4.7	16.5		2.2	16.8	9.7	9.6	19.9	
Cycle Queue Clearance Time (*g c*), s	4.2	28.0	28.0	4.7	16.5		2.2	16.8	9.7	9.6	19.9	
Green Ratio (*g/C*)	0.58	0.44	0.44	0.46	0.28		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	1226	767	730	665	915		434	534	447	391	534	
Volume-to-Capacity Ratio (*X*)	0.219	0.690	0.691	0.340	0.601		0.138	0.578	0.358	0.605	0.661	
Back of Queue (Q), ft/ln (50 th percentile)	37.4	316.5	295.2	44.1	179.8		21.4	185.3	86.8	97.5	223.3	
Back of Queue (Q), veh/ln (50 th percentile)	1.5	12.4	11.8	1.7	7.0		0.8	7.4	3.5	3.9	8.9	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.07	0.00	0.00	0.09	0.00		0.09	0.00	0.41	0.37	0.00	
Uniform Delay (*d 1*), s/veh	12.6	28.9	26.1	21.4	36.6		18.1	34.5	31.6	22.2	35.6	
Incremental Delay (*d 2*), s/veh	0.0	5.0	5.3	0.1	2.9		0.1	1.0	0.2	1.9	2.4	
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	
Control Delay (*d*), s/veh	12.6	33.9	31.4	21.5	39.5		18.1	35.6	31.8	24.1	38.1	
Level of Service (LOS)	B	C	C	C	D		B	D	C	C	D	
Approach Delay, s/veh / LOS	28.6	C		34.2	C		32.5	C		32.4	C	
Intersection Delay, s/veh / LOS	31.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.13	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.56	B	1.13	A	1.36	A	1.46	A

EXHIBIT 4.17
2024 PEAK PM HOUR ANALYSIS (Total) - Hazeldean/Huntmar

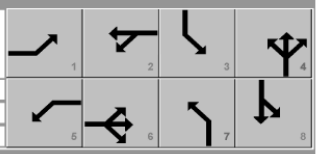
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2024-tot-PM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	288	865	130	373	1196		161	398	288	321	420	

Signal Information					EB			WB			NB		
Cycle, s	120.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	15.5	37.7		5.7	35.4	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.6		2.6	2.9	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	22.0	44.0	22.0	44.0	12.0	42.0	12.0	42.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	7.3		10.8		9.3	28.7	15.0	30.7
Green Extension Time (g_e), s	0.5	0.0	0.5	0.0	0.0	1.5	0.0	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.01		0.30		1.00	0.31	1.00	0.59

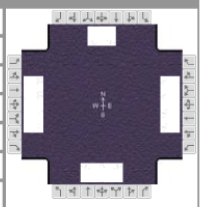
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	313	555	527	405	1300		175	433	161	349	457	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1667	1613	1660		1661	1786	1492	1701	1786	
Queue Service Time (g_s), s	5.3	37.5	37.5	8.8	38.7		7.3	26.7	10.1	13.0	28.7	
Cycle Queue Clearance Time (g_c), s	5.3	37.5	37.5	8.8	38.7		7.3	26.7	10.1	13.0	28.7	
Green Ratio (*g/C*)	0.58	0.32	0.32	0.58	0.32		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	753	567	538	738	1071		347	542	452	298	542	
Volume-to-Capacity Ratio (*X*)	0.416	0.979	0.979	0.549	1.214		0.504	0.799	0.356	1.171	0.843	
Back of Queue (Q), ft/ln (50 th percentile)	46.8	536.7	501.6	65.1	799.9		72.4	318.5	91.2	351.6	352.5	
Back of Queue (Q), veh/ln (50 th percentile)	1.9	21.0	20.1	2.5	31.0		2.8	12.6	3.6	14.0	14.0	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.08	0.00	0.00	0.13	0.00		0.31	0.00	0.43	1.35	0.00	
Uniform Delay (d_1), s/veh	21.2	40.7	40.3	26.7	40.7		22.9	38.9	32.6	27.7	39.6	
Incremental Delay (d_2), s/veh	0.1	32.9	34.0	0.5	105.1		0.5	7.6	0.2	106.9	11.0	
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	21.4	73.6	74.3	27.2	145.7		23.4	46.5	32.8	134.7	50.5	
Level of Service (LOS)	C	E	E	C	F		C	D	C	F	D	
Approach Delay, s/veh / LOS	62.1	E		117.6	F		38.4	D		87.0	F	
Intersection Delay, s/veh / LOS	82.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.49	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.64	B	1.89	B	1.76	B	1.82	B

EXHIBIT 4.18
2029 PEAK AM HOUR ANALYSIS (Total) - Hazeldean/Huntmar

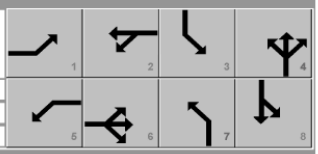
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2029-tot-AM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	270	909	132	226	552		60	311	306	231	349	

Signal Information					EB			WB			NB			SB		
Cycle, s	115.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	7.5	5.5		30.7	5.7		33.4		0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7		3.7		0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.8		2.6	2.6		2.9		0.0			



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	26.0	49.0	14.0	37.0	12.0	40.0	12.0	40.0
Change Period, ($Y+R_c$), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	6.7		7.1		4.4	20.8	12.3	23.7
Green Extension Time (g_e), s	0.6	0.0	0.0	0.0	0.0	1.6	0.0	1.5
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		1.00		1.00	0.03	1.00	0.09

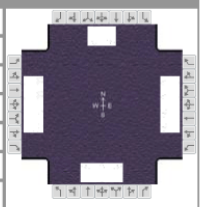
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	293	580	552	246	600		65	338	191	251	379	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1670	1613	1660		1661	1786	1493	1701	1786	
Queue Service Time (g_s), s	4.7	31.9	32.0	5.1	18.4		2.4	18.8	11.8	10.3	21.7	
Cycle Queue Clearance Time (g_c), s	4.7	31.9	32.0	5.1	18.4		2.4	18.8	11.8	10.3	21.7	
Green Ratio (*g/C*)	0.58	0.44	0.44	0.46	0.28		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	1185	767	729	620	915		413	534	447	370	534	
Volume-to-Capacity Ratio (*X*)	0.248	0.756	0.757	0.396	0.656		0.158	0.633	0.428	0.679	0.710	
Back of Queue (Q), ft/ln (50 th percentile)	41.2	366.7	343	48.3	201.2		23.5	209.8	106.4	109.2	248.2	
Back of Queue (Q), veh/ln (50 th percentile)	1.6	14.3	13.7	1.9	7.8		0.9	8.3	4.3	4.3	9.8	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.07	0.00	0.00	0.10	0.00		0.10	0.00	0.51	0.42	0.00	
Uniform Delay (d_1), s/veh	13.1	30.2	27.3	23.0	37.2		18.5	35.2	32.4	23.1	36.3	
Incremental Delay (d_2), s/veh	0.0	6.8	7.2	0.2	3.7		0.1	1.9	0.2	4.1	3.7	
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	13.1	37.0	34.5	23.1	40.9		18.6	37.1	32.6	27.2	40.0	
Level of Service (LOS)	B	D	C	C	D		B	D	C	C	D	
Approach Delay, s/veh / LOS	31.1		C	35.7		D	33.6		C	34.9		C
Intersection Delay, s/veh / LOS	33.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.13	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.66	B	1.19	A	1.47	A	1.53	B

EXHIBIT 4.19
2029 PEAK PM HOUR ANALYSIS (Total) - Hazeldean/Huntmar

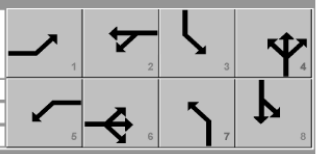
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/1/2021	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Hazeldean Road	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Huntmar/Hazeldean	File Name	724_2029-tot-PM.xus		
Project Description	21 Huntmar Drive Apartments				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	310	937	144	410	1310		176	429	315	337	458	

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	15.5	37.7		5.7	35.4	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7		3.7	3.7	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	2.6		2.6	2.9	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	22.0	44.0	22.0	44.0	12.0	42.0	12.0	42.0
Change Period, (*Y+R c*), s	6.5	6.3	6.5	6.3	6.3	6.6	6.3	6.6
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	8.2		12.4		10.1	31.5	15.0	34.3
Green Extension Time (*g e*), s	0.5	0.0	0.4	0.0	0.0	1.2	0.0	0.4
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.03		1.00		1.00	0.80	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	1	6	16	5	2		7	4	14	3	8	
Adjusted Flow Rate (*v*), veh/h	337	603	572	446	1424		191	466	190	366	498	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1652	1758	1666	1613	1660		1661	1786	1492	1701	1786	
Queue Service Time (*g s*), s	6.2	38.7	38.7	10.4	38.7		8.1	29.5	12.2	13.0	32.3	
Cycle Queue Clearance Time (*g c*), s	6.2	38.7	38.7	10.4	38.7		8.1	29.5	12.2	13.0	32.3	
Green Ratio (*g/C*)	0.58	0.32	0.32	0.58	0.32		0.48	0.30	0.30	0.48	0.30	
Capacity (*c*), veh/h	753	567	537	738	1071		317	542	452	274	542	
Volume-to-Capacity Ratio (*X*)	0.447	1.063	1.065	0.604	1.330		0.604	0.861	0.420	1.335	0.919	
Back of Queue (Q), ft/ln (50 th percentile)	50.8	641.2	599.9	73.7	991.1		84.1	368.4	110.2	449.8	428	
Back of Queue (Q), veh/ln (50 th percentile)	2.0	25.0	24.0	2.9	38.4		3.3	14.6	4.4	17.8	17.0	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.09	0.00	0.00	0.15	0.00		0.37	0.00	0.52	1.73	0.00	
Uniform Delay (*d 1*), s/veh	22.9	40.7	40.7	28.6	40.7		24.5	39.9	33.4	30.7	40.8	
Incremental Delay (*d 2*), s/veh	0.2	55.6	57.4	1.0	154.9		2.3	12.7	0.2	173.6	20.5	
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	
Control Delay (*d*), s/veh	23.0	96.3	98.1	29.6	195.5		26.9	52.6	33.6	204.4	61.4	
Level of Service (LOS)	C	F	F	C	F		C	D	C	F	E	
Approach Delay, s/veh / LOS	80.6	F		156.0	F		42.5	D		122.0	F	
Intersection Delay, s/veh / LOS	109.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.49	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.73	B	2.03	B	1.89	B	1.91	B

EXHIBIT 4.20
2016 PEAK AM HOUR ANALYSIS (Traffic Counts) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar Drive Apartments	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	25	1	25	0	27	3	2	2	7	426	22	7	4	333	3
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	27	1	27	0	29	3	2	2	8	468	24	8	4	366	3
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	2				3				9				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			34			502			381	
Entry Volume, veh/h		55			34			497			377	
Circulating Flow (v_c), pc/h	409			513			40			42		
Exiting Flow (v_{ex}), pc/h	29			14			505			424		
Capacity (c_{pce}), pc/h		909			818			1325			1322	
Capacity (c), veh/h		909			817			1311			1310	
v/c Ratio (x)		0.06			0.04			0.38			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.5			4.8			6.3			5.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.8			1.2	
Approach Delay, s/veh	4.5			4.8			6.3			5.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.8						A					

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EXHIBIT 4.21
2016 PEAK PM HOUR ANALYSIS (Traffic Counts) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar Drive Apartments	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	2	25	0	62	9	0	0	46	488	29	6	6	700	25
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	18	2	27	0	67	10	0	0	50	536	32	7	7	768	27
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	3				2				6				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		47			77			618			809	
Entry Volume, veh/h		47			77			613			801	
Circulating Flow (v_c), pc/h	849			611			34			127		
Exiting Flow (v_{ex}), pc/h	41			87			561			862		
Capacity (c_{pce}), pc/h		580			740			1333			1212	
Capacity (c), veh/h		580			740			1320			1201	
v/c Ratio (x)		0.08			0.10			0.46			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.2			6.0			7.4			12.1	
Lane LOS		A			A			A			B	
95% Queue, veh		0.3			0.3			2.5			5.4	
Approach Delay, s/veh	7.2			6.0			7.4			12.1		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	9.8						A					

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EXHIBIT 4.22
2024 PEAK AM HOUR ANALYSIS (Background) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2024	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar (BACKGROUND)	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	25	1	25	0	27	3	2	2	7	679	22	7	4	547	3
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	27	1	27	0	29	3	2	2	8	745	24	8	4	601	3
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	2				3				9				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			34			779			616	
Entry Volume, veh/h		55			34			772			610	
Circulating Flow (v_c), pc/h	644			790			40			42		
Exiting Flow (v_{ex}), pc/h	29			14			782			659		
Capacity (c_{pce}), pc/h		715			616			1325			1322	
Capacity (c), veh/h		715			616			1311			1309	
v/c Ratio (x)		0.08			0.06			0.59			0.47	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.8			6.5			9.5			7.5	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			4.1			2.5	
Approach Delay, s/veh	5.8			6.5			9.5			7.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.5						A					

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EXHIBIT 4.23
2024 PEAK PM HOUR ANALYSIS (Background) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2024	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar (BACKGROUND)	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	2	25	0	62	9	0	0	46	804	29	6	6	1040	25
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	18	2	27	0	67	10	0	0	50	883	32	7	7	1142	27
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	3				2				6				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		47			77			965			1183	
Entry Volume, veh/h		47			77			956			1172	
Circulating Flow (v_c), pc/h	1223			958			34			127		
Exiting Flow (v_{ex}), pc/h	41			87			908			1236		
Capacity (c_{pce}), pc/h		396			519			1333			1212	
Capacity (c), veh/h		396			519			1320			1201	
v/c Ratio (x)		0.12			0.15			0.72			0.98	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.9			8.9			13.2			39.1	
Lane LOS		B			A			B			E	
95% Queue, veh		0.4			0.5			6.9			19.2	
Approach Delay, s/veh	10.9			8.9			13.2			39.1		
Approach LOS	B			A			B			E		
Intersection Delay, s/veh | LOS	26.5						D					

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EXHIBIT 4.24
2029 PEAK AM HOUR ANALYSIS (Background) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2029	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar (BACKGROUND)	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	25	1	25	0	27	3	2	2	7	731	22	7	4	588	3
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	27	1	27	0	29	3	2	2	8	803	24	8	4	646	3
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	2				3				9				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			34			837			661	
Entry Volume, veh/h		55			34			829			655	
Circulating Flow (v_c), pc/h	689			848			40			42		
Exiting Flow (v_{ex}), pc/h	29			14			840			704		
Capacity (c_{pce}), pc/h		683			581			1325			1322	
Capacity (c), veh/h		683			581			1311			1309	
v/c Ratio (x)		0.08			0.06			0.63			0.50	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			6.9			10.5			8.0	
Lane LOS		A			A			B			A	
95% Queue, veh		0.3			0.2			4.8			2.9	
Approach Delay, s/veh	6.1			6.9			10.5			8.0		
Approach LOS	A			A			B			A		
Intersection Delay, s/veh | LOS	9.2						A					

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EXHIBIT 4.25
2029 PEAK PM HOUR ANALYSIS (Background) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2029	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar (BACKGROUND)	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	2	25	0	62	9	0	0	46	863	29	6	6	1126	25
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	18	2	27	0	67	10	0	0	50	947	32	7	7	1236	27
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	3				2				6				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		47			77			1029			1277	
Entry Volume, veh/h		47			77			1020			1265	
Circulating Flow (v_c), pc/h	1317			1022			34			127		
Exiting Flow (v_{ex}), pc/h	41			87			972			1330		
Capacity (c_{pce}), pc/h		360			487			1333			1212	
Capacity (c), veh/h		360			487			1320			1201	
v/c Ratio (x)		0.13			0.16			0.77			1.05	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.1			9.6			15.1			59.6	
Lane LOS		B			A			C			F	
95% Queue, veh		0.4			0.6			8.3			26.1	
Approach Delay, s/veh	12.1			9.6			15.1			59.6		
Approach LOS	B			A			C			F		
Intersection Delay, s/veh | LOS	38.2						E					

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EXHIBIT 4.26
2024 PEAK AM HOUR ANALYSIS (Total) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	
Date Performed	2/1/2021
Analysis Year	2024
Time Analyzed	Peak AM Hour
Project Description	21 Huntmar Drive Apartments

Site Information

Intersection	Rosehill/Huntmar
E/W Street Name	Rosehill Avenue
N/S Street Name	Huntmar Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	25	1	25	0	27	3	2	2	7	709	22	7	4	556	3
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	27	1	27	0	29	3	2	2	8	778	24	8	4	610	3
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	2				3				9				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			34			812			625	
Entry Volume, veh/h		55			34			804			619	
Circulating Flow (v_c), pc/h	653			823			40			42		
Exiting Flow (v_{ex}), pc/h	29			14			815			668		
Capacity (c_{pce}), pc/h		709			596			1325			1322	
Capacity (c), veh/h		709			596			1311			1309	
v/c Ratio (x)		0.08			0.06			0.61			0.47	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.9			6.7			10.1			7.6	
Lane LOS		A			A			B			A	
95% Queue, veh		0.3			0.2			4.5			2.6	
Approach Delay, s/veh	5.9			6.7			10.1			7.6		
Approach LOS	A			A			B			A		
Intersection Delay, s/veh | LOS	8.8						A					

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EXHIBIT 4.27
2024 PEAK PM HOUR ANALYSIS (Total) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2024	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar Drive Apartments	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	2	25	0	62	9	0	0	46	823	29	6	6	1070	25
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	18	2	27	0	67	10	0	0	50	904	32	7	7	1175	27
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	3				2				6				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		47			77			986			1216	
Entry Volume, veh/h		47			77			977			1204	
Circulating Flow (v_c), pc/h	1256			979			34			127		
Exiting Flow (v_{ex}), pc/h	41			87			929			1269		
Capacity (c_{pce}), pc/h		383			508			1333			1212	
Capacity (c), veh/h		383			508			1320			1201	
v/c Ratio (x)		0.12			0.15			0.74			1.00	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.3			9.1			13.7			45.5	
Lane LOS		B			A			B			F	
95% Queue, veh		0.4			0.5			7.3			21.5	
Approach Delay, s/veh	11.3			9.1			13.7			45.5		
Approach LOS	B			A			B			E		
Intersection Delay, s/veh | LOS	30.1						D					

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EXHIBIT 4.28
2029 PEAK AM HOUR ANALYSIS (Total) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2029	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar Drive Apartments	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	25	1	25	0	27	3	2	2	7	761	22	7	4	597	3
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	27	1	27	0	29	3	2	2	8	835	24	8	4	655	3
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	2				3				9				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			34			869			670	
Entry Volume, veh/h		55			34			861			664	
Circulating Flow (v_c), pc/h	698			880			40			42		
Exiting Flow (v_{ex}), pc/h	29			14			872			713		
Capacity (c_{pce}), pc/h		677			562			1325			1322	
Capacity (c), veh/h		677			562			1311			1309	
v/c Ratio (x)		0.08			0.06			0.66			0.51	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.2			7.1			11.1			8.1	
Lane LOS		A			A			B			A	
95% Queue, veh		0.3			0.2			5.2			3.0	
Approach Delay, s/veh	6.2			7.1			11.1			8.1		
Approach LOS	A			A			B			A		
Intersection Delay, s/veh | LOS	9.6						A					

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EXHIBIT 4.29
2029 PEAK PM HOUR ANALYSIS (Total) - Rosehill/Huntmar

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Rosehill/Huntmar
Agency or Co.		E/W Street Name	Rosehill Avenue
Date Performed	2/1/2021	N/S Street Name	Huntmar Drive
Analysis Year	2029	Analysis Time Period (hrs)	0.25
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Project Description	21 Huntmar Drive Apartments	Jurisdiction	City of Ottawa

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	2	25	0	62	9	0	0	46	882	29	6	6	1157	25
Percent Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Flow Rate (v_{PCE}), pc/h	0	18	2	27	0	67	10	0	0	50	968	32	7	7	1270	27
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	3				2				6				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		47			77			1050			1311	
Entry Volume, veh/h		47			77			1040			1298	
Circulating Flow (v_c), pc/h	1351			1043			34			127		
Exiting Flow (v_{ex}), pc/h	41			87			993			1364		
Capacity (c_{pce}), pc/h		348			476			1333			1212	
Capacity (c), veh/h		348			476			1320			1201	
v/c Ratio (x)		0.14			0.16			0.79			1.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.6			9.8			15.9			68.7	
Lane LOS		B			A			C			F	
95% Queue, veh		0.5			0.6			8.9			29.0	
Approach Delay, s/veh	12.6			9.8			15.9			68.7		
Approach LOS	B			A			C			F		
Intersection Delay, s/veh | LOS	43.5						E					

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EXHIBIT 4.30
ACCESS/HUNTMAR - PLOS INTERSECTION EVALUATION

MAIN STREET	Huntmar Drive
MINOR STREET	Access
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?	Yes		Yes		No		No	
Total Travel Lanes Crossed	5	75	5	75	3	105	2	120
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Protected	0	Protected	0	Permissive	−8	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		48		48		70		85
DELAY SCORE								
Cycle length		100		100		100		100
From Signal Timing Plan		28		28		30		30
PETSI SCORE		**D**		**D**		**C**		**B**
DELAY SCORE		**C**		**C**		**C**		**C**
OVERALL APPROACH SCORE		**D**		**D**		**C**		**C**

OVERALL INTERSECTION SCORE **D**

EXHIBIT 4.31
HAZELDEAN/HUNTMAR - PLOS INTERSECTION EVALUATION

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar 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?	Yes		Yes		Yes		Yes	
Total Travel Lanes Crossed	6	60	5	75	6	60	7	45
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Protected	0	Protected	0	Protected	0	Protected	0
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	> 15m to 25m	−8	> 15m to 25m	−8	> 15m to 25m	−8	> 15m to 25m	−8
5.3b Right Turn Channel	Right Turn Channel without Right Turn	0	No Right Turn Channel	−4	Right Turn Channel without Right Turn	0	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		35		46		35		16
DELAY SCORE								
Cycle length		120		120		120		120
From Signal Timing Plan		42		34		32		34
PETSI SCORE		**E**		**D**		**E**		**F**
DELAY SCORE		**E**		**D**		**D**		**D**
OVERALL APPROACH SCORE		**E**		**D**		**E**		**D**

OVERALL INTERSECTION SCORE **F**

EXHIBIT 4.32
ACCESS/HUNTMAR - BLOS INTERSECTION EVALUATION

MAIN STREET	Huntmar Drive
MINOR STREET	Access
APPROACHES	All Approaches
YEAR	2029
DIRECTION	North/South
MMLOS MODE	BLOS

INTERSECTION SCORE **E**

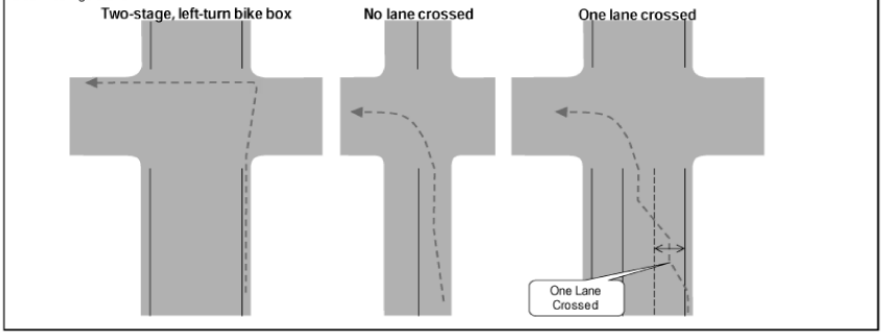
Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a 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

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 4.33
HAZELDEAN/HUNTMAR - BLOS INTERSECTION EVALUATION

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar Drive
APPROACHES	All Approaches
YEAR	2029
DIRECTION	Eastbound/Westbound
MMLOS MODE	BLOS

INTERSECTION SCORE **F**

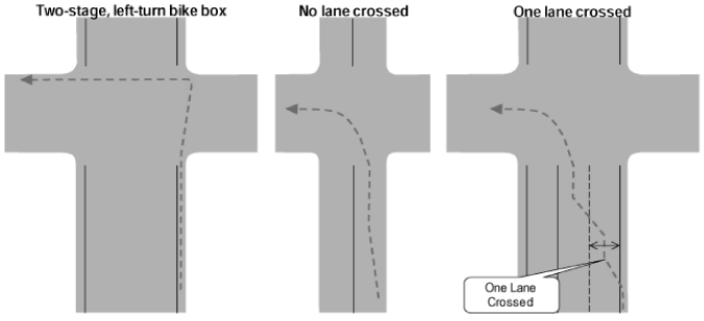
Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a 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

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 4.34
ACCESS/HUNTMAR - TLOS INTERSECTION EVALUATION

MAIN STREET	Huntmar Drive
MINOR STREET	Access
APPROACHES	All
YEAR	2029
MMLOS MODE	TLOS

INTERSECTION SCORE **C**

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 4.35
HAZELDEAN/HUNTMAR - TLOS INTERSECTION EVALUATION

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar Drive
APPROACHES	All
YEAR	2029
MMLOS MODE	TLOS

INTERSECTION SCORE **E**

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