COMMUNITY RETAIL DEVELOPMENT
5707 HAZELDEAN ROAD
OTTAWA, ONTARIO

TRANSPORTATION IMPACT ASSESSMENT (REVISED)

December 20, 2019

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Prepared for:

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

COMMUNITY RETAIL DEVELOPMENT
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STEP 1 - SCREENING

A Screening Form has been prepared for the proposed additional retail located at the Shoppes at Fairwinds shopping centre at 5707 Hazeldean Road. The Screening Form, which is included as Exhibit 1.1 in the Appendix, determined that the Trip Generation and Location Triggers have been triggered. It is recommended that the assessment study proceed to the Scoping Document. 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 Community Retail Development will comprise of additional retail constructed within the Shoppes at Fairwinds shopping centre located at the northeast corner of the intersection of Hazeldean Road and Huntmar Drive. The total site is 8.460 hectares (20.9 acres) and has had Phase 1 of the shopping centre constructed in 2011 which included the Food Basics grocery store at the Huntmar Drive site access. At the time of the Site Plan Application for Phase 1, a Transportation Impact Study (TIS) was prepared dated December 22, 2008 which addressed the impact of the total development of the site (Phase 1 and Phase 2). The existing site currently contains a variety of uses comprising of retail stores, bank, a drug store, medical clinics and a high turn-over restaurant. Since the original study was prepared and approved, additional retail buildings have been constructed as part of Phase 2 and an Addendum was prepared to address the impact of the development. Figure 2.1 shows the location of the site.

This Transportation Impact Assessment (TIA) study will be addressing the impact of the retail buildings labelled Box D, Pad B and CPU B. As part of the previous submissions, Box D and Pad B received Site Plan approval under the Master Plan, and the CPU B Expansion was proposed as several Box retail stores along the north side of the site. Tenants for the three retail stores have not been secured to date. The gross floor area of the proposed buildings is provided in Table 2.1 with completion expected by 2021.

FIGURE 2.1
SITE LOCATION PLAN

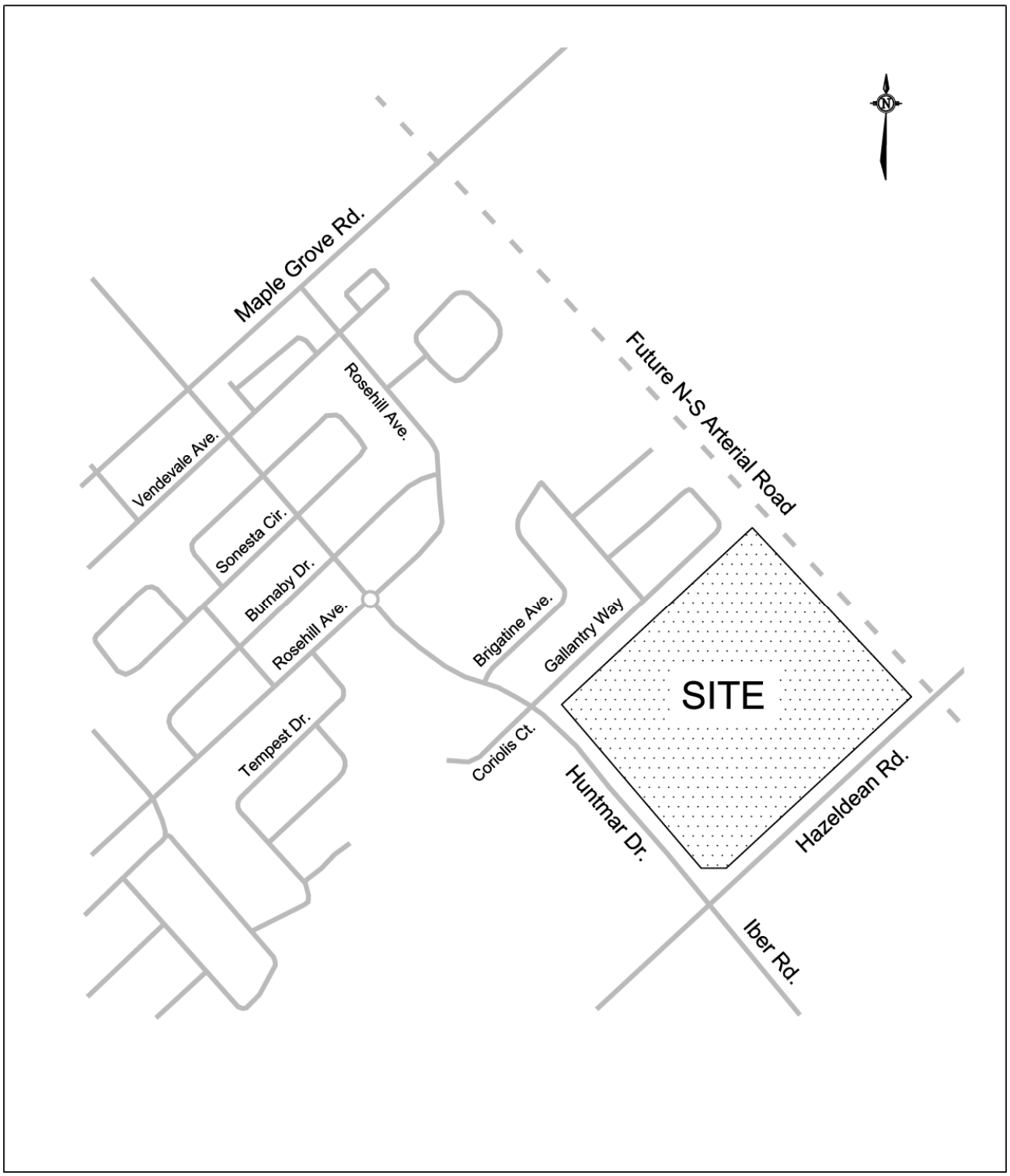

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TABLE 2.1
INVENTORY OF PROPOSED RETAIL

BUILDING	GROSS FLOOR AREA	
BOX D	2,322.5 m^2	25,000 ft^2
PAD B	675.3 m^2	7,270 ft^2
CPU B Expansion	1,434.3 m^2	15,440 ft^2
Total Gross Floor Area	**4,432.1 m^2**	**47,710 ft^2**

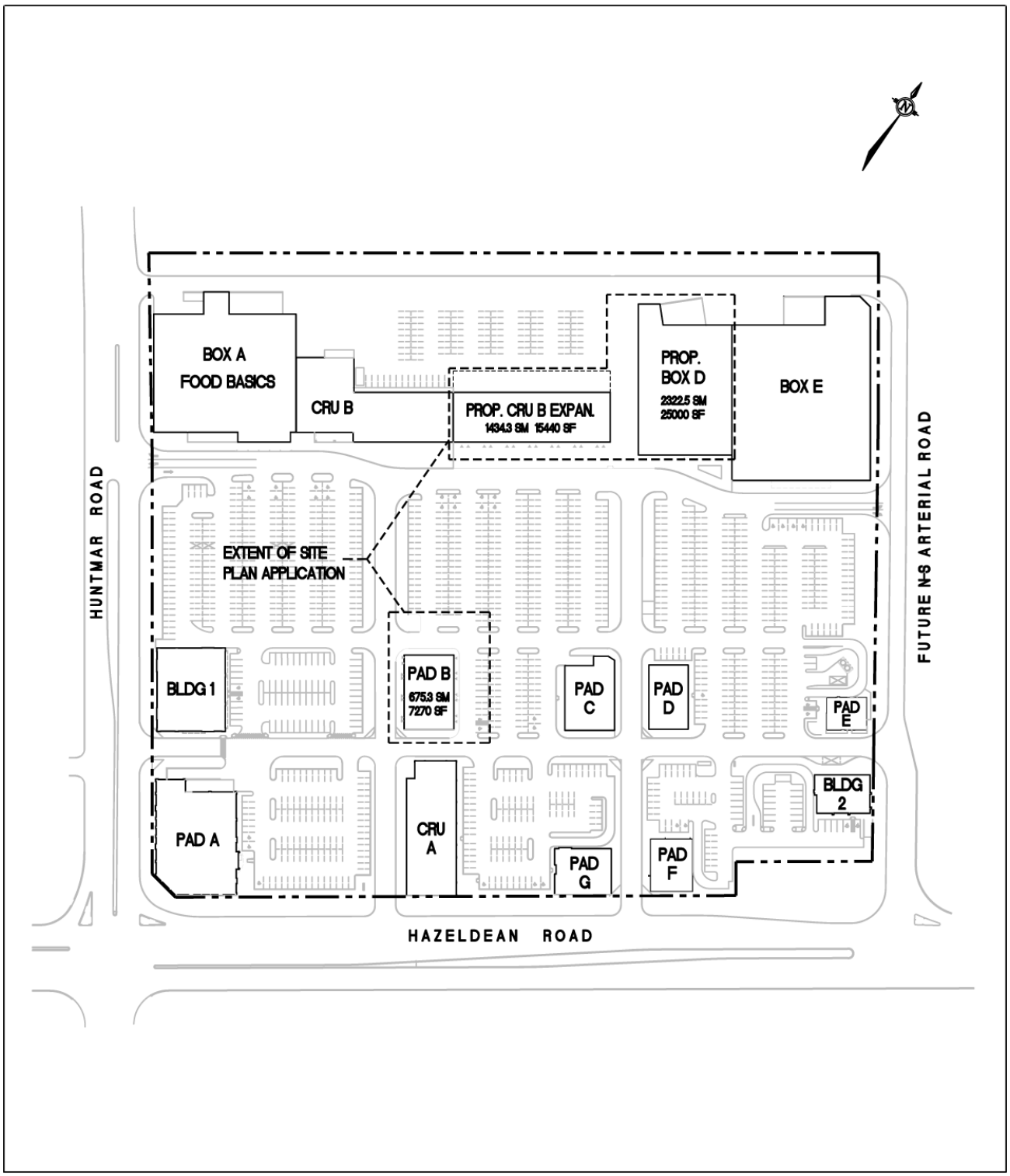
Trips by customers to the retail will utilize the existing shopping centre access points onto Hazeldean Road and Huntmar Drive. The main access points to the shopping centre would be the signalized intersection at the southeast corner of the site which will be the future intersection of Hazeldean Road and the N-S Arterial Road, and the full movement access at the northwest corner of the site which is a two-way stop controlled intersection at the Food Basics access onto Huntmar Drive. There are two existing right-in/right-out accesses on Hazeldean Road and one right-in/right-out access onto Huntmar Drive, with turning movements all controlled by a centre median. An existing service access is located at the north end of the site behind the retail buildings. There are no new site accesses proposed for the site.

The shopping centre is zoned AM7[1446] “Arterial Mainstreet Zone” which will support the proposed buildings. The Site Plan shows that 1076 parking spaces are provided. As development progresses, the number of parking spaces will always meet City of Ottawa By-laws. Figure 2.2 provides a conceptual site plan of the development.

Element 2.1.2 – Existing Conditions

The Shoppes at Fairwinds shopping centre is located at the northeast corner of the Huntmar/Hazeldean intersection. 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 and is a four lane divided urban road. The posted speed limit in the vicinity of the site is 60 km./h., which reduces to 50 km./h. at the north limit of the site where the adjacent development becomes residential. Trucks are prohibited along Huntmar Drive between Hazeldean Road and Palladium Drive. A sidewalk is provided along the east side of the road adjacent to the site. 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 on both sides of the road. On the west side of Huntmar Drive across from the site are vacant lands with the exception of a restaurant at the northwest corner of the Hazeldean/Huntmar intersection. The restaurant has two right-in/right-out accesses, with one onto Huntmar Drive and the second on Hazeldean Road.

FIGURE 2.2
CONCEPTUAL SITE PLAN



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Hazeldean Road is under the jurisdiction of the City of Ottawa and is adjacent to the south limit of the site. The road was reconstructed in 2010 to a four lane 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. Lands on the south side of Hazeldean Road across from the site are vacant with the one residential/commercial building with a right-in/right-out driveway just west of the Hazeldean/N-S Arterial intersection.

There is one full movement access onto Huntmar Drive at a "T" intersection which is controlled by a stop sign at the westbound site egress. Below is the existing lane configuration to the Huntmar/Food Basics (210 m N of Hazeldean) 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)

The shopping centre has one full movement access onto Hazeldean Road which would eventually form the intersection to the future N-S Arterial Road. The intersection is a "T" intersection controlled by traffic signals and was constructed as part of the Hazeldean Road Rehabilitation project. The shopping centre has one access onto the future N-S Arterial Road located 90 m north of Hazeldean Road, with a second future access to be located 105 m further north of the existing access. The second access would be connected to the N-S Arterial Road following the construction of the road. Below is the existing lane configuration to the Hazeldean/N-S Arterial (325 m E of Huntmar) intersection:

Southbound N-S Arterial	One left turn lane
	One Right turn lane
Eastbound Hazeldean	One left turn lane (70 m storage)
	Two through lanes
Westbound Hazeldean	One right turn lane
	Two through lanes

In addition to the two full movement intersections, the shopping centre currently has three right-in/right-out accesses with turning movements controlled by a centre median. Two of the accesses are onto Hazeldean Road with one located 115 m east of the Hazeldean/Huntmar intersection and the second located 225 m east of the Hazeldean/Huntmar intersection. The site has one right-in/right-out access onto Huntmar Drive located 90m north of the Hazeldean/Huntmar intersection.

The shopping centre is located at the northeast corner of the intersection of Hazeldean Road and Huntmar Drive. 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

Rehabilitation 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)

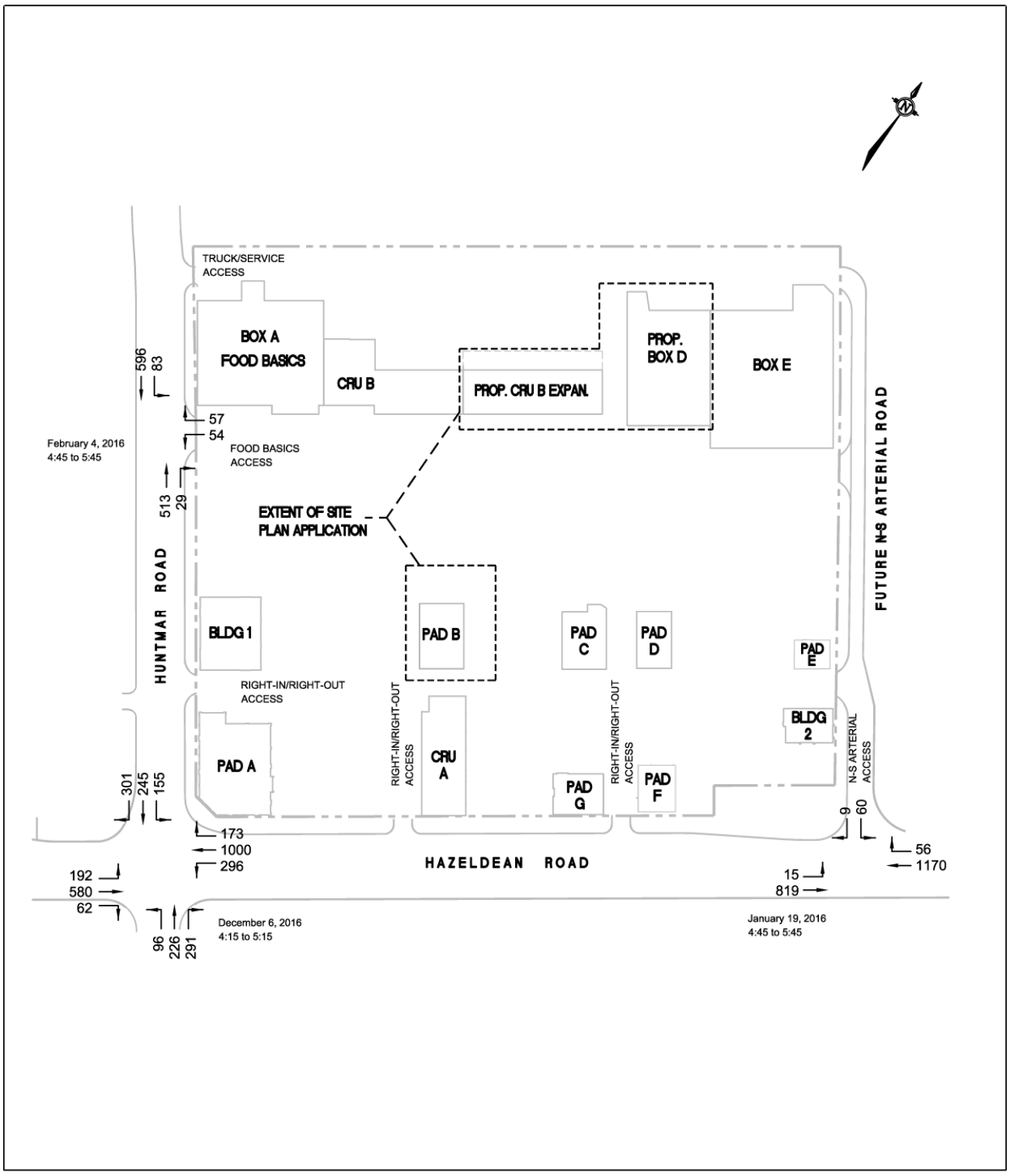
The most recent 2016 weekday peak PM hour traffic counts which were obtained from the City of Ottawa are shown in Figure 2.3 for the intersections of Huntmar/Food Basics, Hazeldean/N-S Arterial and Hazeldean/Huntmar. The traffic counts are provided in the Appendix as Exhibit 2.1, 2.2 and 2.3. The traffic signal timing plans obtained from the City of Ottawa are provided as Exhibit 2.4 for the Hazeldean/N-S Arterial and Exhibit 2.5 for the Hazeldean/Huntmar intersections.

Collision reports were obtained from the City of Ottawa through Open Data Ottawa for the five year time period between the years January 1, 2013 and December 31, 2017. The collision reports were for the Huntmar/Food Basics (210 m N of Hazeldean), the Hazeldean/N-S Arterial (335 m E of Huntmar) and Hazeldean/Huntmar intersections. Reported collisions were also obtained for the Hazeldean Road and Huntmar Drive road segments adjacent to the site. Table 2.2 summarizes the collisions by year and type.

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 Routes 261 and 263 provide service along Huntmar Drive. Bus stops are provided along Hazeldean Road adjacent to the site and along Huntmar Drive at the first street north of the site along with stops at the Hazeldean/Huntmar intersection.

Traffic counts for the 2016 weekday peak PM hour and Saturday peak hour at the Huntmar/Food Basics intersection determined that the volume of traffic along Huntmar Drive was highest during the weekday peak PM hour. The Shoppes of Fairwinds has experienced little development since the 2016 counts were taken with the exception of a high-turnover sit-down restaurant built at the southeast corner of the shopping centre in the fall of 2018. The peak hour study analysis will examine the impact of the proposed development during the peak hour which the traffic counts determined to be during the weekday peak PM hour of the adjacent roads. The study will analyze the three signalized intersections of Huntmar/Food Basics (210m N of Hazeldean), Hazeldean/N-S Arterial (325m E of Huntmar) and Hazeldean/Huntmar. The analysis years would be the most recent traffic counts obtained from the City of Ottawa for the 2016 traffic at the Huntmar/Food Basics, Hazeldean/Huntmar, and the Hazeldean/N-S Arterial

FIGURE 2.3
2016 PEAK PM HOUR TRAFFIC COUNTS



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intersections. All intersections would be examined at the completion of the proposed development at the year 2021 and five years beyond completion at the year 2026.

TABLE 2.2
COLLISION SUMMARY

YEAR	COLLISION TYPE					TOTAL
	REAR END	ANGULAR	TURNING	SIDESWIPE	OTHER (SMV)	
Huntmar Drive at Food Basics (210m north of Hazeldean Road)						
2013		1				1
2014						0
2015		1				1
2016						0
2017						0
Hazeldean Road at N-S Arterial Road (335m east of Huntmar Drive)						
2013	3			1		4
2014				1		1
2015		1	1			2
2016						0
2017			1			1
Hazeldean Road at Huntmar Drive						
2013	6		2		1	9
2014	8	2	2		2	14
2015	7	2	3	1		13
2016	4	1		2		7
2017	7	1	1			9
Huntmar Drive Segment between Hazeldean and 210m north of Hazeldean Road						
2013						0
2014						0
2015						0
2016						0
2017						0
Hazeldean Road Segment between Huntmar Drive and 335m east of Huntmar Drive						
2013						0
2014						0
2015						0
2016						0
2017						0

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 has been recently constructed 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 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 additional retail was determined to be confined to the signalized site accesses and adjacent intersection. The intersections analyzed would comprise of the Huntmar/Food Basics, Hazeldean/N-S Arterial and Hazeldean/Huntmar intersections. The three right-in/right-out site accesses were not examined as they would experience low traffic volumes and have a high level of service.

Element 2.2.2 – Time Periods

The time period for the analysis would be the weekday peak PM time period of traffic which would occur during the peak hour of the adjacent street traffic when drivers are travelling home from work. Although the Saturday peak hour would likely be the peak hour of the shopping centre, the weekday peak PM hour would produce the highest traffic along Hazeldean Road and Huntmar Drive and would be the time period that the site would have the highest impact on the adjacent roads.

Element 2.2.3 – Horizon Years

The TIA will address the impact of the additional retail for the Shoppes at Fairwinds which is expected to be completed and operational by the year 2021. The analysis will further examine the impact at the year 2026 which is 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	No – The site accesses which have already been constructed will be examined for the additional retail.
	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. The site will use the existing parking lot at the Shoppes at Fairwinds.
	4.2.2 Spillover Parking	Yes - Parking will meet the City of Ottawa By-laws. Spillover parking is not expected to be a problem.
Network Impact Component		
4.5 Transportation Demand Management	All Elements	Yes – The retail would not have greater than 60 employees and would not benefit from TDM.
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Yes – The site will have access onto an arterial 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 proposed development will consist of three individual retail buildings which are labeled as Box D, Pad B and CPU B as shown in the conceptual site plan of Figure 2.2. The buildings are distributed throughout the shopping centre site sharing parking with other building uses and utilizing the existing site accesses onto Hazeldean Road and Huntmar Drive. The buildings will consist of a retail use with tenants not secured to date. The proposed development (all three buildings) will have a combined gross floor area of 4,432.1 m^2 (47,710 ft^2) as detailed in Table 2.1. The number of expected site generated trips utilized the trip statistical data in the Institute of Transportation Engineers (ITE) document, *Trip Generation Manual 10th Edition*. Since the proposed additional retail is part of the larger retail on site, the study will utilize the Average Trip Rate for a "Shopping Center" ITE 820 Land Use. The trip rate for the weekday peak PM hour of the adjacent street traffic shown in Table 3.1 with the ITE trip data graph provided as Exhibit 3.1 in the Appendix.

TABLE 3.1
VEHICLE TRIP GENERATION RATES AND DIRECTIONAL SPLITS

Peak Hour	**Peak PM Hour**	
Trip Rate	3.81 T/1000 ft^2	
Directional Distribution	48% Entering	52% Exiting

The modal share was determined using statistical data for the Kanata/Stittsville area in the *2011 NCR Household Origin-Destination Survey* (page 117) for a weekday peak PM hour, The modal share in Table 3.2 recognizes that travel trends to an outdoor shopping centre generally have a lower transit and cycling share than most destinations.

The auto-trips are shown in Table 3.3 and are the product of the gross floor area of the total of all three building proposed in the application (Table 2.1), and the peak hour trip generation rates of Table 3.1. The number of person-trips was determined by the number of auto-trips calculated from the ITE trip rates, and multiplied by 1.28 (from the TIA Guidelines) to convert auto-trips to person-trips. Table 3.3 shows the future peak hour auto-trips and person-trips.

TABLE 3.2
MODE SHARE SUMMARY (Person-Trips)

FUTURE MODE SHARE TARGETS FOR THE DEVELOPMENT		
Travel Mode	**Mode Share Target**	**Rationale**
Transit	10%	Retail store land use
Walking	10%	Retail store land use
Cycling	3%	Consistent with the City's 2011 NCR Household O-D Survey
Auto Passenger	22%	Consistent with the proximity to residential development and the City's 2011 NCR Household O-D Survey
Auto Driver	55%	

TABLE 3.3
TOTAL PEAK HOUR SITE GENERATED TRIPS

Trips	**AUTO-TRIP GENERATION**	**FUTURE PERSON-TRIPS**
	Peak PM Hr.	**Peak PM Hr.**
Retail	182 Auto-Trips	233 Person-Trips

The percentage of primary and pass-by trips was determined by examination of the statistical data in the ITE *Trip Generation Handbook, 3rd Edition*. The document shows the average weekday peak PM hour pass-by vehicle percentage to be between 20 and 35 percent for a "Shopping Centre" (ITE Land Use Code 820). The study has assumed a pass-by percentage of 20 percent which was applied to all modes for the peak PM hour based on the ITE data, surrounding residential area, and the roadway network. Table 3.4 shows the primary and pass-by person-trips during the peak PM hour.

TABLE 3.4
PRIMARY AND PASS-BY PERSON-TRIPS

UNIT TYPE	**PEAK PM HR.**
	Total
Primary Trips	207
Pass-By Trips	26
Total Trips	**233**

The peak hour person-trips per mode were determined by the product of the peak hour person-trips from Table 3.4 and the mode share from Table 3.2. The mode share in Table 3.2 was applied to both the site generated primary trips and pass-by trips. The weekday peak PM hour person-trips for all modes are shown in Table 3.5.

TABLE 3.5
FUTURE DEVELOPMENT GENERATED PERSON-TRIPS

TRAVEL MODE	DEVELOPMENT GENERATED PERSON-TRIPS	
	PRIMARY TRIPS	PASS-BY TRIPS
	Peak PM Hr.	Peak PM Hr.
Transit	19 per./trips	5 per./trips
Walking	19 per./trips	5 per./trips
Cycling	5 per./trips	1 per./trips
Auto Passenger	41 per./trips	10 per./trips
Auto Driver	102 per./trips	26 per./trips
Total Trips	186 per./trips	47 per./trips

The TIA Guidelines allow for three Trip Reduction Factors that may be applied to the expected development trips. Below discusses the three factors, with the second factor providing a trip reduction for the development:

1. Deduction of Existing Development Trips - The proposed site contains a mixture of retail and commercial uses. All existing buildings on the site will remain, with the trips generated by the existing site uses assigned as background traffic. The TIA has not applied any further trip reductions for the existing development.

2. Pass-by Vehicular Trips - The total number of site generated trips is a combination of primary trips and pass-by trips. As previously discussed in Element 3.1.1, the analysis has utilized a 20 percent pass-by trip percentage of the total trips for the expected weekday peak PM hour.

   The analysis has assumed that one auto driver trip would equal one vehicle trip. The site would generate 128 auto driver or vehicular trips during the peak PM hour as shown in Table 3.6. The trips have been proportioned to expected primary and pass-by vehicular trips. The pass-by trips would provide a trip reduction to the background traffic.

3. Synergy or Internalization – The Shoppes at Fairwinds is a large shopping centre at the northeast corner of Hazeldean Road and Huntmar Drive. The shopping

centre currently has a grocery store, two banks each with a drive-through ATM, a drug store, and various retail stores. As documented in the ITE *Trip Generation Handbook, 3rd Edition*, the trip data for a shopping centre land use considers a shopping centre as a stand-alone development which reflects the mixed-use nature and shared trips of the development. The TIA has not applied any further trip reductions for internalization of site trips.

TABLE 3.6
PRIMARY AND PASS-BY AUTO DRIVER TRIPS

UNIT TYPE	WEEKDAY PEAK PM HR.		
	TOTAL	ENTER	EXIT
Primary Trips	102	49 (48%)	53 (52%)
Pass-By Trips	26	12 (48%)	14 (52%)
Total Trips	128	**61**	**67**

Element 3.1.2 – Trip Distribution

The distribution of site generated primary trips for the proposed retail development was determined by examining the size of residential development in the surrounding area and the distance the development is from the Shoppes at Fairwinds shopping centre. The pass-by trips were distributed at the same proportion as the peak PM hour background traffic along Hazeldean Road and Huntmar Drive (Iber Road). Table 3.7 shows the distribution of primary and pass-by trips which will be used in the peak PM hour traffic analysis.

TABLE 3.7
PRIMARY AND PASS-BY TRIP DISTRIBUTION

ROAD SEGMENT	PRIMARY TRIPS		PASS-BY TRIPS	
	TO	FROM	TO	FROM
North along Huntmar Road	30%	30%	15%	20%
South along Iber Road	15%	15%	15%	15%
East along Hazeldean Road	15%	15%	30%	40%
West along Hazeldean Road	40%	40%	40%	25%

Element 3.1.3 – Trip Assignment

The trip assignment has examined the site generated trips with respect to the shortest and most convenient routes to/from the development. The trip distribution as discussed in Element 3.1.2 was applied to the weekday peak PM hour primary and pass-by trips shown in Table 3.7. Figure 3.1 presents the peak hour primary trips to/from the site, and Figure 3.2 the pass-by trips.

MODULE 3.2 - Background Network Travel Demands

Element 3.2.1 – Transportation Network Plans

The City of Ottawa *Transportation Master Plan 2013* was reviewed to identify transit and roadway projects in the vicinity of the development. The documents examined did not identify any changes to the transit or roadway network within the time horizon of the TIA study which would impact the operation of the retail shopping centre. The Hazeldean Road widened in 2010 and the construction of Huntmar Drive in 2008 are both accounted for in the background traffic and trips to/from the site. The construction of the N-S Arterial Road adjacent to the east limit of the site will be completed beyond the horizon year of the study.

Element 3.2.2 – Background Growth

To determine the growth in background traffic, the study has compared historical traffic counts obtained from the City of Ottawa at the Hazeldean/Huntmar intersection between the year of 2008 and 2016. The counts determined that the volume of background traffic increased at an annual compounded rate of less than 3.0 percent. The study has utilized a 3.0 percent annual compounded increase in background traffic which was applied to all of the approaches at the Hazeldean/N-S Arterial and Hazeldean/Huntmar intersections. Traffic along Huntmar Drive was increased at 5.0 percent determined from historical counts taken at the Huntmar/Food Basics intersection. The increase is in agreement with the *Shoppes at Fairwinds, 5649 and 5705 Hazeldean Road TIS Addendum – 2* dated March 7, 2016 prepared by this firm. The increase would account for future development north of the site and the construction of the N-S Arterial Road.

Additional development of the shopping centre site 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 includes the 3.0 percent annual compounded increase in traffic along Hazeldean Road and 5.0 percent along Huntmar Drive, plus the expected trips from the two buildings on site discussed in the March 7, 2016 TIS. Figure 3.3 shows the 2021 peak PM hour background traffic and Figure 3.4 the expected 2026 traffic.

FIGURE 3.1
PEAK PM HOUR SITE GENERATED PRIMARY TRIPS

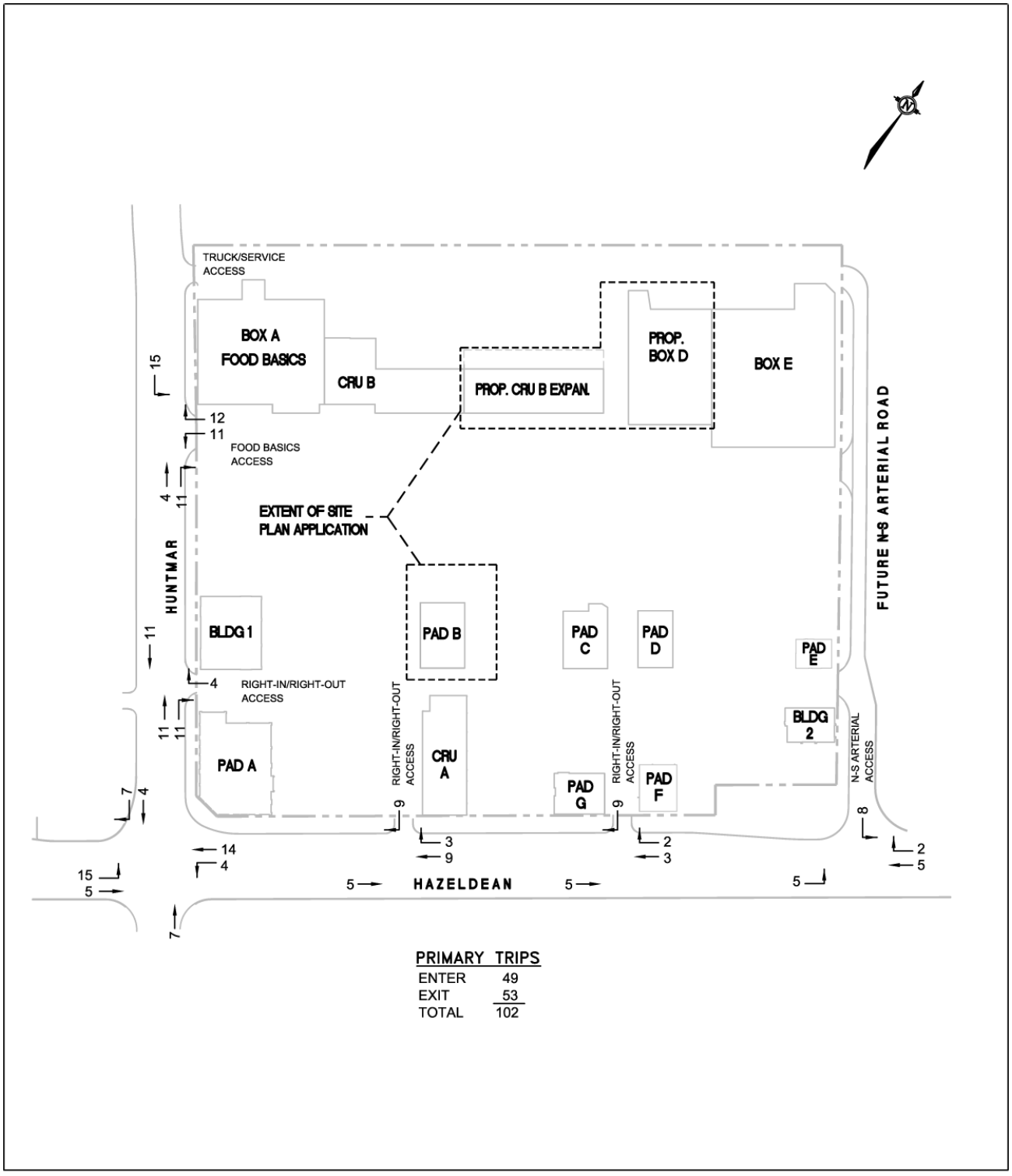

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FIGURE 3.2
PEAK PM HOUR SITE GENERATED PASS-BY TRIPS

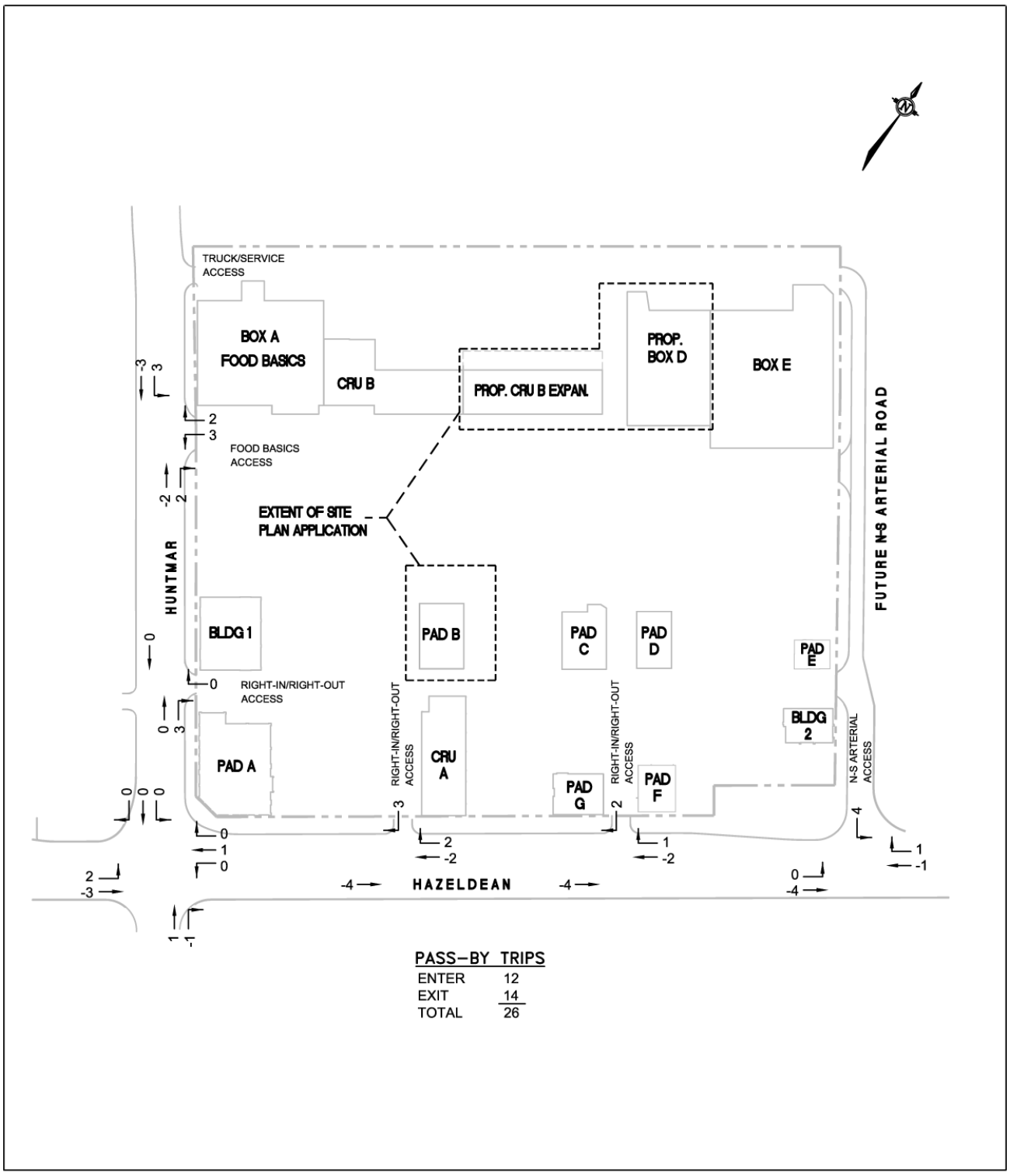

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FIGURE 3.3
2021 PEAK PM HOUR BACKGROUND TRAFFIC

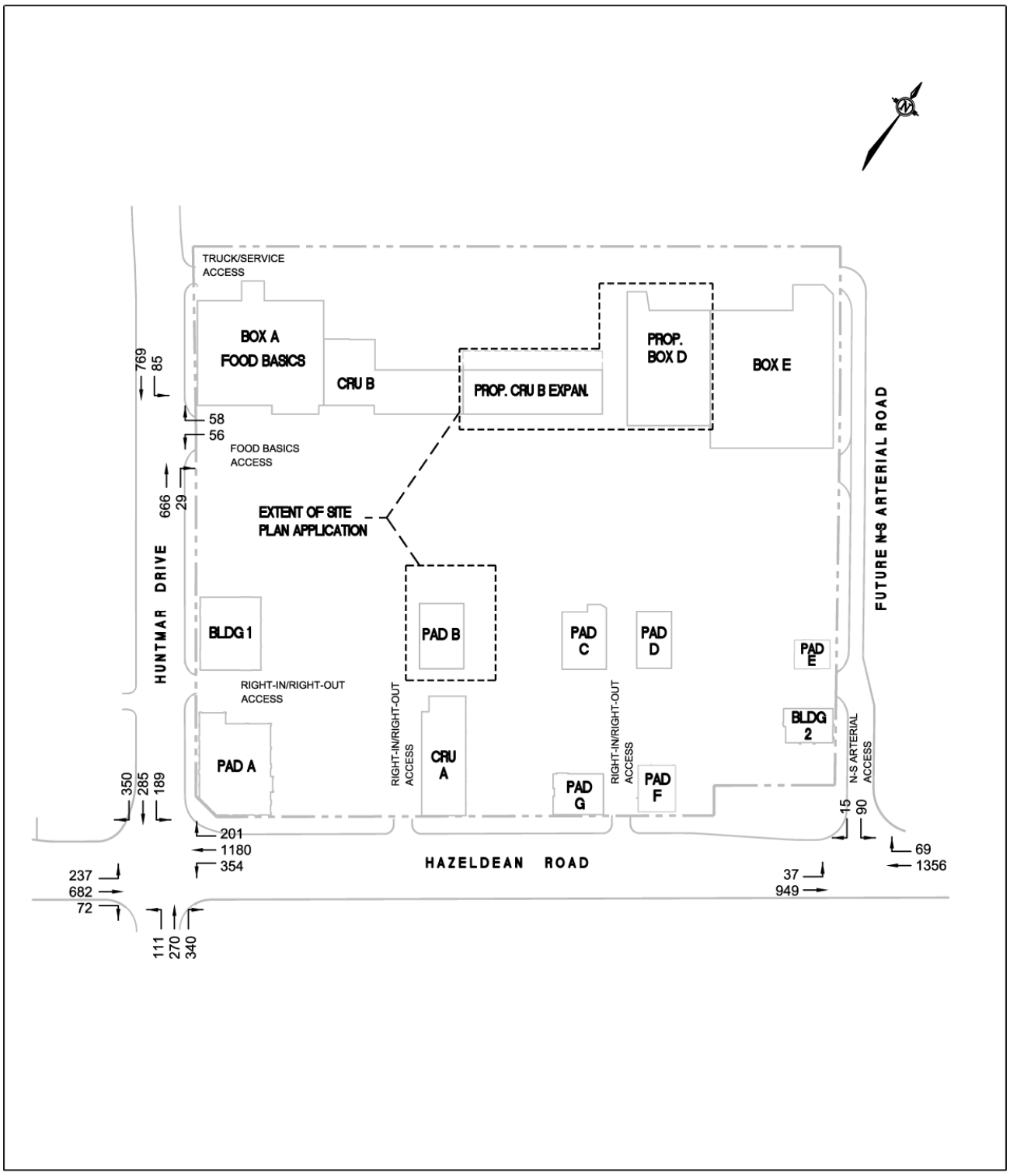

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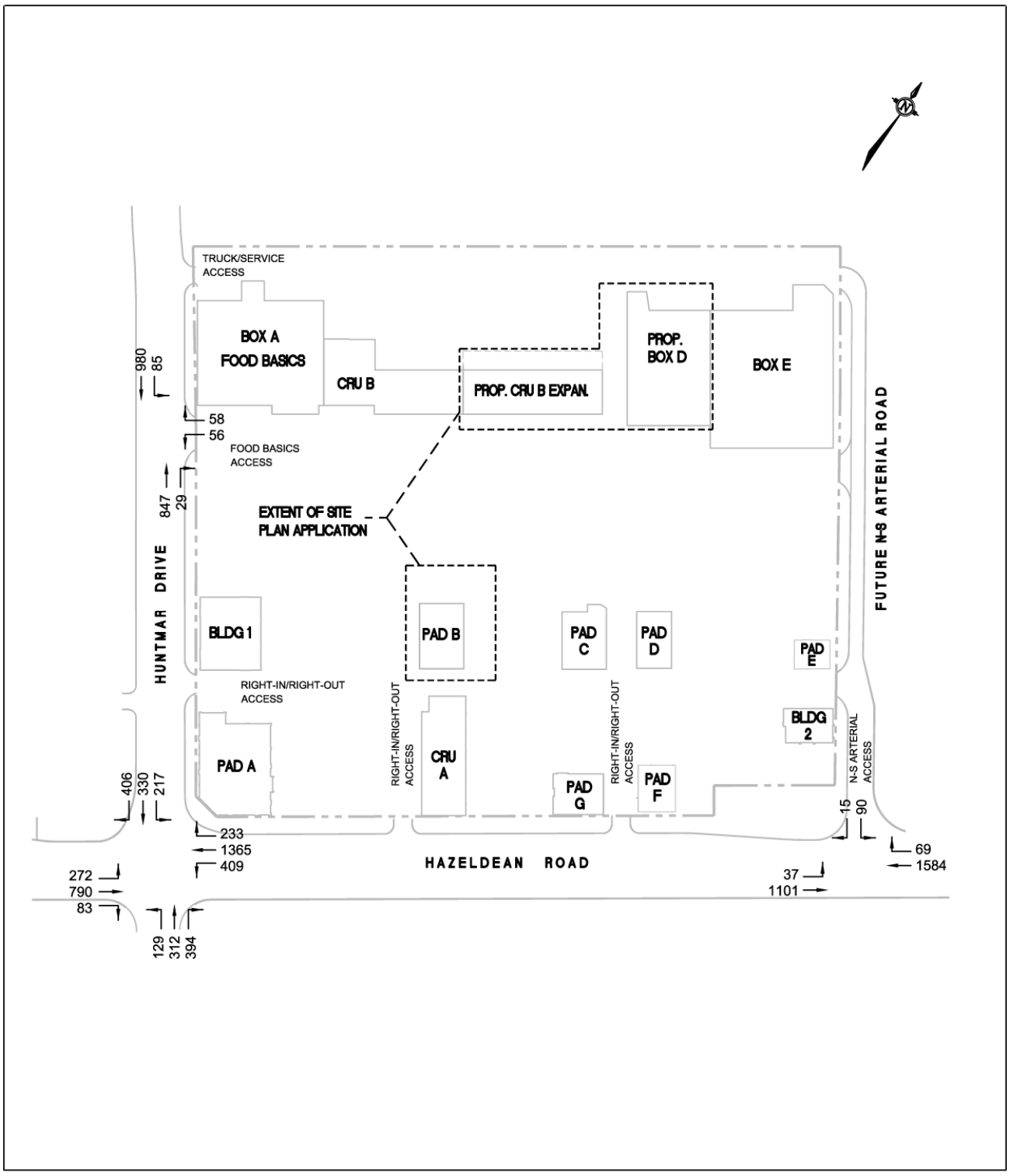
FIGURE 3.4
2026 PEAK PM HOUR BACKGROUND TRAFFIC



Element 3.2.3 – Other Developments

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

- The development of vacant lands are 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 building 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 site generated trips during the peak AM and PM hours.
- Property at 5754 Hazeldean Road will comprise of retail/office/medical uses along with a pharmacy. The number of site trips is relatively low with the majority assigned to/from the east along Hazeldean Road past the site. Although construction has not commenced, the TIS did assume completion and full occupancy by 2014.
- 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 study has assigned a small volume of trips south along Huntmar Drive past the site.
- The trips along Huntmar Drive past the site for 1620 Maple Grove Road were determined from the Technical Memorandum for the Interim Phase of development. The Memorandum assigned 4 veh/h northbound and 4 veh/h southbound along Huntmar Drive past the site during the peak PM hour.

The 3.0 and 5.0 percent annual growth discussed in Element 3.2.2 accounts for future development outside the study area including the development discussed above.

MODULE 3.3 - Demand Rationalization

The City of Ottawa completed a roadway modification project for Hazeldean Road in 2010 which included the widening of the road to a four lane divided road and the installation of traffic control signals at the intersection of the N-S Arterial Road and Hazeldean Road. The City of Ottawa in 2008 completed the extension of Huntmar Drive from Maple Grove Road to Hazeldean Road. The design of both projects anticipated future development in the area and the demand and capacity of the surrounding roadway network for all modes of travel.

The number of new trips from the three proposed buildings onto the adjacent roads is small and would not generate the requirement for further roadway modifications.

The requirement for the installation of traffic signals at the Huntmar Drive full movement access at the Food Basics grocery store will be investigated to ensure that the intersection will accommodate the vehicular demand at the intersection while also providing the safe crossing of Huntmar Drive for pedestrians.

Retail shopping centres and grocery stores exhibit a high percentage of auto trips due to the many packages which customers purchase and carry home. It would be difficult to implement a shift to alternative modes of travel. There would be no requirement to applied measures to reduce travel demand to either background or site related trips.

STEP 4 – ANALYSIS

MODULE 4.1 – Development Design

Element 4.1.1 – Design for Sustainable Modes

The Shoppes at Fairwinds shopping centre provides 1,076 parking spaces as shown on the Site Plan. All vehicular parking can be accommodated within the site.

The site also provides racks for the storage of bicycles in a protected area close to the building entrance. The number of bicycle spaces provided would satisfy the City of Ottawa By-laws.

Transit service is also provided along Hazeldean Road and Huntmar Drive past the site. The transit routes provide service from the surrounding residential areas to the site with bus stops adjacent to the site.

Pedestrian sidewalks are provided within the Shoppes at Fairwinds shopping centre which connect to the existing municipal sidewalks along Hazeldean Road and along Huntmar Drive providing access to/from the residential neighborhoods north of the shopping centre.

The study has utilized the TDM-Supportive Development Design and Infrastructure Checklist 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 additional development of the Shoppes at Fairwinds shopping centre.

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

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: *Non-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	✓☐ Satisfies Zoning.
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓☐ Entrances located along on-site sidewalk network.
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓☐ All entrances face the peaking area.
	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)*	✓☐ N/A
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)*	✓☐ All buildings within the development are connected through a sidewalk network which is connected to the municipal sidewalks and bus stops along Huntmar Road and Hazeldean Road.

TDM-supportive design & infrastructure measures: *Non-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)*	✓☐ Shown on the Site Plan.
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	✓☐ Sidewalks within the development have depressed curbs with easy access to extra-wide parking spaces.
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)*	✓☐ All buildings are connected to municipal sidewalks along Huntmar Drive and Hazeldean Road through the on-site sidewalk network.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	✓☐ Shown on the Site Plan.
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 well lighted by on-site lighting and municipal street lights.
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	✓☐ All roadways within the development are through the parking lot which would result in low operating speeds.
	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	✓☐ A landscaping plan has been prepared showing all the proposed amenities.
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)	✓☐ Signs are placed throughout the site to facilitate the efficient movement of pedestrians, cyclists and vehicles.

		TDM-supportive design & infrastructure measures: *Non-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)*	✓☐ Bicycle racks are provided in accordance with By-laws and staff recommendations,
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)*	✓☐ Satisfies By-law requirements.
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)*	✓☐ Provided in the Site Plan.
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	✓☐ Will provide the number of parking spaces required by By-laws.
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	✓☐ Will provide the number of parking spaces required. No additional spaces beyond that required will be provided
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	✓☐ N/A
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	✓☐ Bike racks are provided in a visible area in close proximity to the building entrances.
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	✓☐ N/A
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	✓☐ N/A
	2.4	**Bicycle repair station**	
BETTER	2.4.1	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)	✓☐ N/A

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	✓☐ N/A There are no on-site transit stops.
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	✓☐ Will be examined during the Site Plan Application review.
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	✓☐ N/A There are no on-site transit stops.
	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	✓☐ There will be no designated areas for carpooling or pick up and drop off within the shopping centre parking lot.
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	✓☐ There will be no designated areas for carpooling or pick up and drop off within the shopping centre parking lot.
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	✓☐ N/A
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	✓☐ N/A No carsharing proposed for the development.
	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	✓☐ N/A No bikesharing proposed for the development.

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	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	✓☐ Will be providing the same number of spaces permitted by zoning.
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	✓☐ Would not apply for a shopping centre. Employers may request that employees use a designated area or park in more remote areas to allow prime spaces to be available for customers.
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)*	✓☐ The shopping centre is expected to have shared trips between retail stores. Will be providing the number of spaces permitted by zoning.
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)*	✓☐ N/A
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	✓☐ Employee parking will be determined by the retail store tenants and would be designated in more remote areas of the parking lot.
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	✓☐ N/A

Element 4.1.2 – Circulation and Access

The shopping centre has access from Hazeldean Road at the signalized intersection of Hazeldean Road at the location of what will be the future N-S Arterial Road. The site will also have two right-in/right-out accesses onto Hazeldean Road. From Huntmar Drive the shopping centre has access from a full movement two-way stop controlled intersection at Food Basics and one right-in/right-out access.

Trucks and delivery/service vehicles will enter the loading area at the north portion of the site behind the stores. The access is a full movement access from Huntmar Drive located approximately 75 m north of the Huntmar/Food Basics access. Delivery/service vehicles for the retail/commercial uses within the site would enter/exit from either the signalized intersection at Hazeldean/N-S Arterial or from the right-in/right-out accesses. Loading and unloading of deliveries by service vehicles will not be done on Hazeldean Road or Huntmar Drive.

The Fire Route is designated to enter/exit at the Hazeldean/N-S Arterial and Huntmar/Food Basics intersections, and at the Huntmar Drive right-in/right-out access.

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 Shoppes at Fairwinds will provide parking for 1076 vehicles with the City of Ottawa Parking By-law requiring 687 parking spaces.

The average peak period parking demand was examined for a Friday and Saturday (Non-December) using the ITE *Parking Generation 3rd Edition* document for a Shopping Center land use (Land Use 820). The parking demand for spaces for a gross floor area of 20,075.7 m^2 (216,095 ft^2) was determined to be 505 parking spaces for the peak Friday time period and 634 spaces for the peak Saturday time period.

The parking supply within the site will exceed parking demand as determined by the City of Ottawa Parking By-law and established parking generation statistical data.

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 site would consist of Hazeldean Road and Huntmar Drive. Hazeldean Road was reconstructed in 2010 by the City of Ottawa which modified the roadway to a four lane divided road with traffic signals installed at major intersections. Huntmar Road was constructed in 2008 between Maple Grove Road and Hazeldean Road which included roundabouts and the installation of traffic signals at the Hazeldean/Huntmar intersection. All construction was completed in accordance with the City of Ottawa Complete Streets concept, and would have the capacity to accommodate future traffic and development. The roadway designs would provide the proper infrastructure to satisfy the City's walking and cycling network.

MODULE 4.4 – Access Intersection Design

Element 4.4.1 – Location and Design of Access

The Site Plan does not propose any new access points to the shopping centre site. All of the site accesses were constructed under Phase 1 of the development. The main access to the site is from the Hazeldean/N-S Arterial intersection which is a signalized intersection and will eventually form the connection for the future N-S Arterial Road to Hazeldean Road. The Hazeldean/N-S Arterial intersection is located 325 m east of the Hazeldean/Huntmar intersection. The full movement two-way stop controlled access at the Huntmar/Food Basics intersection is 210 m north of the Hazeldean/Huntmar intersection.

A right-in/right-out access is located on the west side of Huntmar Drive which forms the rear access to an existing restaurant at the northwest corner of the Hazeldean/Huntmar intersection. The access is located 105 m north of the Hazeldean/Huntmar intersection with turning movements controlled by a centre median along Huntmar Drive.

Element 4.4.2 – Intersection Control

The existing site has the Hazeldean/N-S Arterial intersection controlled by traffic signals and the Huntmar/Food Basics intersection controlled by two-way stop control signs. The TIA will determine the operation of the Huntmar/Food Basics intersection and the recommended type of traffic controls.

Element 4.4.3 – Intersection Design

The analysis of the Hazeldean/N-S Arterial, Huntmar/Food Basics and Hazeldean/Huntmar intersections will be completed for all modes using the *Multi-Modal Level of Service (MMLOS) Guidelines*. Each mode will be addressed in the following sections:

VEHICLE LEVEL OF SERVICE (LoS) – Intersection Capacity Analysis

The analysis of the Hazeldean/N-S Arterial, Huntmar/Food Basics and Hazeldean/Huntmar intersections will use the *Highway Capacity Software, Version 7.7,* which uses the capacity analysis procedure as documented in the Transportation

Research Board publications, *Highway Capacity Manual (HCM) 2010* and the *HCM 6th Edition*.

For unsignalized intersections the level of service of each lane movement and approach is determined as a function of the 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	DELAY	
Level of Service A	0-10 sec./vehicle	Little or No Delay
Level of Service B	>10-15 sec./vehicle	Short Traffic Delays
Level of Service C	>15-25 sec./vehicle	Average Traffic Delays
Level of Service D	>25-35 sec./vehicle	Long Traffic Delays
Level of Service E	>35-50 sec./vehicle	Very Long Traffic Delays
Level of Service F	>50 sec./vehicle	Extreme Delays – Demand Exceeds Capacity

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

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

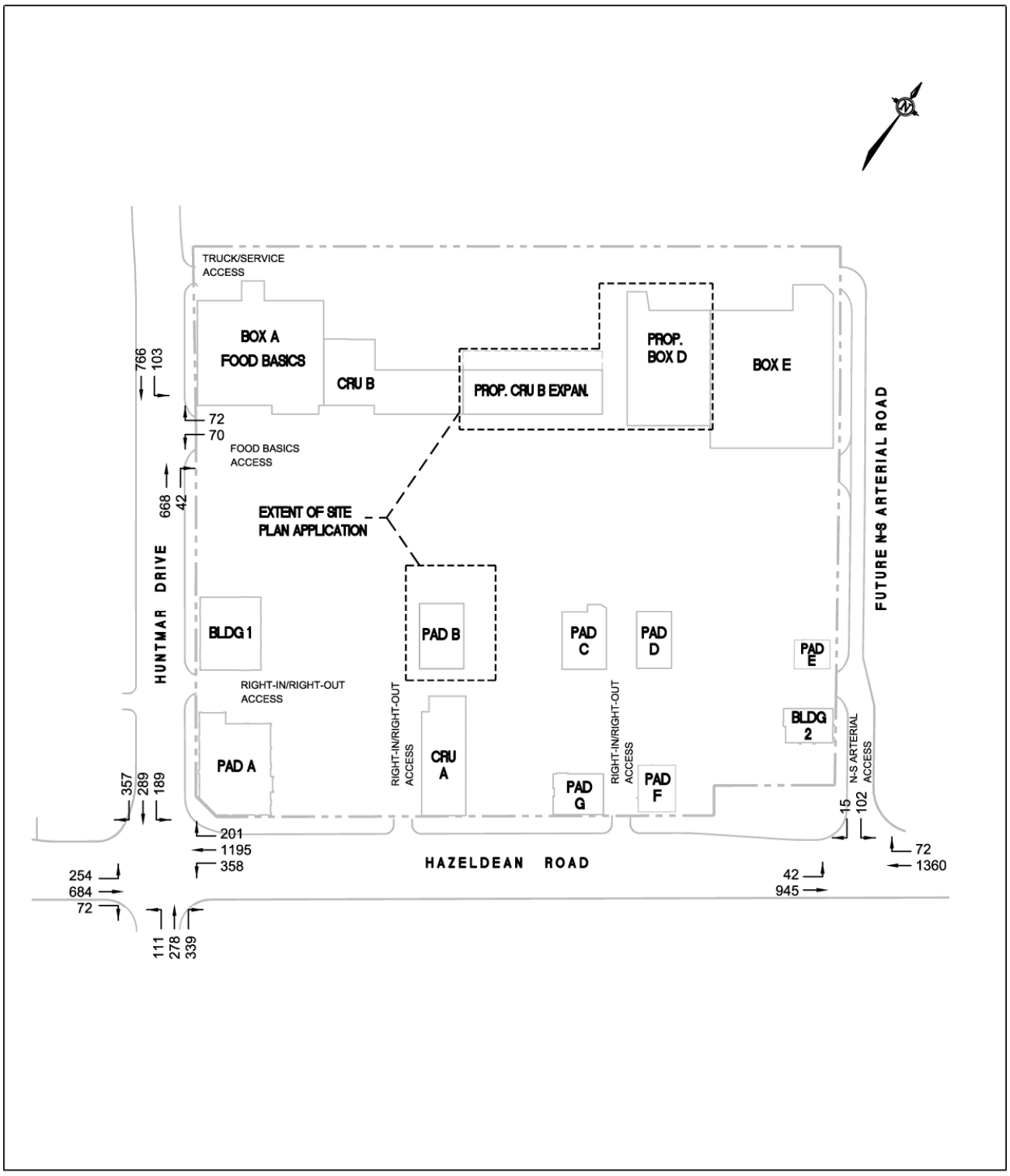
LEVEL OF SERVICE	VOLUME TO CAPACITY RATIO
Level of Service A	0 to 0.60
Level of Service B	0.61 to 0.70
Level of Service C	0.71 to 0.80
Level of Service D	0.81 to 0.90
Level of Service E	0.91 to 1.00
Level of Service F	> 1.00

The total traffic is the sum of the peak hour site generated primary trips (Figure 3.1) and pass-by trips (Figure 3.2), and the peak PM hour background traffic (Figure 3.3 for the year 2021 and Figure 3.4 for the year 2026). Figure 4.1 presents the total 2021 peak PM hour vehicular traffic and Figure 4.2 the total 2026 peak PM hour vehicular traffic.

Huntmar Drive and Food Basics Access Intersection

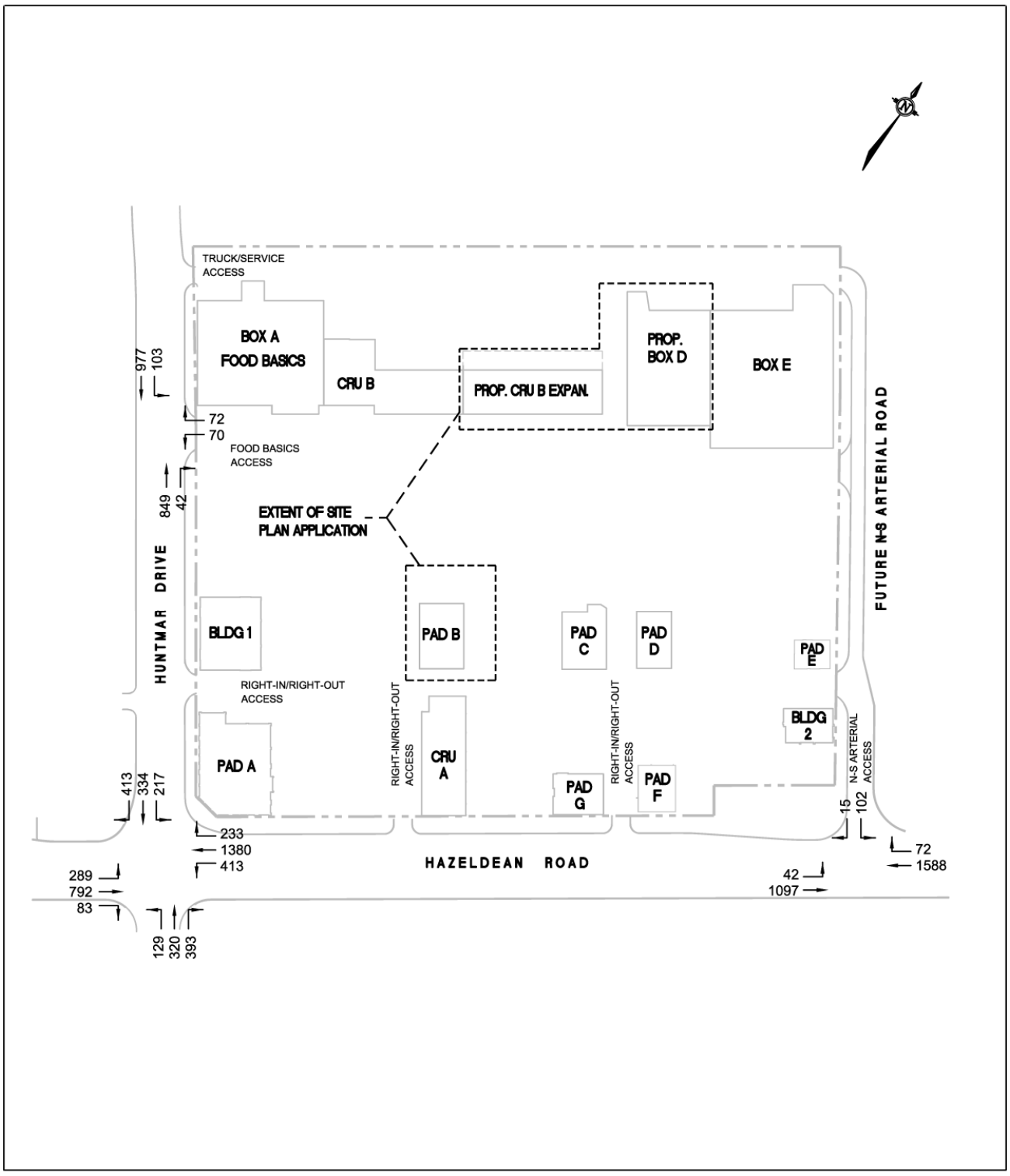
The Shoppes at Fairwinds is located on the east side of Huntmar Drive. The only full movement access onto Huntmar Drive is at the access to Food Basics which is located

FIGURE 4.1
2021 PEAK PM HOUR TOTAL TRAFFIC



NOT TO SCALE

FIGURE 4.2
2026 PEAK PM HOUR TOTAL TRAFFIC



210 m north of Hazeldean Road. The access is currently a two-way stop controlled intersection with Huntmar Drive forming the northbound and southbound approaches, and the Food Basics access the stop controlled westbound approach. The intersection provides access to Food Basics and all development within the shopping centre. The following is the current lane configuration of the two-way stop controlled intersection:

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

The Huntmar/Food Basics two-way stop controlled intersection currently operates at a Level of Service (LoS) "B" utilizing the February 4, 2016 peak PM hour traffic counts obtained from the City of Ottawa. Table 4.1 summarizes the 2016 operation of the intersection with the analysis sheet provided in the Appendix as Exhibit 4.1.

TABLE 4.1
HUNTMAR/FOOD BASICS INTERSECTION (Stop Controlled) – LoS & Delay

Intersection Approach	**PEAK PM HOUR** **YEAR** *2016* 2021 (2026)	
	LoS	**Delay (sec.)**
WB Left – Food Basics	*B* C (C)	*13.6* 16.9 (20.5)
WB Right – Food Basics	*B* B (B)	*10.6* 11.7 (12.9)
SB Left – Huntmar Drive	*A* A (B)	*9.0* 9.9 (10.9)
Approach LoS	*B* B (C)	*12.1* 14.2 (16.6)

For the expected traffic at the year 2026 which represents five years beyond completion of the proposed development, a left turn lane warrant analysis was completed utilizing the method documented in the *Ontario Traffic Manual (OTM) Book 12 – Traffic Signals*. The warrant analysis determined that the 2026 traffic at the Huntmar/Food Basics intersection met 56 percent of the warrants. The OTM states that 120 percent of the warrants must be met for future development to trigger the installation of traffic control signals. The TIA has assumed for the 2021 and 2026 peak PM hour traffic analysis that the intersection will be a two-way stop controlled intersection with a stop sign placed at the westbound Food Basics approach to Huntmar Drive. The weekday 2026 peak PM hour left turn lane warrant provided as Exhibit 4.2 in the Appendix.

The retail development would be completed by the year 2021. Using the existing intersection geometry and two-way stop controls, the intersection would operate at a LoS "B" during the peak PM hour. Table 4.1 summarizes the 2021 peak PM hour operation of the intersection with the analysis sheet provided as Exhibit 4.3.

At the year 2026 which represents five years beyond completion of the site, the intersection would operate at a LoS "C" due to the increasing background volume of traffic. The 95th percentile queue at the westbound left turn movement would be 1.0 vehicle, right turn movement 0.5 vehicles, and at the southbound Huntmar Drive left turn movement 0.5 vehicles. The 40 m storage provided in the southbound Huntmar Drive left turn lane and 25 m storage in the westbound Food Basics left turn lane are of sufficient length for the expected 2026 queued vehicles at the intersection. Table 4.1 summarizes the 2026 peak PM hour operation of with Exhibit 4.4 providing the analysis.

Hazeldean Road and N-S Arterial Road Intersection

The intersection of Hazeldean Road and the N-S Arterial Road is controlled by traffic signals with a signal cycle of 120 seconds for the weekday peak PM hour (Exhibit 2.4). The intersection is located 325 m east of Huntmar Drive with a lane configuration provided in Element 2.1.2 – Existing Conditions. The intersection was constructed during the 2010 Hazeldean Road widening project. The N-S Arterial Road will be extended past the site from Abbott Street to Palladium Drive in the future and beyond the horizon years of this TIA analysis.

The existing operation of the Hazeldean/N-S Arterial intersection using the 2016 traffic counts determined that all approaches to the intersection would function at a LoS "A" during the weekday peak PM hour. Table 4.2 summarizes the 2016 peak PM hour operation of the intersection with the analysis sheet provided as Exhibit 4.5.

TABLE 4.2
HAZELDEAN/N-S ARTERIAL INTERSECTION – LoS & v/c Ratio

Intersection Approach	**PEAK PM HOUR** **YEAR** *2016* 2021 (2026)	
	LoS	**v/c Ratio**
EB Left - Hazeldean	*A* A (A)	*0.038* 0.128 (0.156)
EB Through – Hazeldean	*A* A (A)	*0.319* 0.370 (0.429)
WB Through – Hazeldean	*A* A (B)	*0.448* 0.532 (0.622)
SB Left – N-S Arterial	*A* A (A)	*0.368* 0.595 (0.595)
SB Right – N-S Arterial	*A* A (A)	*0.063* 0.099 (0.099)
Total Intersection	*A* A (A)	*0.352* 0.428 (0.499)

For the expected 2021 traffic following the completion of the proposed development on site, all approaches would continue to function at a LoS “A”. Table 4.2 summarizes the operation of the intersection with the analysis sheet provided as Exhibit 4.6.

At the year 2026 the intersection would function at an acceptable level of service with all approach movements functioning at a LoS “A” with the exception of the westbound Hazeldean Road through movement which would function at a LoS “B”. For a 120 second signal cycle the required vehicular storage for the eastbound Hazeldean Road left turn lane would be 15 m with 70 m provided. Table 4.2 summarizes the 2026 peak PM hour operation of the intersection with the analysis sheet provided as Exhibit 4.7.

Hazeldean Road and Huntmar Drive Intersection

The intersection of Hazeldean Road and Huntmar Drive is a signalized intersection located at the southwest corner of the site. The intersection was reconstructed in 2010 under the Hazeldean Road widening project.
For the 2016 traffic counts, existing lane geometry and 120 second signal timing plan, all approaches functioned at an acceptable level of service with approaches functioning at a LoS “A” to LoS “D”. Table 4.3 summarizes the operation of the intersection with the analysis sheet provided as Exhibit 4.8.

TABLE 4.3
HAZELDEAN/HUNTMAR INTERSECTION – LoS & v/c Ratio

Intersection Approach	**PEAK PM HOUR** **YEAR** *2016* 2021 (2026)	
	LoS	**v/c Ratio**
EB Left - Hazeldean	*B* C (C)	*0.664* 0.728 (0.758)
EB Through – Hazeldean	*A* B (C)	*0.472* 0.627 (0.808)
EB Right – Hazeldean	*A* B (C)	*0.473* 0.628 (0.808)
WB Left – Hazeldean	*C* D (E)	*0.769* 0.834 (0.962)
WB Through – Hazeldean	*B* E (F)	*0.706* 0.954 (1.251)
NB Left – Iber	*B* C (C)	*0.684* 0.712 (0.746)
NB Through – Iber	*C* C (C)	*0.739* 0.773 (0.759)
NB Right – Iber	*C* D (D)	*0.772* 0.820 (0.857)
SB Left – Huntmar	*D* F (F)	*0.861* 1.050 (1.205)
SB Through – Huntmar	*C* C (C)	*0.718* 0.764 (0.793)
Total Intersection	B C (E)	*0.653* 0.797 (0.937)

At the year 2021 as background traffic increases, the level of service decreases slightly to a range between LoS “B” and LoS “D” with the westbound Hazeldean Road though movement functioning at a LoS “E” and southbound Huntmar Drive at a LoS “F”. The operation of the intersection is summarized in Table 4.3 with the analysis sheet provided as Exhibit 4.9.

For the expected 2026 traffic at five years beyond completion of the development, increasing background traffic has resulted in the approaches to the intersection functioning at LoS “C” and LoS “D” with the westbound Hazeldean Road left turn movement functioning at a LoS “E”, and westbound Hazeldean Road through and southbound Huntmar Drive left turn movements functioning at a LoS “F”. Table 4.3 summarizes the operation of the intersection with the analysis sheet provided in the Appendix as Exhibit 4.10. The operation of the Hazeldean/Huntmar intersection will improve when the N-S Arterial Road is constructed from Abbott Street to Palladium Drive.

PEDESTRIAN LEVEL OF SERVICE (PLOS)

The pedestrian level of service was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. There are sidewalks along both sides of Hazeldean Road and along the east side of Huntmar Drive adjacent to the site. There is a sidewalk along the west side of Huntmar Drive for a distance of approximately 95 m north of Hazeldean Road which was constructed as part of the development at the southwest corner of Hazeldean/Huntmar. The sidewalk will be extended further north as development takes place along Huntmar Drive. Table 4.4 presents the level of service for the street segments and intersections adjacent to the site, with the analysis provided in the Appendix.

TABLE 4.4
PEDESTRIAN LEVEL OF SERVICE (PLOS) – Street Segments & Intersections

Street	Segment	Level of Service	Analysis
Huntmar Drive	Vicinity of Shared Access/Belfast	C	Exhibit 4.11
Hazeldean Road	Vicinity of OTY Access/Industrial	D	Exhibit 4.12
Intersection		**Level of Service**	**Analysis**
Hazeldean/N-S Arterial		D	Exhibit 4.13
Hazeldean/Huntmar		F	Exhibit 4.14

BICYCLE LEVEL OF SERVICE (BLOS)

The bicycle level of service (BLOS) was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. TMP identifies both

Hazeldean Road and Huntmar Drive as a Spine Routes in the primary cycling network. There are cycling lanes along Hazeldean Road and Huntmar Drive in the vicinity of the site. Table 4.5 presents the level of service for the road segments and intersections with the analysis sheets provided in the Appendix.

TABLE 4.5
BICYCLE LEVEL OF SERVICE (BLOS) – Street Segments & Intersections

Street	Segment	Level of Service	Analysis
Huntmar Drive	Vicinity of Shared Access/Belfast	D	Exhibit 4.15
Hazeldean Road	Vicinity of OTY Access/Industrial	D	Exhibit 4.16
Intersection		**Level of Service**	**Analysis**
Hazeldean/N-S Arterial		C	Exhibit 4.17
Hazeldean/Huntmar		C	Exhibit 4.18

TRANSIT LEVEL OF SERVICE (TLOS)

Transit service is provided by Rapid Route 61 which travels along Hazeldean Road past the site and Rapid Route 62 which travels along Huntmar Drive. Both routes have bus stops adjacent to or close to the shopping centre, and provide service from Stittsville to Tunney's Pasture. Connexion Routes 261 and 263 provide peak hour service Monday to Friday between Stittsville/Stanley Corners and Tunney's Pasture. There are no dedicated transit lanes in the vicinity of the site. Table 4.6 presents the level of service along the Hazeldean Road and Huntmar Drive road segments and intersections which were determined from the evaluation table provided in the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*.

TABLE 4.6
TRANSIT LEVEL OF SERVICE (TLOS) – Street Segments & Intersections

Street	Segment	Level of Service	Analysis
Huntmar Drive	Vicinity of Shared Access/Belfast	D	Exhibit 4.19
Hazeldean Road	Vicinity of OTY Access/Industrial	D	Exhibit 4.20
Intersection		**Level of Service**	**Analysis**
Hazeldean/N-S Arterial		D	Exhibit 4.21
Hazeldean/Huntmar		D	Exhibit 4.222

TRUCK LEVEL OF SERVICE (TkLOS) - Street Segments & Intersections

The truck level of service (TkLOS) was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. Truck travel is prohibited along Huntmar Drive between Hazeldean Road and Highway 417. Table 4.7 presents the truck level of service with the analysis provided in the Appendix.

TABLE 4.7
TRUCK LEVEL OF SERVICE (TkLOS) – Street Segments & Intersections

Street	Segment	Level of Service	Analysis
Huntmar Drive		N/A	N/A
Hazeldean Road	Vicinity of OTY Access/Industrial	A	Exhibit 4.23
Intersection		**Level of Service**	**Analysis**
Hazeldean/Huntmar		A	Exhibit 4.24
Hazeldean/Huntmar		A	Exhibit 4.25

MODULE 4.5 – Transportation Demand Management

Exempt as determined in the Scoping Document.

MODULE 4.6 – Neighbourhood Traffic Management

Element 4.6.1 – Adjacent Neighbourhoods

Exempt as determined in the Scoping Document.

MODULE 4.7 - Transit

Element 4.7.1 – Route Capacity

OC Transpo Rapid Route 61 travels along Hazeldean Road and Rapid Route 62 along Huntmar Drive past the site between Stittsville and Tunney's Pasture. Connexion Routes 261 and 263 provides Monday to Friday peak hour service along Huntmar Drive past the site between Stittsville/Stanley Corners and Tunney's Pasture. The routes have bus stops close or adjacent to the site and provide all day service. The routes would have the capacity to handle the additional transit trips from the Shoppes at Fairwinds shopping centre.

Element 4.7.1 – Transit Priority

Transit priority measures would not be applicable since the Hazeldean/N-S Arterial and Hazeldean/Huntmar intersections were recently reconstructed in 2010 under the Hazeldean Road widening project and transit demand would be low for the shopping centre land use.

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 Hazeldean/N-S Arterial and Hazeldean/Huntmar intersections were reconstructed in 2010 under the Hazeldean Road widening project and are currently controlled by traffic signals. The intersections were designed and constructed to accommodate the anticipated future traffic along the roadway network.

The intersection of Huntmar Drive and the access to Food Basics is a two-way stop controlled intersection. The “T” intersection has a stop sign placed at the westbound Food Basics access from the shopping centre. A traffic signal warrant analysis was conducted (Exhibit 4.2 in the Appendix) which determined that the intersection met 56 percent of the warrants for the installation of traffic control signals during the weekday time period. The weekday time period would be the period when the traffic volumes were the highest along the Huntmar Drive and other municipal roads within the network. The analysis utilized the traffic signal warrant analysis method documented in the *Ontario Traffic Manual (OTM) Book 12*. The analysis resulted in the TIA study to examine the operation of the Huntmar/Food Basics intersection as a two-way stop controlled intersection with the existing stop sign and lane geometry. There would be no intersection control modifications required.

Element 4.9.2 – Intersection Design

The Hazeldean Road and Huntmar Drive street segments and intersections were analyzed to determine the level of service, and compared the results to the MMLOS targets for pedestrians, bicycles, transit, autos and trucks. The targets are shown in Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*.

The MMLOS analysis determined that the Bicycle (BLOS), Transit (TLOS) and Truck (TkLOS) level of service met or exceeded the targets provided in MMLOS Guidelines for intersections. Table 4.8 summarizes the MMLOS for the road segment and intersections along with the targets.

TABLE 4.8
MULTI-MODAL (MMLOS) SUMMARY TABLE

SEGMENTS	Level of Service (LoS) – 2026				
	Pedestrian	**Bicycle**	**Transit**	**Auto**	**Truck**
Huntmar Drive	C	D	D	-	N/A
Target	C	C	N/A	D	N/A
Hazeldean Road	D	D	D	-	A
Target	C	C	N/A	D	D
INTERSECTIONS	**Level of Service (LoS) – 2026**				
	Pedestrian	**Bicycle**	**Transit**	**Auto**	**Truck**
Hazeldean/N-S Arterial	D	C	D	A	A
Target	C	D	N/A	D	D
Hazeldean/Huntmar	F	C	D	E	A
Target	C	D	N/A	D	D

The Pedestrian (PLOS) did not meet the target for either the Hazeldean/N-S Arterial or Hazeldean/Huntmar intersections. The reason for the low level of service was mainly due to the number of lanes crossed at the intersection. Providing sufficient green time for pedestrians to cross the roads would increase the level of safety and security of pedestrians.

SUMMARY

The Site Plan Application has been prepared for the addition of retail at the Shoppes at Fairwinds shopping centre which is located at the northeast quadrant of the intersection of Hazeldan Road and Huntmar Drive. The 8.460 hectare site currently contains a variety of uses comprising of a grocery store, retail stores, bank, drug store and a restaurant. The existing development was approved through previous Transportation Impact Study reports and addendums with construction beginning in 2011.

This Transportation Impact Assessment (TIA) study has examined the impact of the retail buildings labelled Box D, Pad B and CPU B. As part of the previous submissions and Transportation Impact Study reports, Box D and Pad B received Site Plan approval under the Master Plan, and the CPU B Expansion was proposed as several Box retail stores along the north side of the site. Tenants for the three retail stores have not been secured to date. The completion of the proposed retail examined in the TIA is expected by the year 2021. The transportation analysis has determined the following:

1. The proposed retail is expected to generate an additional 61 auto driver vehicle trips entering and 67 trips exiting during the weekday peak PM hour for a total of 128 auto driver trips, or a total of 233 person-trips.

2. The future background traffic used in the study has accounted for the growth in traffic along Hazeldean Road and Huntmar Drive, and the additional traffic proposed from developments in the area as determined from Transportation Impact Study reports submitted to the City of Ottawa for site plan or subdivision applications. Huntmar Drive was constructed in 2008 and Hazeldean Road reconstructed and widened in 2010. Both projects designed the roads and intersections anticipating future development in the area including development of the Shoppes at Fairwinds shopping centre.

3. The proposed retail at the Shoppes at Fairwind shopping centre will utilize the existing site accesses onto Hazeldean Road and Huntmar Drive with the analysis assuming the current lane configuration and traffic controls.

4. The TIA analysis has examined the roads and intersections for the expected traffic during the weekday peak PM hour using the current traffic counts, for the completion of the development in 2021, and at the year 2026 which represents five years beyond completion. There would be no requirement for intersection modifications or changes to the traffic controls which would be triggered by the proposed development.

5. The analysis determined that for the expected 2026 weekday peak hour, the Hazeldean Road and Huntmar Drive road segments operated at an acceptable level of service. During the same time period the intersection of Hazeldean Road and N-S Arterial Road operated at an acceptable level of service. The intersection of Hazeldan Road and Huntmar Drive operated at a LoS “E” due to

the increasing westbound background traffic along Hazeldean Road. The pedestrian level of service was below target due the number of lanes crossed at the Hazeldean/Huntmar intersection. A summary of the level of service for the various modes of transportation for both the intersections and road segments are summarized in Table 4.8 with the results detailed in the analysis sheets provided as Exhibits in the Appendix. There would be no requirement for roadway modifications due to the development of the Shoppes at Fairwinds shopping centre site.

6. The full movement intersection of Huntmar Drive and the Food Basics access is currently a two-way stop controlled intersection with a stop sign placed at the westbound Food Basics access. A traffic signal warrant analysis was conducted for the expected 2026 weekday traffic. The analysis determined that the intersection met 56 percent of the warrants for the installation of traffic signals. The intersection was therefore analyzed as a two-way stop controlled intersection for the 2021 and 2026 traffic.

   Although the weekday peak PM hour would present higher background traffic along Huntmar Drive, the Saturday peak hour would present higher site related traffic. An analysis using the 2026 weekday background traffic and the expected Saturday peak hour site traffic (worst case scenario) determined that the Huntmar/Food Basics intersection met 100 percent of the warrants for the installation of traffic control signals. The OTM states that 120 percent of the warrants must be met for future development to trigger the installation of traffic control signals. The proposed Shoppes at Fairwinds development would not trigger the installation of Traffic signals, but the operation of the intersection should be monitored to establish when traffic signals are warranted.

Prepared by:

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

APPENDIX

SCREENING FORM

TRAFFIC COUNTS

TRAFFIC SIGNAL TIMING PLANS

ITE TRIP GENERATION DATA SHEETS

OPERATIONAL ANALYSIS SHEETS

TRAFFIC SIGNAL WARRANT ANALYSIS

EXHIBIT 1.1
SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	**5707 Hazeldean** Road, Ottawa
Description of Location	
Land Use Classification	AM7[1446] – Arterial Mainstreet Zone
Development Size (units)	
Development Size (m^2)	Three building with a gross floor area of 4,545.8 m^2
Number of Accesses and Locations	Five existing accesses.
Phase of Development	Single phase
Buildout Year	2021

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
Retail	48,935 ft^2

	Yes	No
48,935 ft^2 x (4.5 T/1000 ft^2) = 220 Vehicle-Trips x 1.28 = 282 Person-Trips **282 Person-Trips > 60 Person-Trips**	X	

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

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

3. 3. Location Triggers

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

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

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

4. Safety Triggers

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

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).

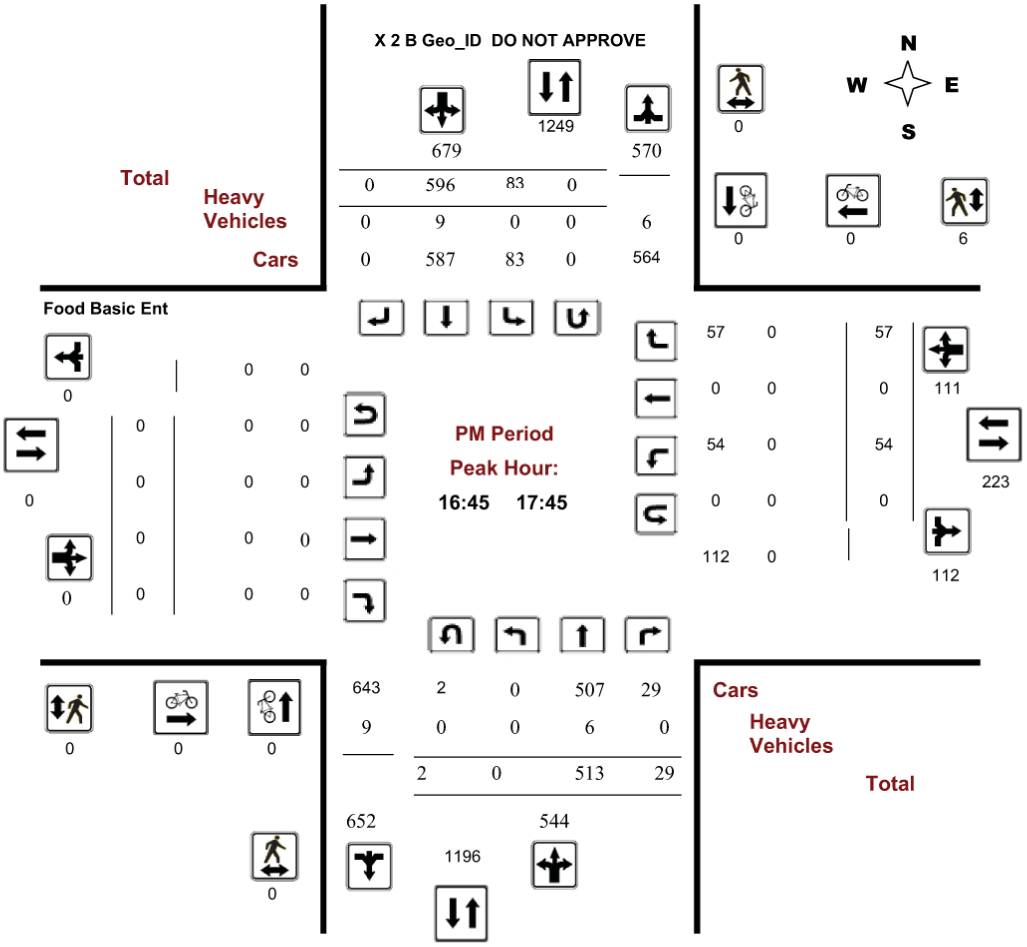
EXHIBIT 2.1
2016 PEAK PM HOUR TRAFFIC COUNTS (Huntmar/Food Basics)

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

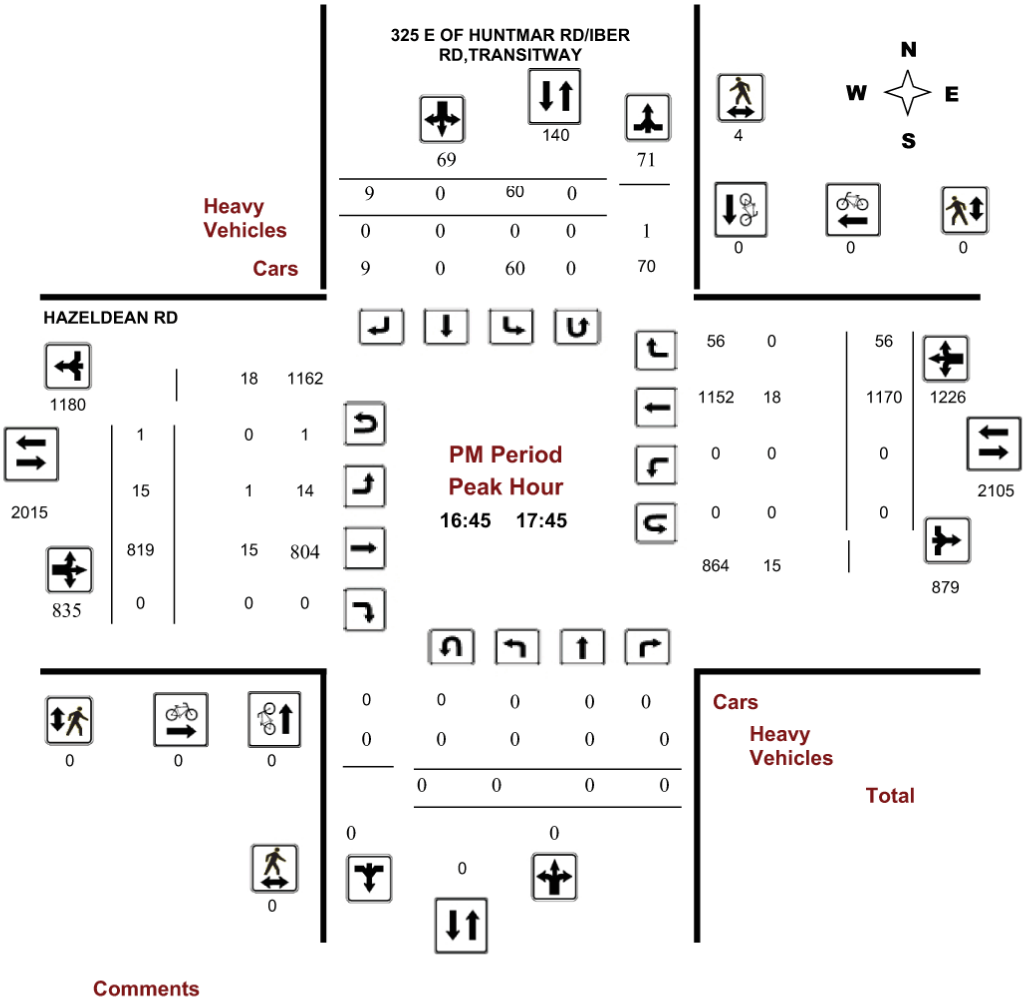
EXHIBIT 2.2
2016 PEAK PM HOUR TRAFFIC COUNTS (Hazeldean/N-S Arterial)

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

325 E OF HUNTMAR RD/IBER RD,TRANSITWAY @ HAZELDEAN RD

Survey Date: Tuesday, January 19, 2016 **WO No:** 35664
Start Time: 07:00 **Device:** Miovision



Comments

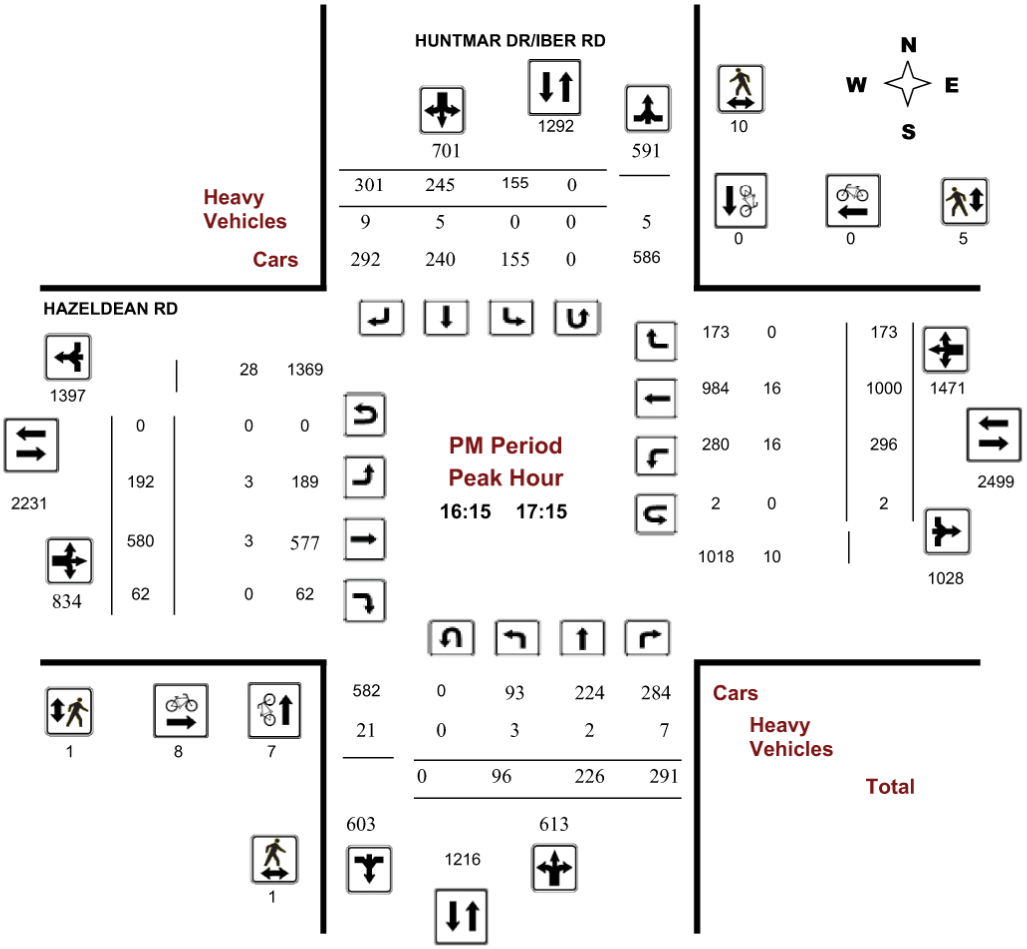
EXHIBIT 2.3
2016 PEAK PM HOUR TRAFFIC COUNTS (Hazeldean/Huntmar)

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HAZELDEAN RD @ HUNTMAR DR/IBER RD

Survey Date: Tuesday, December 06, 2016 **WO No:** 36581
Start Time: 07:00 **Device:** Miovision



Comments

EXHIBIT 2.4
TRAFFIC SIGNAL TIMING PLAN (Hazeldean/N-S Arterial)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

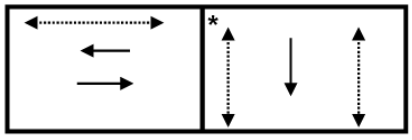
Intersection:	**Main:**	Hazeldean	**Side:**	325m E of Iber	
Controller:	MS3200		**TSD:**	6762	
Author:	M. Anderson		**Date:**	29-Apr-2019	

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	94	49	119	X	11			
EB Thru	79	68	84	68	74	-	-	3.7 + 2.4
WB Thru	79	68	84	68	74	7	13	3.7 + 2.4
SB Thru	36	32	36	32	36	7	22	3.3 + 2.8

Phasing Sequence‡

Plan:



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
22:30	4

Sunday

Time	Plan
0:10	4
8:00	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
TRAFFIC SIGNAL TIMING PLAN (Hazeldean/Huntmar)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

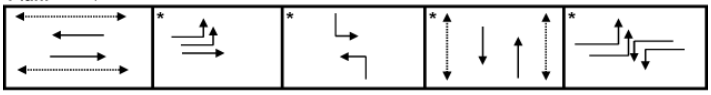
Intersection:	**Main:**	Hazeldean	**Side:**	Huntmar/Iber	
Controller:	MS-3200			**TSD:**	6508
Author:	M. Anderson			**Date:**	29-Apr-2019

Existing Timing Plans†

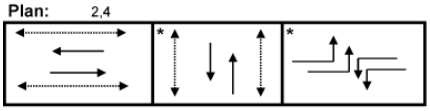
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Weekend 5	*Walk*	*DW*	*A+R*
Cycle	115	100	120	100	110			
Offset	62	48	32	X	32			
EB Thru	49	43	44	43	38	7	23	3.7+2.6
WB Thru	37	43	44	43	38	7	23	3.7+2.6
EB Left (fp)	12	-	-	-	-	-	-	3.7+2.8
NB Left	12	-	12	-	-	-	-	3.7+2.6
SB Left	12	-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

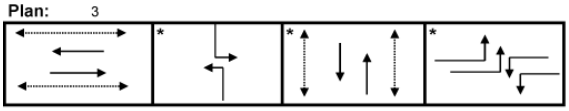
Plan: 1



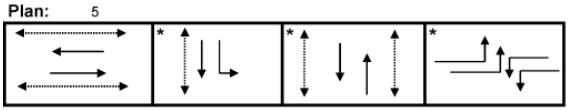
Plan: 2,4



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 3.1
ITE TRIP GENERATION MANUAL 10TH EDITION – Land Use 820 Trip Data

Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 261
1000 Sq. Ft. GLA: 327
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation

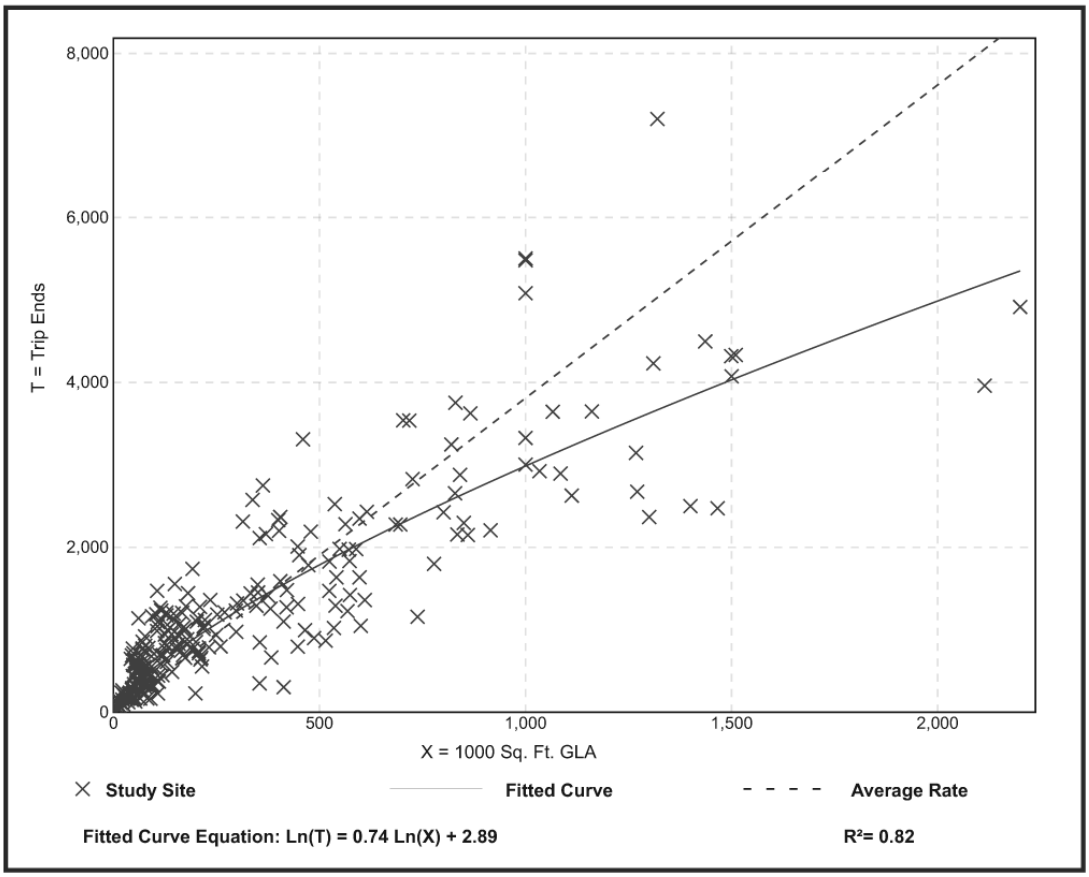
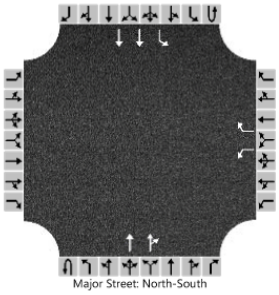


EXHIBIT 4.1
2016 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Huntmar/Food Basics

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Huntmar/Food Basics
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	6/24/2019	East/West Street	Food Basics Access
Analysis Year	2016	North/South Street	Huntmar Drive
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	5707 Hazeldean Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	0	0	1	2	0
Configuration						L		R			T	TR		L	T	
Volume (veh/h)						54		57			513	29	0	83	596	
Percent Heavy Vehicles (%)						0		0					0	0		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized						No										
Median Type | Storage		Left + Thru								6						

Critical and Follow-up Headways

Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.80		6.90						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						59		62						90		
Capacity, c (veh/h)						475		708						996		
v/c Ratio						0.12		0.09						0.09		
95% Queue Length, Q_{95} (veh)						0.4		0.3						0.3		
Control Delay (s/veh)						13.6		10.6						9.0		
Level of Service (LOS)						B		B						A		
Approach Delay (s/veh)						12.1								1.1		
Approach LOS						B										

HCS™ TWSC Version 7.7
2016_PM.xtw
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EXHIBIT 4.2
TRAFFIC SIGNAL WARRANT ANALYSIS (Weekday 2026) – Huntmar/Food Basics

MINIMUM WARRANTS FOR INSTALLATION OF TRAFFIC SIGNAL USING PROJECTED VOLUME

Location Huntmar Drive and Food Basics Access **Municipality** City of Ottawa **Projected Volume** Year 2026

JUSTIFICATION 7 PROJECTED VOLUMES	DESCRIPTION	MINIMUM REQUIREMENT FOR 1 LANE HIGHWAYS		MINIMUM REQUIREMENT FOR 2 OR MORE LANES		COMPLIANCE		
		FREE FLOW	RESTRICT. FLOW	FREE FLOW	RESTRICT. FLOW	SECTIONAL NUMBER	SECTIONAL %	ENTIRE %
1. MINIMUM VEHICULAR VOLUME	1. A. Vehicle volume all approaches (Average hour)	480	720	600	(900)	1057	100	(56%)
	B. Vehicle volume, along minor roads, (Average hour)	120	170	120	(255) ~~170~~	144	56	
2. DELAY TO CROSS TRAFFIC	1. A. Vehicle volume, along artery (Average hour)	480	720	600	(900)	986	100	47%
	B. Combined vehicle and pedestrian volume crossing artery from minor roads, (Average hour)	50	75	50	(75)	35	47	

Projected Average Hour - Use the sum of the PM Peak volumes divided by 2

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.

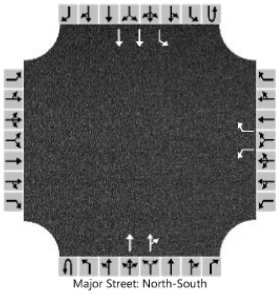
ROAD CONDITION	JUSTIFICATION 7 - AVERAGE HOURLY VOLUME (AHV)
BOTH INTERSECTING ROADS EXIST, DEVELOPMENT IS FUTURE	120 %
ONE ROAD, BOTH ROADS AND/OR INTERSECTION ARE FUTURE. DEVELOPMENT IS FUTURE	150 %

EXHIBIT 4.3
2021 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Huntmar/Food Basics

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Huntmar/Food Basics
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	6/24/2019	East/West Street	Food Basics Access
Analysis Year	2021	North/South Street	Huntmar Drive
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	5707 Hazeldean Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	0	0	1	2	0
Configuration						L		R			T	TR		L	T	
Volume (veh/h)						70		72			668	42	0	103	776	
Percent Heavy Vehicles (%)						0		0					0	0		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized						No										
Median Type | Storage		Left + Thru								6						

Critical and Follow-up Headways

Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.80		6.90						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		

Delay, Queue Length, and Level of Service

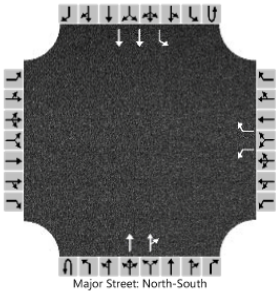
Flow Rate, v (veh/h)						76		78						112		
Capacity, c (veh/h)						379		618						852		
v/c Ratio						0.20		0.13						0.13		
95% Queue Length, Q_{95} (veh)						0.7		0.4						0.5		
Control Delay (s/veh)						16.9		11.7						9.9		
Level of Service (LOS)						C		B						A		
Approach Delay (s/veh)						14.2								1.2		
Approach LOS						B										

EXHIBIT 4.4
2026 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Huntmar/Food Basics

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Huntmar/Food Basics
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	6/24/2019	East/West Street	Food Basics Access
Analysis Year	2026	North/South Street	Huntmar Drive
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	5707 Hazeldean Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	2	0	0	1	2	0
Configuration						L		R			T	TR		L	T	
Volume (veh/h)						70		72			849	42	0	103	977	
Percent Heavy Vehicles (%)						0		0					0	0		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized						No										
Median Type | Storage		Left + Thru								6						

Critical and Follow-up Headways

Base Critical Headway (sec)						7.5		6.9						4.1		
Critical Headway (sec)						6.80		6.90						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						76		78						112		
Capacity, c (veh/h)						308		534						720		
v/c Ratio						0.25		0.15						0.16		
95% Queue Length, Q_{95} (veh)						1.0		0.5						0.5		
Control Delay (s/veh)						20.5		12.9						10.9		
Level of Service (LOS)						C		B						B		
Approach Delay (s/veh)						16.6								1.0		
Approach LOS						C										

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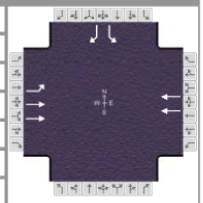
EXHIBIT 4.5
2016 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/N-S Arterial

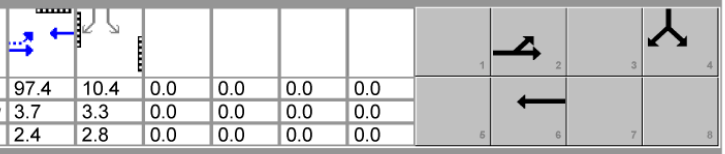
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2016	Analysis Period	1> 7:00
Intersection	Hazeldean/N-S Arterial	File Name	2016_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	15	819			1152					60		9

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On



Green	97.4	10.4	0.0	0.0	0.0	0.0
Yellow	3.7	3.3	0.0	0.0	0.0	0.0
Red	2.4	2.8	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		6.0		8.0				9.0
Phase Duration, s		103.5		103.5				16.5
Change Period, ($Y+R_c$), s		6.1		6.1				6.1
Max Allow Headway (*MAH*), s		0.0		0.0				3.2
Queue Clearance Time (g_s), s								6.3
Green Extension Time (g_e), s		0.0		0.0				0.1
Phase Call Probability								0.92
Max Out Probability								0.00

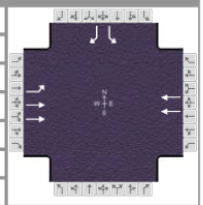
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6					7		14
Adjusted Flow Rate (*v*), veh/h	16	890			1252					65		10
Adjusted Saturation Flow Rate (*s*), veh/h/ln	447	1687			1687					1714		1508
Queue Service Time (g_s), s	0.0	0.0			0.0					4.3		0.7
Cycle Queue Clearance Time (g_c), s	0.0	0.0			0.0					4.3		0.7
Green Ratio (*g/C*)	0.83	0.83			0.83					0.10		0.10
Capacity (*c*), veh/h	430	2794			2794					177		156
Volume-to-Capacity Ratio (*X*)	0.038	0.319			0.448					0.368		0.063
Back of Queue (*Q*), ft/ln (50 th percentile)	0.5	3			5.1					46		6.4
Back of Queue (*Q*), veh/ln (50 th percentile)	0.0	0.1			0.2					1.8		0.3
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00			0.00					0.00		0.00
Uniform Delay (d_1), s/veh	0.0	0.0			0.0					50.1		46.7
Incremental Delay (d_2), s/veh	0.2	0.3			0.5					0.5		0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	0.2	0.3			0.5					50.6		46.7
Level of Service (LOS)	A	A			A					D		D
Approach Delay, s/veh / LOS	0.3	A		0.5	A		0.0			50.1	D	
Intersection Delay, s/veh / LOS	2.1						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.77	A	1.83	B	2.16	B	2.33	B
Bicycle LOS Score / LOS	1.24	A	1.52	B		A		F

EXHIBIT 4.6
2021 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/N-S Arterial

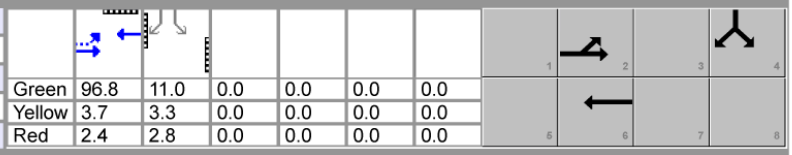
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Hazeldean/N-S Arterial	File Name	2021_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	42	945			1360					102		15

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On



Green	96.8	11.0	0.0	0.0	0.0	0.0						
Yellow	3.7	3.3	0.0	0.0	0.0	0.0						
Red	2.4	2.8	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		6.0		8.0				9.0
Phase Duration, s		102.9		102.9				17.1
Change Period, (*Y+R c*), s		6.1		6.1				6.1
Max Allow Headway (*MAH*), s		0.0		0.0				3.2
Queue Clearance Time (*g s*), s								9.4
Green Extension Time (*g e*), s		0.0		0.0				0.2
Phase Call Probability								0.99
Max Out Probability								0.00

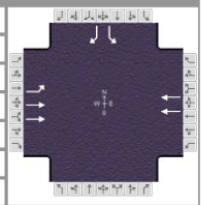
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6					7		14
Adjusted Flow Rate (*v*), veh/h	46	1027			1478					111		16
Adjusted Saturation Flow Rate (*s*), veh/h/ln	360	1687			1687					1714		1509
Queue Service Time (*g s*), s	0.0	0.0			0.0					7.4		1.1
Cycle Queue Clearance Time (*g c*), s	0.0	0.0			0.0					7.4		1.1
Green Ratio (*g/C*)	0.82	0.82			0.82					0.11		0.11
Capacity (*c*), veh/h	356	2776			2776					186		164
Volume-to-Capacity Ratio (*X*)	0.128	0.370			0.532					0.595		0.099
Back of Queue (*Q*), ft/ln (50 th percentile)	1.8	3.7			7.2					80.3		10.6
Back of Queue (*Q*), veh/ln (50 th percentile)	0.1	0.1			0.3					3.2		0.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00			0.00					0.00		0.00
Uniform Delay (*d 1*), s/veh	0.0	0.0			0.0					51.0		46.2
Incremental Delay (*d 2*), s/veh	0.7	0.4			0.7					1.1		0.1
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	0.7	0.4			0.7					52.1		46.3
Level of Service (LOS)	A	A			A					D		D
Approach Delay, s/veh / LOS	0.4	A		0.7	A		0.0			51.3	D	
Intersection Delay, s/veh / LOS	3.0						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.77	A	1.83	B	2.16	B	2.33	B
Bicycle LOS Score / LOS	1.37	A	1.71	B		A		F

EXHIBIT 4.7
2026 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/N-S Arterial

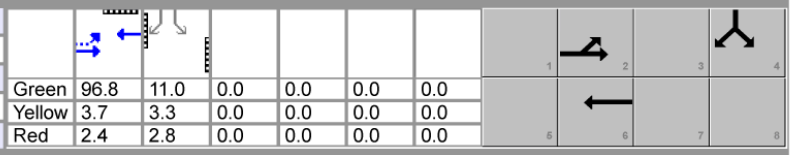
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2026	Analysis Period	1> 7:00
Intersection	Hazeldean/N-S Arterial	File Name	2026_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	42	1097			1588					102		15

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On



Green	96.8	11.0	0.0	0.0	0.0	0.0
Yellow	3.7	3.3	0.0	0.0	0.0	0.0
Red	2.4	2.8	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6				4
Case Number		6.0		8.0				9.0
Phase Duration, s		102.9		102.9				17.1
Change Period, (*Y+R c*), s		6.1		6.1				6.1
Max Allow Headway (*MAH*), s		0.0		0.0				3.2
Queue Clearance Time (*g s*), s								9.4
Green Extension Time (*g e*), s		0.0		0.0				0.2
Phase Call Probability								0.99
Max Out Probability								0.00

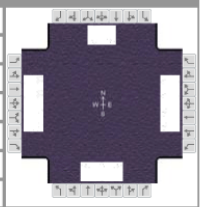
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6					7		14
Adjusted Flow Rate (*v*), veh/h	46	1192			1726					111		16
Adjusted Saturation Flow Rate (*s*), veh/h/ln	283	1687			1687					1714		1509
Queue Service Time (*g s*), s	0.0	0.0			0.0					7.4		1.1
Cycle Queue Clearance Time (*g c*), s	0.0	0.0			0.0					7.4		1.1
Green Ratio (*g/C*)	0.82	0.82			0.82					0.11		0.11
Capacity (*c*), veh/h	293	2776			2776					186		164
Volume-to-Capacity Ratio (*X*)	0.156	0.429			0.622					0.595		0.099
Back of Queue (*Q*), ft/ln (50 th percentile)	2.3	4.8			10.4					80.3		10.6
Back of Queue (*Q*), veh/ln (50 th percentile)	0.1	0.2			0.4					3.2		0.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00			0.00					0.00		0.00
Uniform Delay (*d 1*), s/veh	0.0	0.0			0.0					51.0		46.2
Incremental Delay (*d 2*), s/veh	1.1	0.5			1.1					1.1		0.1
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	1.1	0.5			1.1					52.1		46.3
Level of Service (LOS)	A	A			A					D		D
Approach Delay, s/veh / LOS	0.5	A		1.1	A		0.0			51.3	D	
Intersection Delay, s/veh / LOS	2.9						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.77	A	1.83	B	2.16	B	2.33	B
Bicycle LOS Score / LOS	1.51	B	1.91	B		A		F

EXHIBIT 4.8
2016 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/Huntmar

HCS7 Signalized Intersection Results Summary

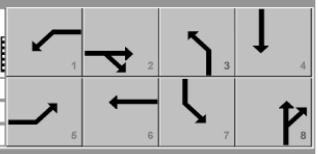
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2016	Analysis Period	1> 7:00
Intersection	Hazeldean/Huntmar	File Name	2016_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192	580	62	296	1000		96	226	291	155	245	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On

Green	9.5	4.2	48.6	9.1	2.6	20.3	
Yellow	3.7	0.0	3.7	3.7	0.0	3.7	
Red	2.8	0.0	2.6	2.6	0.0	2.9	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	16.0	54.9	20.2	59.1	15.4	26.9	18.0	29.5
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	9.3		13.5		9.4	18.4	13.6	18.7
Green Extension Time (g_e), s	0.2	0.0	0.2	0.0	0.0	1.3	0.0	1.3
Phase Call Probability	1.00		1.00		0.97	1.00	1.00	1.00
Max Out Probability	0.03		1.00		1.00	0.00	1.00	0.00

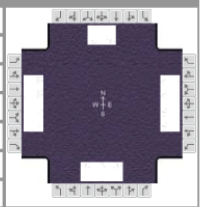
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6		3	8	18	7	4	
Adjusted Flow Rate (*v*), veh/h	209	355	343	322	1087		104	246	208	168	266	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1639	1786	1718	1600	1687		1647	1786	1445	1714	1786	
Queue Service Time (g_s), s	7.3	14.2	14.3	11.5	26.5		7.4	15.6	16.4	11.6	16.7	
Cycle Queue Clearance Time (g_c), s	7.3	14.2	14.3	11.5	26.5		7.4	15.6	16.4	11.6	16.7	
Green Ratio (*g/C*)	0.10	0.42	0.42	0.13	0.46		0.09	0.19	0.19	0.11	0.21	
Capacity (*c*), veh/h	314	753	724	418	1539		152	332	269	196	371	
Volume-to-Capacity Ratio (*X*)	0.664	0.472	0.473	0.769	0.706		0.684	0.739	0.772	0.861	0.718	
Back of Queue (Q), ft/ln (50 th percentile)	74.6	140.3	134.7	122.5	230.6		83.6	175.1	153.7	162.7	186.4	
Back of Queue (Q), veh/ln (50 th percentile)	2.9	5.6	5.4	4.7	9.1		3.2	6.9	6.0	6.5	7.4	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	50.5	18.8	18.3	47.8	18.5		52.8	47.0	46.4	52.2	45.2	
Incremental Delay (d_2), s/veh	0.9	2.1	2.2	5.8	2.8		4.5	1.2	1.8	28.9	1.0	
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	51.4	20.9	20.5	53.6	21.3		57.2	48.2	48.2	81.2	46.1	
Level of Service (LOS)	D	C	C	D	C		E	D	D	F	D	
Approach Delay, s/veh / LOS	27.8	C		28.7	C		49.9	D		59.7	E	
Intersection Delay, s/veh / LOS	36.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.42	B	2.11	B	2.46	B	2.46	B
Bicycle LOS Score / LOS	1.24	A	1.65	B	1.41	A	1.20	A

EXHIBIT 4.9
2021 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/Huntmar

HCS7 Signalized Intersection Results Summary

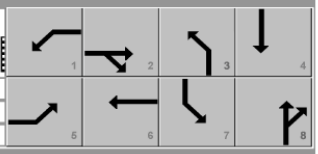
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2021	Analysis Period	1> 7:00
Intersection	Hazeldean/Huntmar	File Name	2021_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	254	684	72	358	1195		111	278	339	189	289	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On

Green	11.9	3.6	42.8	10.3	1.4	24.3	
Yellow	3.7	0.0	3.7	3.7	0.0	3.7	
Red	2.8	0.0	2.6	2.6	0.0	2.9	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	18.4	49.1	22.0	52.7	16.6	30.9	18.0	32.2
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	11.6		16.0		10.5	22.5	15.7	21.7
Green Extension Time (*g e*), s	0.3	0.0	0.0	0.0	0.0	1.6	0.0	1.6
Phase Call Probability	1.00		1.00		0.98	1.00	1.00	1.00
Max Out Probability	0.49		1.00		1.00	0.02	1.00	0.02

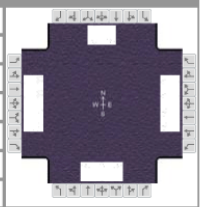
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6		3	8	18	7	4	
Adjusted Flow Rate (*v*), veh/h	276	419	403	389	1299		121	302	260	205	314	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1639	1786	1719	1600	1687		1647	1786	1448	1714	1786	
Queue Service Time (*g s*), s	9.6	20.5	20.6	14.0	43.8		8.5	19.1	20.5	13.7	19.7	
Cycle Queue Clearance Time (*g c*), s	9.6	20.5	20.6	14.0	43.8		8.5	19.1	20.5	13.7	19.7	
Green Ratio (*g/C*)	0.12	0.37	0.37	0.15	0.40		0.10	0.22	0.22	0.11	0.23	
Capacity (*c*), veh/h	379	667	642	467	1362		169	391	317	196	411	
Volume-to-Capacity Ratio (*X*)	0.728	0.627	0.628	0.834	0.954		0.712	0.773	0.820	1.050	0.764	
Back of Queue (Q), ft/ln (50 th percentile)	99.9	213.6	204.9	156.6	456		101	216.9	199.2	251.9	224.5	
Back of Queue (Q), veh/ln (50 th percentile)	3.9	8.5	8.2	6.0	18.0		3.9	8.6	7.7	10.1	8.9	
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d 1*), s/veh	48.9	24.6	24.0	46.9	27.6		52.1	45.0	44.6	53.2	44.0	
Incremental Delay (*d 2*), s/veh	2.8	4.4	4.6	11.7	15.6		8.4	2.4	5.3	78.0	2.7	
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	51.7	29.1	28.6	58.6	43.2		60.5	47.4	49.9	131.2	46.8	
Level of Service (LOS)	D	C	C	E	D		E	D	D	F	D	
Approach Delay, s/veh / LOS	34.6	C		46.7	D		50.7	D		80.1	F	
Intersection Delay, s/veh / LOS	48.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.11	B	2.46	B	2.46	B
Bicycle LOS Score / LOS	1.39	A	1.88	B	1.61	B	1.34	A

EXHIBIT 4.10
2026 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Hazeldean/Huntmar

HCS7 Signalized Intersection Results Summary

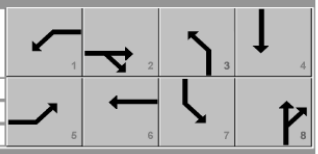
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	6/14/2019	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5707 Hazeldean Road	Analysis Year	2026	Analysis Period	1> 7:00
Intersection	Hazeldean/Huntmar	File Name	2026_PM.xus		
Project Description	The Shoppes at Fairwinds				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	289	792	83	413	1380		129	320	393	217	334	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On

Green	13.2	2.3	38.3	11.7	28.8	0.0
Yellow	3.7	0.0	3.7	3.7	3.7	0.0
Red	2.8	0.0	2.6	2.6	2.9	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	19.7	44.6	22.0	46.9	18.0	35.4	18.0	35.4
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	3.2	3.1	3.2
Queue Clearance Time (g_s), s	13.0		18.7		11.9	27.1	15.7	24.8
Green Extension Time (g_e), s	0.2	0.0	0.0	0.0	0.0	1.7	0.0	1.8
Phase Call Probability	1.00		1.00		0.99	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.19	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	5	2	12	1	6		3	8	18	7	4	
Adjusted Flow Rate (*v*), veh/h	314	485	466	449	1500		140	348	318	236	363	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1639	1786	1719	1600	1687		1647	1786	1449	1714	1786	
Queue Service Time (g_s), s	11.0	28.2	28.2	16.7	42.6		9.9	21.6	25.1	13.7	22.8	
Cycle Queue Clearance Time (g_c), s	11.0	28.2	28.2	16.7	42.6		9.9	21.6	25.1	13.7	22.8	
Green Ratio (*g/C*)	0.13	0.34	0.34	0.15	0.36		0.11	0.26	0.26	0.11	0.26	
Capacity (*c*), veh/h	414	600	578	467	1199		188	458	372	196	458	
Volume-to-Capacity Ratio (*X*)	0.758	0.808	0.808	0.962	1.251		0.746	0.759	0.857	1.205	0.793	
Back of Queue (Q), ft/ln (50 th percentile)	115.8	319.6	306.7	216.6	895		123.4	247.8	258.1	323.3	265.5	
Back of Queue (Q), veh/ln (50 th percentile)	4.6	12.7	12.3	8.3	35.2		4.7	9.8	10.0	12.9	10.5	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	48.1	30.6	29.8	48.0	31.6		51.5	42.1	42.5	53.2	42.5	
Incremental Delay (d_2), s/veh	4.8	11.2	11.5	31.8	120.0		13.4	3.7	11.3	130.5	5.1	
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	52.9	41.7	41.3	79.8	151.6		64.8	45.8	53.8	183.7	47.7	
Level of Service (LOS)	D	D	D	E	F		E	D	D	F	D	
Approach Delay, s/veh / LOS	44.3	D		135.1	F		52.2	D		101.2	F	
Intersection Delay, s/veh / LOS	91.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.43	B	2.12	B	2.45	B	2.45	B
Bicycle LOS Score / LOS	1.53	B	2.10	B	1.82	B	1.48	A

EXHIBIT 4.11
HUNTMAR DRIVE – PLOS Segment Evaluation

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Gallantry Way
YEAR	2026
DIRECTION	Northbound–Southbound
MMLOS MODE	PLOS

SEGMENT SCORE **C**

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 4.12
HAZELDEAN ROAD – PLOS Segment Evaluation

STREET Hazeldean Road
FROM Huntmar Drive
TO Future N–S Arterial Road
YEAR 2026
DIRECTION Eastbound–Westbound
MMLOS MODE PLOS

SEGMENT SCORE **D**

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 4.13
HAZELDEAN/N-S ARTERIAL – PLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	N–S Arterial
APPROACHES	All
YEAR	2026
DIRECTION	All
MMLOS MODE	PLOS

	North Approach		South Approach		East Approach		West Approach	
	Comment	Points	Comment	Points	Comment	Points	Comment	Points
5.1 Crossing Distance & Conditions								
Median?	No				No		No	
Total Travel Lanes Crossed	3	105			5	72	5	72
5.2 Signal Phasing & Timing Features								
Left Turn Conflict	Permissive	–8					Permissive	–8
Right Turn Conflict	Permissive or Yield Control	–5			Permissive or Yield Control	–5		
Right Turns on Red	RTOR Allowed	–3			RTOR Allowed	–3		
Leading Ped Interval	No	–2			No	–2		
5.3a Corner Radius	> 10m to 15m	–6			> 15m to 25m	–8		
5.3b Right Turn Channel	No Right Turn Channel	–4			Right Turn Smart Channel	2		
5.4 Crosswalk Treatment	Standard Transverse Markings	–7			Standard Transverse Markings	–7	Standard Transverse Markings	–7
TOTAL PETSI SCORE		70				49		57
DELAY SCORE From Signal Timing Plan		7				20		20
PETSI SCORE		**C**				**D**		**D**
DELAY SCORE		**A**				**B**		**B**
OVERALL APPROACH SCORE		**C**				**D**		**D**

OVERALL INTERSECTION SCORE **D**

EXHIBIT 4.14
HAZELDEAN/HUNTMAR – PLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar Drive
APPROACHES	All
YEAR	2026
DIRECTION	All
MMLOS MODE	PLOS

	North Approach		South Approach		East Approach		West Approach	
	Comment	Points	Comment	Points	Comment	Points	Comment	Points
5.1 Crossing Distance & Conditions								
Median?	No		No		No		No	
Total Travel Lanes Crossed	5	72	5	72	7	39	6	55
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	> 10m to 15m	−6	> 15m to 25m	−8	> 10m to 15m	−6
5.3b Right Turn Channel	Right Turn Smart Channel	2	No Right Turn Channel	−4	Right Turn Smart Channel	2	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		49		45		16		28
DELAY SCORE From Signal Timing Plan		7		14		20		20
PETSI SCORE		**D**		**D**		**F**		**E**
DELAY SCORE		**A**		**B**		**C**		**C**
OVERALL APPROACH SCORE		**D**		**D**		**F**		**E**

OVERALL INTERSECTION SCORE **F**

EXHIBIT 4.15
HUNTMAR DRIVE – BLOS Segment Evaluation

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Gallanty Way
YEAR	2026
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 4.16
HAZELDEAN ROAD – BLOS Segment Evaluation

STREET	Hazeldean Road
FROM	Huntmar Drive
TO	Future N–S Arterial Road
YEAR	2026
DIRECTION	Eastbound–Westbound
MMLOS MODE	BLOS

SEGMENT SCORE **D**

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

NOT APPLICABLE

NOT APPLICABLE

NOT APPLICABLE

NOT APPLICABLE

EXHIBIT 4.17
HAZELDEAN/N-S ARTERIAL – BLOS Signalized Intersection Evaluation

MAIN STREET	Hazerldean Road
MINOR STREET	Future N–S Arterial Road
APPROACHES	Eastbound–Westbound
YEAR	2026
DIRECTION	East/West
MMLOS MODE	BLOS

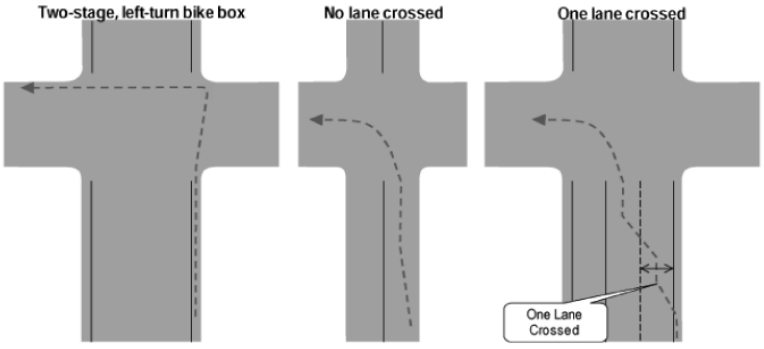
INTERSECTION SCORE **C**

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

NOT APPLICABLE

NOT APPLICABLE

Left-turn Configurations



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

EXHIBIT 4.18
HAZELDEAN/HUNTMAR – BLOS Signalized Intersection Evaluation

MAIN STREET Hazerldean Road
MINOR STREET Huntmar Drive
APPROACHES Eastbound–Westbound
YEAR 2026
DIRECTION East/West
MMLOS MODE BLOS

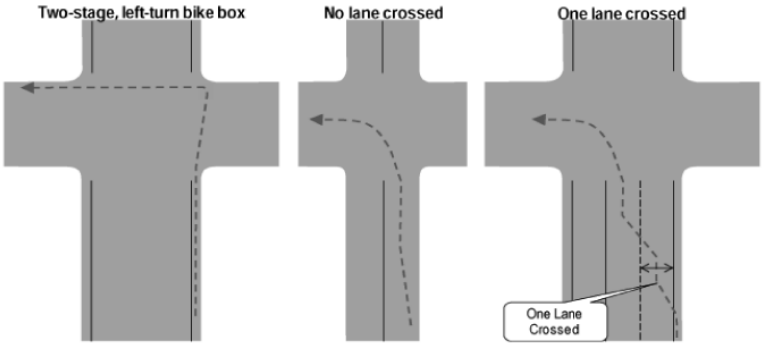
INTERSECTION SCORE **C**

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

NOT APPLICABLE

NOT APPLICABLE

Left-turn Configurations



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

EXHIBIT 4.19
HUNTMAR DRIVE – TLOS Segment Evaluation

STREET	Huntmar Drive
FROM	Hazeldean Road
TO	Gallantry Way
YEAR	2026
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 ≥ 0.8	D
	Moderate parking/driveway friction	Yes	Medium	Medium	Vt/Vp ≤ 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 4.20
HAZELDEAN ROAD – TLOS Segment Evaluation

STREET	Hazeldean Road
FROM	Huntmar Drive
TO	Future N–S Arterial Road
YEAR	2026
DIRECTION	Eastbound–Westbound
MMLOS MODE	TLOS

SEGMENT SCORE **D**

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

Notes:

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

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

EXHIBIT 4.21
HAZELDEAN/N-S ARTERIAL – TLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	Future N–S Arterial Road
APPROACHES	All
YEAR	2026
MMLOS MODE	TLOS

INTERSECTION SCORE **D**

Exhibit 16 – TLOS Signalized Intersection Evaluation Table

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec		C
≤30 sec		D
≤40 sec	TSP & long cycle length	E
>40 sec	No TSP & long cycle length	F

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

EXHIBIT 4.22
HAZELDEAN/HUNTMAR – TLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar Drive
APPROACHES	All
YEAR	2026
MMLOS MODE	TLOS

INTERSECTION SCORE **D**

Exhibit 16 – TLOS Signalized Intersection Evaluation Table

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec		C
≤30 sec		D
≤40 sec	TSP & long cycle length	E
>40 sec	No TSP & long cycle length	F

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

EXHIBIT 4.23
HAZELDEAN ROAD – TkLOS Segment Evaluation

STREET	Belfast Road
FROM	West of Shared Access/Belfast
TO	East of Shared Access/Belfast
YEAR	2026
DIRECTION	Eastbound–Westbound
MMLOS MODE	TkLOS

SEGMENT SCORE **A**

Exhibit 20 – TkLOS Segment Evaluation Table

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

EXHIBIT 4.24
HAZELDEAN/N-S ARTERIAL – TkLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	Future N–S Arterial Road
APPROACHES	Eastbound–Westbound
YEAR	2026
MMLOS MODE	TkLOS

INTERSECTION SCORE **A**

Exhibit 21 – TkLOS Signalized Intersection Evaluation Table

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

EXHIBIT 4.25
HAZELDEAN/HUNTMAR – TkLOS Signalized Intersection Evaluation

MAIN STREET	Hazeldean Road
MINOR STREET	Huntmar Drive
APPROACHES	Eastbound–Westbound
YEAR	2026
MMLOS MODE	TkLOS

INTERSECTION SCORE **A**

Exhibit 21 – TkLOS Signalized Intersection Evaluation Table

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