20 Cedarow Court
Wellings Phase 2
Transportation Impact Assessment

Strategy Report

October 24, 2019

Prepared for:

Nautical Lands General Contractors Inc.

Prepared by:

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1.0 SCREENING

1.1 SUMMARY OF DEVELOPMENT

Municipal Address	20 Cedarow Court (Stittsville)
Description of Location	North-west quadrant of the Hazeldean Road at Fringewood Drive intersection
Land Use Classification	Senior Adult Housing - Attached, Commercial, Restaurant, Medical
Development Size (units)	414 units
Development Size (m^2)	**Commercial:** 512 m^2 GFA (5,500 ft^2 GFA) **Restaurant:** 586 m^2 GFA (6,300 ft^2 GFA) **Medical:** 514 m^2 GFA (5,500 ft^2 GFA)
Number of Accesses and Locations	1 full movements main access to the extension of Fringewood Drive 1 full movements access to Cedarow Court
Phase of Development	2 Phases, subject TIA will assess the entire development together as one phase
Buildout Year	Assumed build-out and occupancy by 2024

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

1.2 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	Triggered
Single-family homes	40 units	✗
Townhomes or apartments	90 units	✗
Office	3,500 m^2	✗
Industrial	5,000 m^2	✗
Fast-food restaurant or coffee shop	100 m^2	✓
Destination retail	1,000 m^2	✗
Gas station or convenience market	75 m^2	✗
Generates more than 60 person trips per hour		✓

** 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.

1.3 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?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone? *		✗

**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.

1.4 SAFETY TRIGGERS

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

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

1.5 SUMMARY

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

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).

2.0 SCOPING

2.1 EXISTING AND PLANNED CONDITIONS

2.1.1 Proposed Development

Nautical Lands General Contractors Inc. ("Nautical") is preparing a development application for Site Plan Control of a proposed development in the Stittsville community of Ottawa, Ontario. The proposed development is located at the north-west corner of the Hazeldean Road at Fringewood Drive intersection. The site is bound by Hazeldean Road to the south, Nautical's Wellings Phase 1 development to the east, existing commercial / industrial lands to the west, and Poole Creek to the north.

Figure 1 illustrates the location of the subject development. The subject site is currently zoned as Arterial Mainstreet (AM) Zone; the purpose of the AM Zone, according to the City of Ottawa's Official Plan, is to:

- *"Accommodate a broad range of uses including retail, service commercial, offices, residential and institutional uses in mixed-use buildings or side by side in separate buildings in areas designated **Arterial Mainstreet** in the Official Plan; and*
- *Impose development standards that will promote intensification while ensuring that they are compatible with the surrounding uses."*

The existing property is currently a vacant lot. The proposed primary site access makes up the north leg of the Hazeldean Road at Fringewood Drive intersection. This site access is shared with the adjacent Wellings Phase 1 development to the east of the subject site and is a full movements access without any turning restrictions. A secondary access is proposed to connect into Cedarow Court on the west side of the property. The secondary access is also a full movements access without any turning restrictions. A total of 490 vehicle parking spaces will be provided as part of the proposed development; 414 underground parking spaces and 76 above ground parking spaces.

The proposed development will be constructed in two phases. The first phase contains the building fronting Hazeldean Road and the second phase contains the building on the northern edge of the property. Build-out and occupancy of the entire development (i.e. both phases) is anticipated to occur by 2024. The subject TIA will assess the full build-out of the entire development.

Table 1 outlines the proposed land uses assumed for the analysis which were obtained from the *Institute of Transportation (ITE) Trip Generation Manual 10th Edition*.

Figure 2 illustrates the proposed site plan.

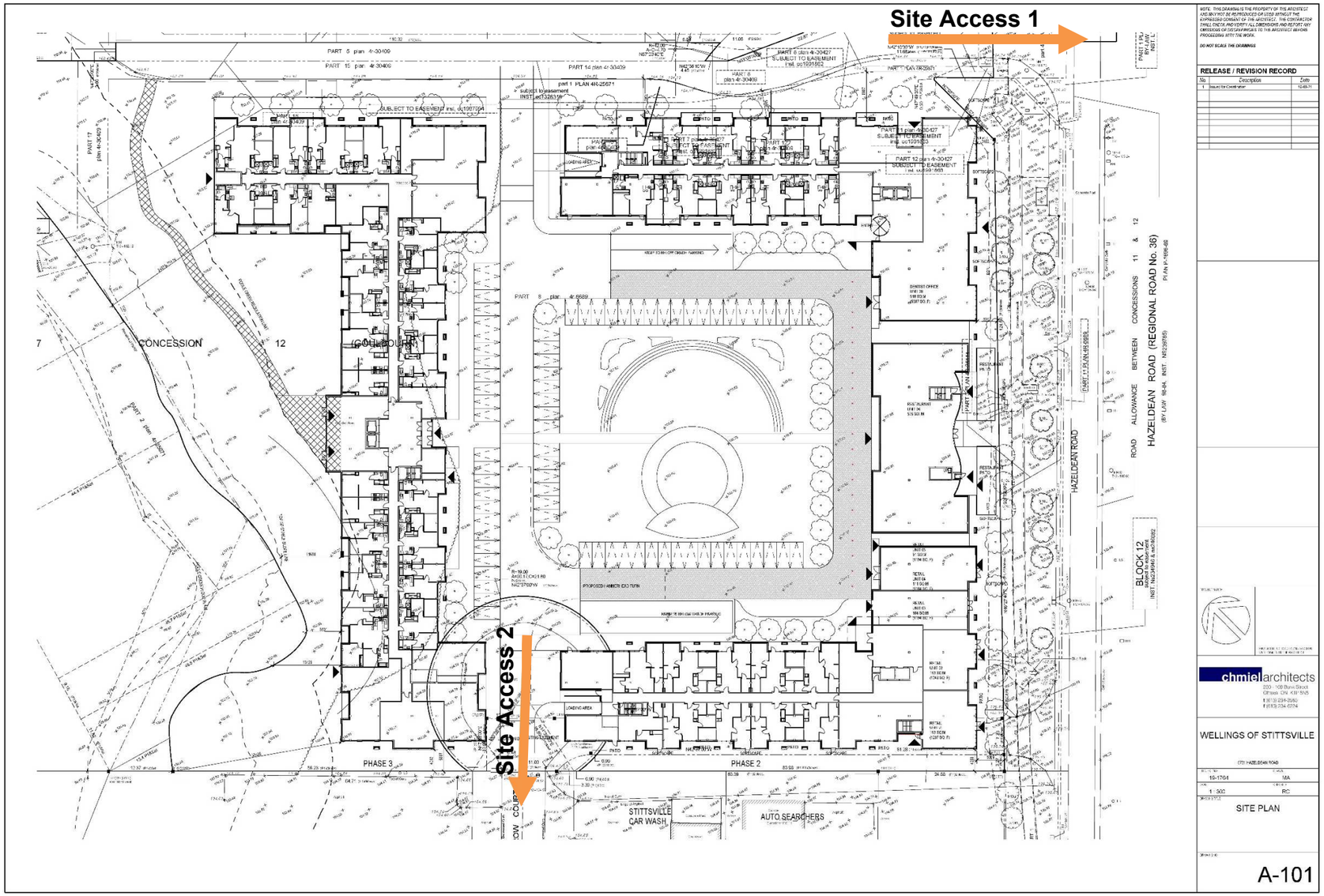
Figure 1 - Site Location

Table 1 - Proposed Land Uses / Land Use Codes

Land Use	Land Use Code (LUC)	Size
Senior Adult Housing - Attached	252	414 units
Shopping Centre	820	5,700 ft^2 GFA
High-Turnover Sit-Down Restaurant	932	6,000 ft^2 GFA
Medical-Dental Office	720	5,575 ft^2 GFA

It is noted that recent changes to the site plan resulted in minor modifications to the size of each land use. The minor discrepancy between the sizes depicted in **Table 1** above and the analysis contained within this report is acknowledged, however, it does not impact the findings or recommendations of this report.

Figure 2 - Site Plan



2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

The roadways under consideration in the study area are described as follows:

Hazeldean Road — Within the vicinity of the subject site, Hazeldean Road is a municipal four-lane divided arterial road with an urban cross-section. The posted speed limit along Hazeldean Road across the frontage of the subject site is 60 km/h. Sidewalks and on-street bicycle lanes are provided along both sides of Hazeldean Road.

Huntmar Drive — Huntmar Drive is a municipal two-lane major collector road with an urban cross-section. The posted speed limit along Huntmar Drive is 50 km/h. Sidewalks and on-street bicycle lanes are provided along both sides of Huntmar Drive. The intersection with Hazeldean Road is signalized and has auxiliary left and right turning lanes on all approaches.

Iber Road — Iber Road is a municipal two-lane major collector road with a rural cross-section. The posted speed limit along Iber Road is 60 km/h. Gravel shoulders are provided along both sides of Iber Road.

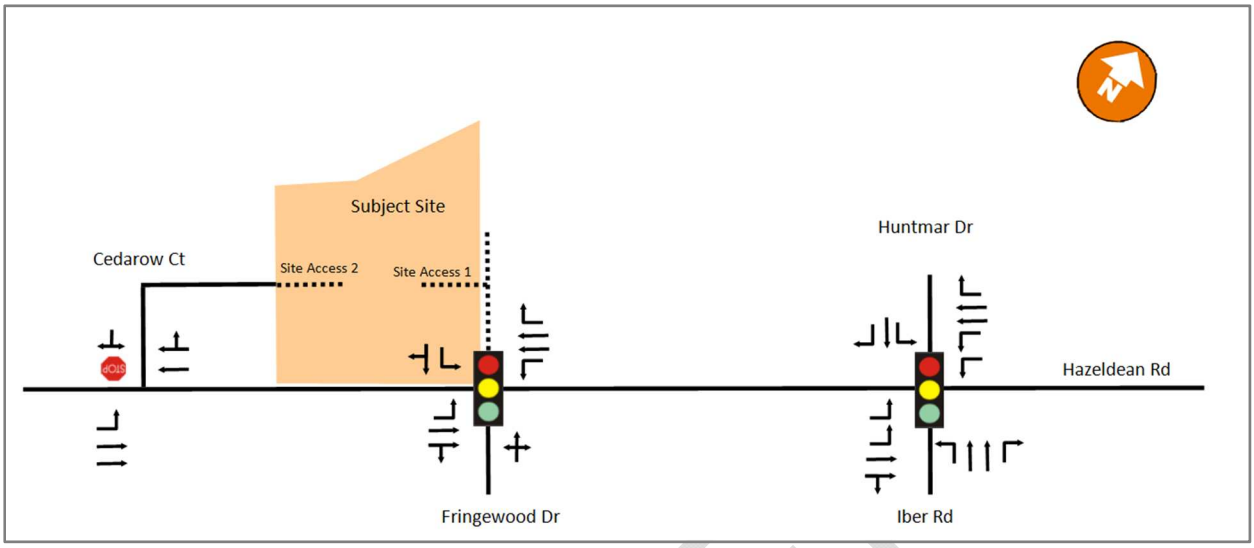
Fringewood Drive — Fringewood Drive is a municipal two-lane local road with a rural cross-section. The posted speed limit along Fringewood Drive is 40 km/h. Gravel shoulders are provided along both sides of Fringewood Drive. The intersection with Hazeldean Road is signalized and includes auxiliary left and right turn lanes in the eastbound and westbound directions. The eastbound left and westbound right turn lanes are already in place in order to accommodate the future developments on the north side of the intersection (the subject development as well as the adjacent Wellings Phase 1 development).

Cedarow Court — Cedarow Court is a municipal two-lane local road with an urban cross-section. In the absence of a posted speed limit, the default speed limit along Cedarow Court is 50 km/h. The intersection with Hazeldean Road is stop-controlled along the Cedarow Court approach. There is currently a median break along Hazeldean Road at this location to allow the intersection with Cedarow Court to operate as a full movements intersection.

Along Hazeldean Road, approximately 160m east of Fringewood Drive, there is an unsignalized access to the Keg restaurant on the north side of Hazeldean Road. Due to the median along Hazeldean Road, this access operates as a right-in / right-out only access. There are numerous existing commercial accesses along the entire length of Cedarow Court.

Figure 3 illustrates the existing lane configuration and traffic control.

Figure 3 - Existing Lane Configuration and Traffic Control



2.1.2.2 Walking and Cycling

Within the vicinity of the subject site, sidewalks and on-street bicycle lanes are provided along both sides of Hazeldean Road and Huntmar Drive. The City of Ottawa's Ultimate Cycling Plan includes Hazeldean Road, Huntmar Drive, and Iber Road as spine cycling routes. It also designates Fringewood Drive as a local cycling route.

Figure 4 illustrates the existing and planned cycling and pedestrian facilities in the vicinity of the subject site.

Figure 4 - Cycling and Pedestrian Facilities

(Source: geoOttawa, accessed June 24th, 2019)

2.1.2.3 Transit

Transit service is currently provided in the immediate vicinity of the proposed development via the following routes:

Route 61 is a Rapid route that runs between Stittsville and Tunney's Pasture/Gatineau.

Route 62 is also a Rapid route that runs between Stittsville and Tunney's Pasture.

Route 261 is a weekday Connexion peak directional route that runs between Stittsville Main and Tunney's Pasture.

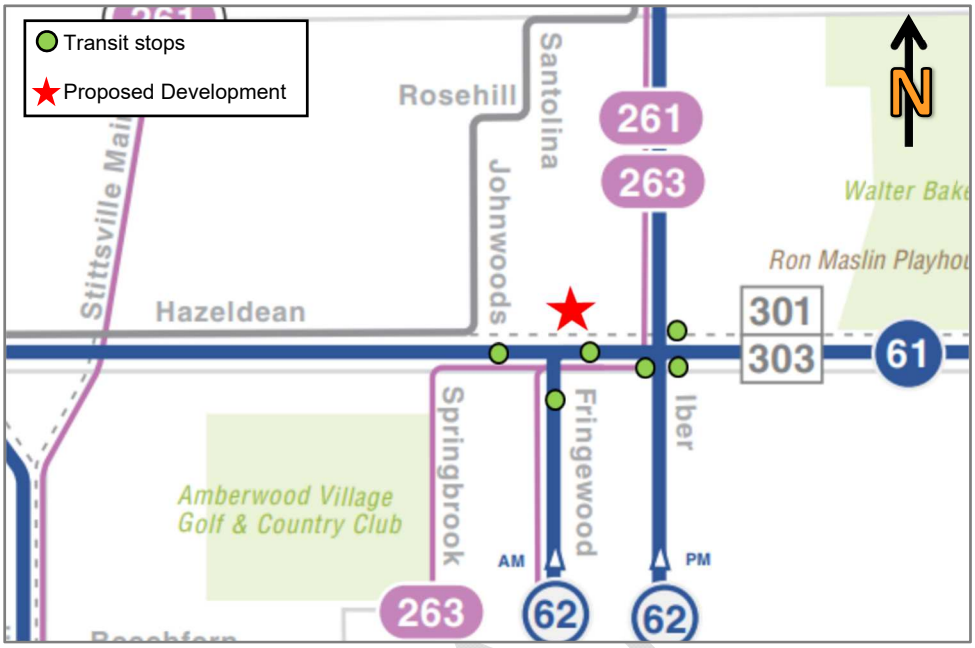
Route 263 is a weekday Connexion peak directional route that runs between Stanley Corners and Tunney's Pasture.

Route 303 is a Local peak directional route that runs on Wednesdays only between Dunrobin and Carlingwood Mall

There are two transit stops along Hazeldean Road at the intersection of Fringewood Drive. These bus stops are serviced by all five transit routes listed above.Although depicied, no schedule information is available for Route 303; it is believed no longer as per its exclusion from OC Transpo's In My Neighborhood webpage.

Figure 5 illustrates the transit routes and transit stops within the vicinity of the subject site.

Figure 5 - Study Area Transit Routes and Stops



(Source: OC Transpo System Map, accessed October 11, 2019)

2.1.2.4 Traffic Management Measures

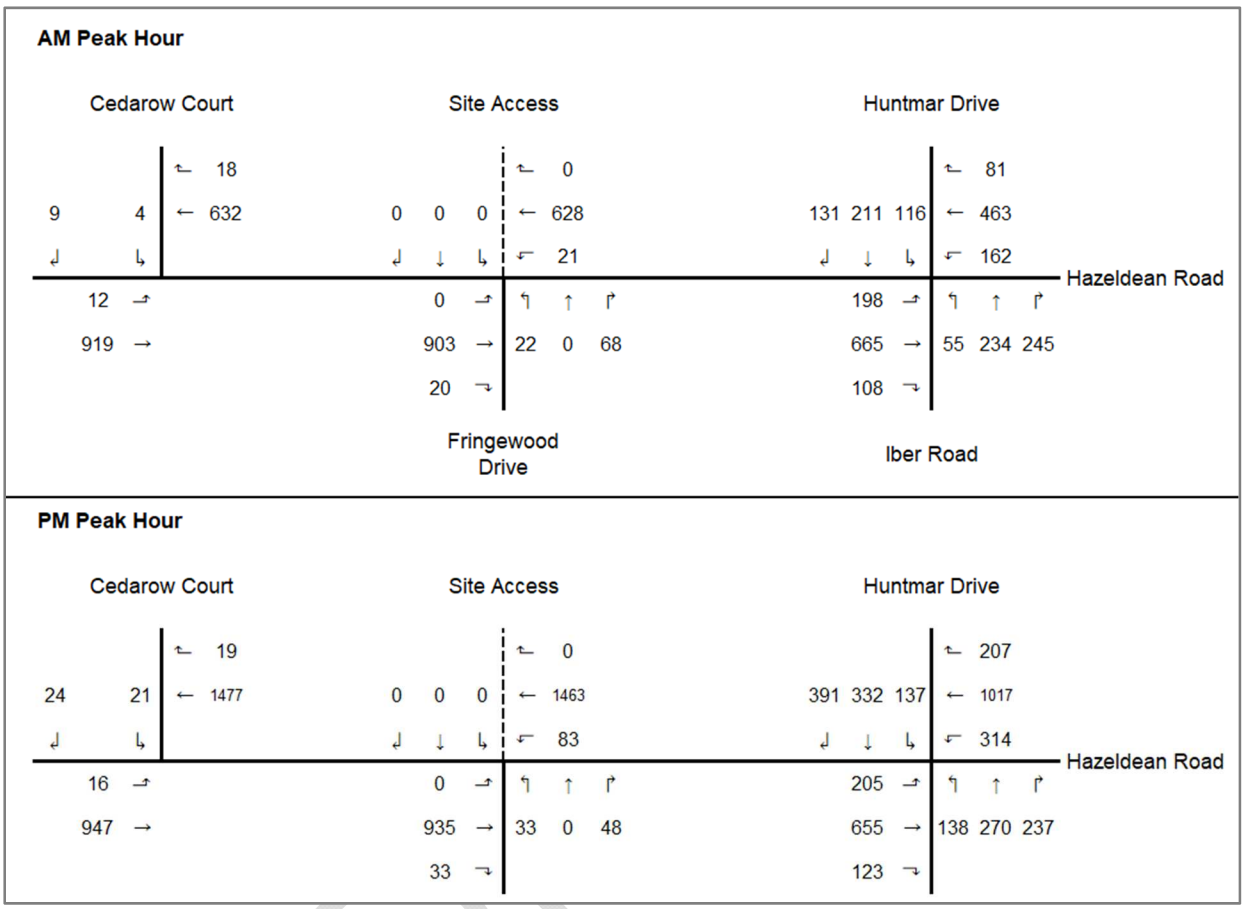
No traffic management measures are currently provided near the subject site.

2.1.2.5 Traffic Volumes

Turning movement counts at the study area intersections were collected by the City of Ottawa in July and August of 2019. **Figure 6** illustrates the existing traffic volumes at the study area intersections.

Appendix A contains the traffic data and is provided for reference.

Figure 6 - 2019 Existing Traffic Volumes



2.1.2.6 Collision History

Collision data was provided by the City of Ottawa for the period January 2013 to December 2017 in the vicinity of the subject site. The data was reviewed to determine if any intersections or road segments exhibited an identifiable collision pattern during the five (5) year period. **Table 2** summarizes the collision class and impact types for each road segment and intersection in the study area.

Table 2 - Collision Summary

		Hazeldean Road between Cedarow Court and Fringewood Drive	Hazeldean Road at Fringewood Drive	Hazeldean Road between Fringewood Drive and Huntmar Drive	Hazeldean Road at Huntmar Drive
Classification	Property Damage Only	2	4	3	37
	Non-Fatal Injury	0	3	2	15
Collision Type	Sideswipe	0	1	1	3
	Angle / Turning	1	3	1	14
	Rear End	1	1	0	32
	Single Motor Vehicle	0	2	3	2
	Other	0	0	0	1
Event	Other Motor Vehicle	1	4	2	47
	Ran off Road	0	1	0	0
	Cyclist	1	1	0	2
	Pedestrian	0	1	0	0
	Skidding	0	0	0	3
	Wild Animal	0	0	1	0
	Physical (curb, pole, barrier)	0	0	2	0

Based on the collision data summarized in **Table 2** above, it was found that the majority of the collisions resulted in property damage only (70%), which suggests that the collisions were low enough speeds to not cause injury to people. The Hazeldean Road at Huntmar Drive intersection experienced the highest number of collisions (79%) with the majority of them being rear end collisions (62%). The rear end collisions at the Hazeldean Road at Huntmar Drive intersection were reviewed further to determine if there are any discernable patterns and can be seen in **Table 3** below.

Table 3 – Rear End Collisions at the Hazeldean Road at Huntmar Drive Intersection

		Hazeldean Road at Huntmar Drive
Environment	Clear	25
	Rain	4
	Snow	3
Surface Condition	Dry	23
	Wet	8
	Slush	1
Vehicle Direction	West	7
	South	9
	East	11
	North	5

The vast majority of the rear end collisions at the Hazeldean Road at Huntmar Drive intersection occurred under clear environmental conditions (78%) and with dry surface conditions (72%). In terms of vehicle direction, the rear end collisions were evenly spread across all four directions.

2.1.3 Planned Conditions

2.1.3.1 Road Network Modifications

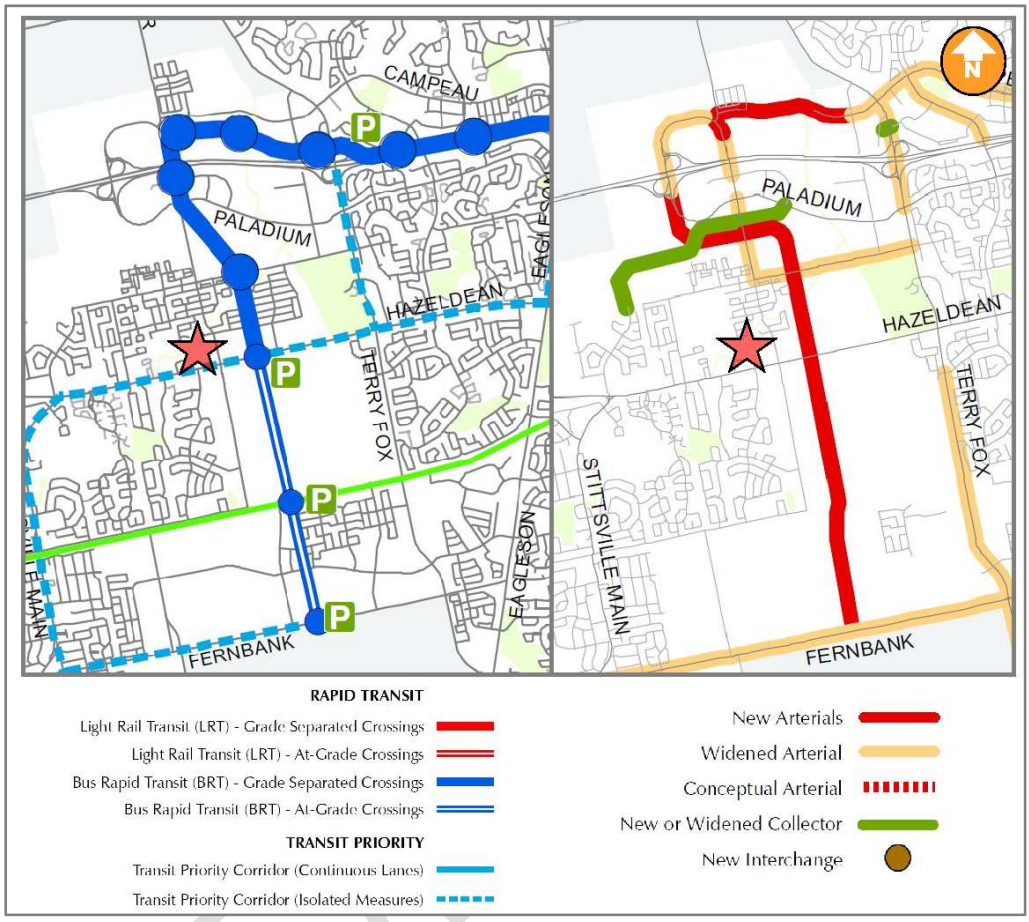
A number of roadway and transit improvements are scheduled to occur within the vicinity of the subject development, as outlined in the City of Ottawa's Transportation Master Plan, and are summarized in **Table 4** below.

Table 4 - City of Ottawa Transportation Master Plan Projects

Project	Description	TMP Phase
Hazeldean Road	Transit signal priority and queue jump lanes between Stittsville Main Street and Eagleson Road.	Affordable Network (2031) and Network Concept
Stittsville Main Street	Transit signal priority and queue jump lanes between Fernbank Road and Hazeldean Road.	Network Concept (post 2031)
Stittsville North-South Arterial	New two-lane road between Palladium Drive and Fernbank Road.	Between Fernbank Road and Iber Road (already constructed) Between Palladium and Iber Road - Phase 2 (2020 – 2025)
	Transit signal priority and queue jump lanes at selected intersections.	Affordable Network (before 2031)
West Transitway Extension	Exclusive and at-grade BRT between Terry Fox and Eagleson Station.	Affordable Network (before 2031)
	Exclusive BRT between Fernbank Road and Eagleson Station.	Network Concept (post 2031)
Huntmar Drive	Widen from two to four lanes between Campeau Drive extension and Cyclone Taylor Boulevard. Widen from two to four lanes between Palladium Drive and Maple Grove Road.	Phase 3 (2026 – 2031)
Stittsville Main Street Extension	New two-lane road between Palladium Drive and Maple Grove Road.	Phase 3 (2026 – 2031)
Palladium Drive Realignment	Realignment of roadway within the vicinity of Huntmar Road to new North-South Arterial.	Phase 2 (2020 – 2025)
Maple Grove Road	Widen from two to four lanes between Terry Fox Drive and Huntmar Drive.	Network Concept (post-2031)

Figure 7 illustrates roadway and transit improvements as outlined in the TMP.

Figure 7 - TMP Roadway and Transit Improvements



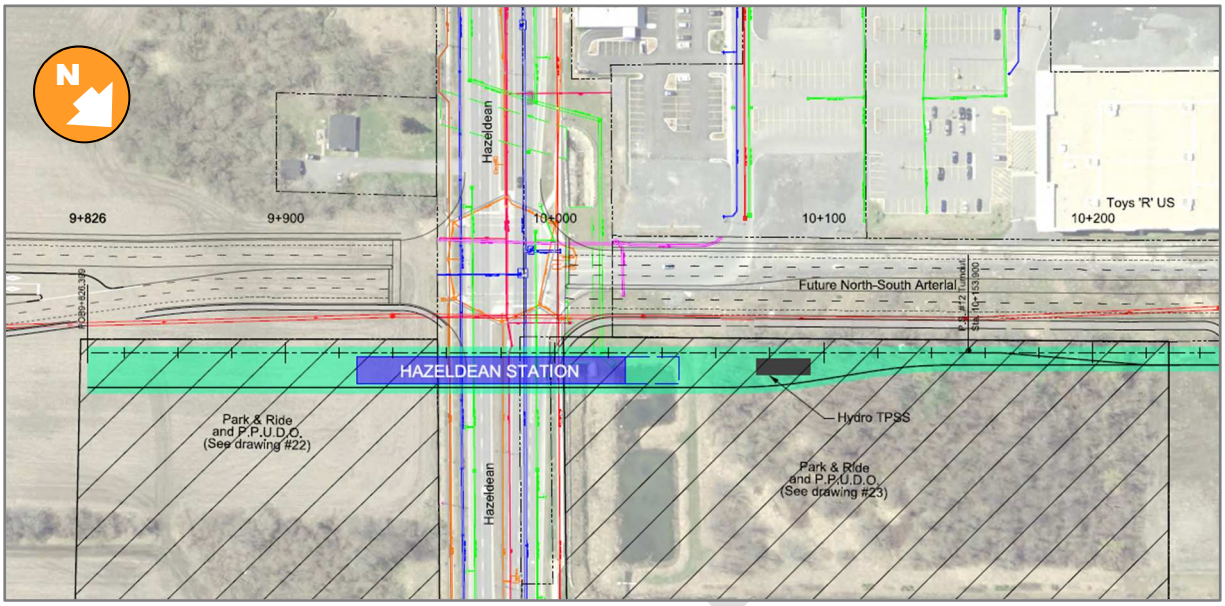
Source: City of Ottawa's Transportation Master Plan, 2013.

Contrary to the above **Figure 7**, the section of the Stittsville Main Street Extension between the Stittsville North-South Arterial and Palladium Drive was included in the City's TMP in error. This section of roadway is not planned to be included in the future roadway network. In addition, although not depicted in the above figure, Maple Grove Road is planned to extend to the Stittsville Main Street Extension.

Although the City's TMP calls for Bus Rapid Transit between Eagleson Station and Fernbank Road, based on the recently completed *Kanata Light Rail Transit Planning and Environmental Assessment Study (August 30, 2018)*, the West Transitway Extension will now include Light Rail Transit in place of Bus Rapid Transit. The alignment of the LRT, as outlined in the completed EA, is located on the north side of Highway 417 and includes stations at March Road, Kanata Town Centre, Terry Fox Drive, Didsbury Road, Campeau Drive, Palladium Drive, Maple Grove Road, and Hazeldean Road. The LRT will cross Highway 417 at Huntmar Drive and will continue south until Hazeldean Road. There is a proposed station at the intersection of Hazeldean Road and the North-South Arterial, which is approximately 600m east of the proposed subject site.

Figure 8 illustrates the proposed Hazeldean Road LRT Station.

Figure 8 - Recommended Hazeldean Road LRT Station



(Source: Kanata Light Rail Transit Planning and Environmental Assessment Study, Aug. 30, 2018)

2.1.3.2 Future Background Developments

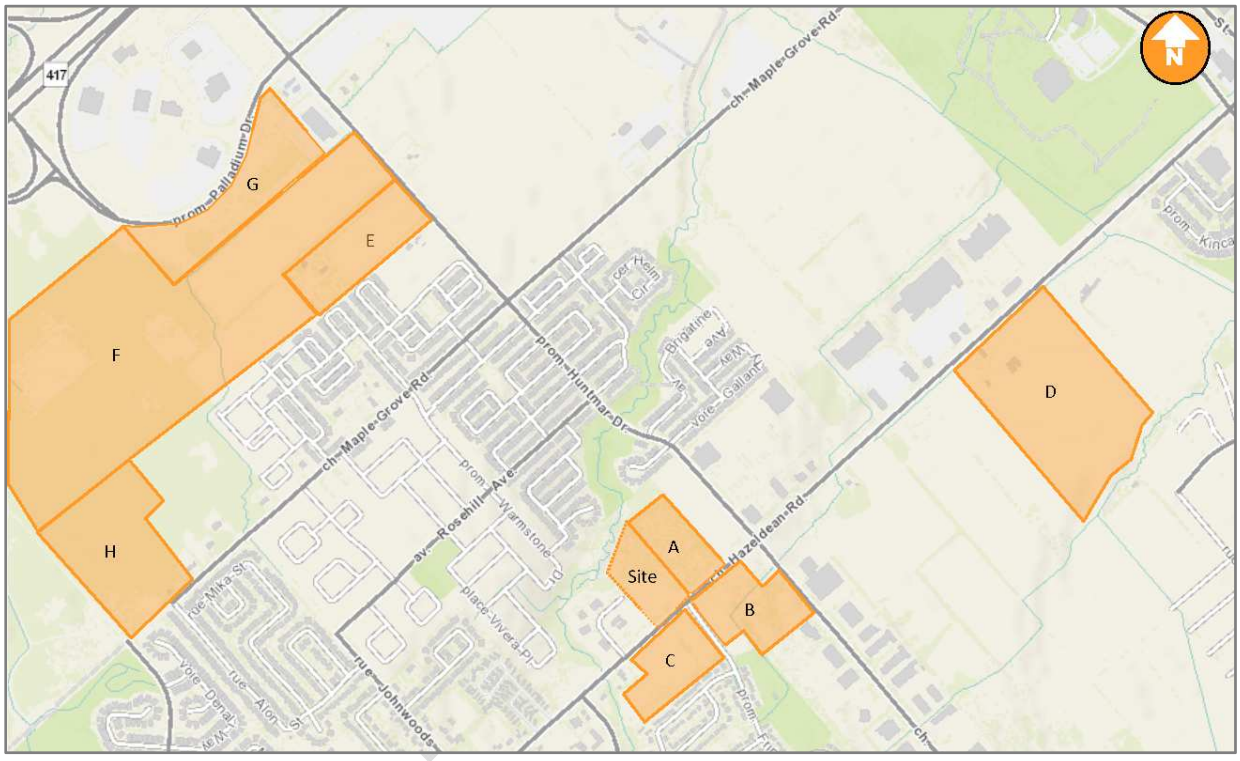
There are numerous developments scheduled to occur in the vicinity of the subject site as illustrated in **Figure 9** and described in **Table 5**.

Table 5 - Background Developments

Key Plan Reference	Development	Location	Description
A	5731 Hazeldean Road	North-east quadrant of the Hazeldean Road at Fringewood Drive intersection	Congregate Care, Assisted Living, Office, and Retail
B	5754 Hazeldean Road	South-east quadrant of the Hazeldean Road at Fringewood Drive intersection	Retail, Office, and Medical
C	5 Orchard Road	South-west quadrant of the Hazeldean Road at Fringewood Drive intersection	Residential and Commercial
D	590 Hazeldean Road	West of the City of Ottawa and south of Hazeldean Road within the Fernbank Community.	748 residential dwelling units consisting of a mix of dwelling types, as well as approximately 3.7 hectares of mixed-use commercial areas.
E	173 Huntmar Drive	West of Huntmar Drive and north of Maple Grove in Ottawa's western community of Kanata.	A mixed-use subdivision with 206 residential dwelling units and approximately 65,000 ft^2 of commercial office / retail.
F	195 Huntmar Drive	West of Huntmar Drive and South of Highway 417.	Mixed-use subdivision comprising of a 2.5-hectare commercial block, a 5.98-hectare district park, and 691 residential units.

Key Plan Reference	Development	Location	Description
G	2499 Palladium Drive	Southwest quadrant of Highway 417 and Palladium Drive interchange in Kanata West.	Rezoning of 7.8-hectares of land to accommodate luxury auto dealerships.
H	1981 Maple Grove Road	Northeast quadrant of Stittsville Main Street, north of Maple Grove Road.	196 mixed type residential units.

Figure 9 - Background Developments



2.2 STUDY AREA AND TIME PERIODS

2.2.1 Study Area

The proposed study area is limited to the following intersections:

- Hazeldean Road at Huntmar Drive / Iber Road;
- Hazeldean Road at Cedarow Court; and
- Hazeldean Road at Fringewood Drive.

2.2.2 Time Periods

The proposed scope of the transportation assessment includes the following analysis time periods:

- Weekday AM peak hour of roadway; and
- Weekday PM peak hour of roadway.

2.2.3 Horizon Years

The scope of the transportation assessment proposes the following horizon years:

- 2019 existing conditions;
- 2024 future background conditions;
- 2024 total future conditions (site build-out); and
- 2029 total future conditions (5 years beyond build-out).

2.3 EXEMPTIONS REVIEW

Table 6 summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

Table 6 - Exemptions Review

Module	Element	Exemption Considerations	Exempted?
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	No
	4.1.3 New Street Networks	Only required for plans of subdivision	Yes
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	No
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Yes
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Yes
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	Yes
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met.	No

3.0 FORECASTING

The Step 3.0 – Forecasting section has been reviewed by the City of Ottawa and was subject to revision as per the comments prepared the City, dated August 30, 2019. The comment responses reflected herein were accepted by the City of Ottawa on September 10 of the same year. Correspondence detailing the Step 3.0 comment responses can be found in **Appendix B.**

3.1 DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1 Trip Generation and Mode Shares

The *Institute of Transportation (ITE) Trip Generation Manual* (10th edition) was used to forecast auto trip generation for the proposed development. Land use codes 252 – Senior Adult Housing – Attached, 820 – Shopping Centre, 932 – High-Turnover Sit-Down Restaurant, and 720 – Medical / Dental Office were thought to be the most representative of the proposed land uses.

Table 7 outlines the assumed land uses and the trip generation rates for each land use.

As per the City of Ottawa's *2017 TIA Guidelines,* the auto trip generation rates for the proposed land uses were converted to person trips using a conversion factor of 1.28.

Table 8 outlines development-generated person trips for each land use.

Table 7 - Land Uses and Trip Generation Rates

LUC	Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Rate	In	Out	Rate
252	Senior Adult Housing Attached	434 Units	35%	65%	0.20	55%	45%	0.25
820	Shopping Centre	10,000 ft^2	62%	38%	0.94	48%	52%	3.81
932	High-Turnover Sit-Down Restaurant	7,000 ft^2	55%	45%	9.94	62%	38%	9.77
720	Medical-Dental Office	6,000 ft^2	78%	22%	3.04	28%	72%	3.73

Table 8 - Person Trips Generated by Land Use

LUC	Land Use	Trip Conversion	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto Trips	30	57	87	58	48	106
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	38	73	111	74	61	136
820	Shopping Centre	Auto Trips	6	3	9	18	20	38
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	8	4	12	23	26	49
932	High-Turnover Sit-Down Restaurant	Auto Trips	39	32	70	42	26	68
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	50	41	90	54	33	87
720	Medical-Dental Office	Auto Trips	14	4	18	6	16	22
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	18	5	23	8	20	28
Total		**Auto Trips**	**89**	**96**	**185**	**124**	**110**	**234**
		Person Trips	**114**	**123**	**237**	**159**	**140**	**299**

To reflect local travel characteristics, the person trips were assigned to the four primary modal shares (i.e. auto, passenger, transit, and active moves) according to the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the Kanata / Stittsville District. The modal shares were based off those in the approved *5731 Hazeldean Road Transportation Impact Study (March 2016)*, which is the development adjacent to the subject site.

Table 9 outlines the anticipated trip generation potential of the proposed development by travel mode based on the assumed mode share targets.

Table 9 - Trips Generated by Travel Mode

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto	50%	19	37	56	37	31	68
		Passenger	15%	6	11	17	11	9	20
		Walk / Bike	10%	4	7	11	7	6	14
		Transit	25%	10	18	28	19	15	34
820	Shopping Centre	Auto	50%	4	2	6	12	13	25
		Passenger	15%	1	1	2	3	4	7
		Walk / Bike	10%	1	0	1	2	3	5
		Transit	25%	2	1	3	6	7	12
932	High-Turnover Sit-Down Restaurant	Auto	50%	25	21	45	27	17	44
		Passenger	15%	8	6	14	8	5	13
		Walk / Bike	10%	5	4	9	5	3	9
		Transit	25%	13	10	23	14	8	22
720	Medical-Dental Office	Auto	50%	9	3	12	4	10	14
		Passenger	15%	3	1	3	1	3	4
		Walk / Bike	10%	2	1	2	1	2	3
		Transit	25%	5	1	6	2	5	7
Total		**Auto**		**57**	**63**	**119**	**80**	**71**	**151**
		Passenger		**18**	**19**	**36**	**23**	**21**	**44**
		Walk / Bike		**12**	**12**	**23**	**15**	**14**	**31**
		Transit		**30**	**30**	**60**	**41**	**35**	**75**

3.1.2 Internal Capture and Pass-By

When predicting trips that are associated with different land use types the interaction between those land use types must be accounted for by applying the principals of internal capture adjustments. Internal capture trips are trips which are shared between two or more uses on the same site. A portion of the generated trips for each individual land use is therefore drawn from the adjacent land uses. Internal capture adjustments were made to account for vehicles that visit more than one land use within the subject commercial development. Since these trips are contained within the subject site, accounting for each trip separately on the roadway network would result in "double-counting". For this reason, land uses that may have associated internal capture trips between one another ultimately had their net new trips adjusted consistent with typical industry standards. In the subject development, the land uses that are subject to internal capture reductions are the shopping centre, restaurant, and medical office land uses.

A portion of the auto trips generated by the proposed restaurant and shopping centre land uses will be 'pass-by' in nature. Pass-by trips are considered intermediate stops between an origin and a destination. They are site trips that are drawn from existing traffic volumes on the road network that are "passing-by" the site. While the total number of trips generated by a given development remains the same, the turning movements at study area intersections and site accesses require adjustments to reflect pass-by traffic. The rate of pass-by traffic is based on the specific land use and the various pass-by rates were obtained from the *ITE Trip Generation Manual*. A pass-by rate of 43% was used for the restaurant land use and a pass-by rate of 34% was used for the shopping centre land use. Due to the nature of the land uses, the pass-by rates were only applied to the PM peak hour.

Table 10 outlines the pass-by, internal capture, and net new trips anticipated for the proposed development.

Table 10 - Pass-By and Internal Capture Trips

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
252	Senior Adult Housing Attached	Auto Trips		19	37	56	37	31	68
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		19	37	56	37	31	68
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		23	44	67	44	37	82
820	Shopping Centre	Auto Trips		4	2	6	12	13	25
		Internal Capture	20%	1	0	1	2	3	5
		Net Auto Trips		3	2	5	10	10	20
		Pass-By	34%	0	0	0	3	3	6
		Net New Auto Trips		3	2	5	7	7	14
932	High-Turnover Sit-Down Restaurant	Auto Trips		25	21	45	27	17	44
		Internal Capture	20%	5	4	9	5	3	8
		Net Auto Trips		20	17	36	22	14	36
		Pass-By	43%	0	0	0	8	8	16
		Net New Auto Trips		20	17	36	14	6	20
720	Medical-Dental Office	Auto Trips		9	3	12	4	10	9
		Internal Capture	20%	2	1	2	1	2	2
		Net Auto Trips		7	2	10	3	8	12
		Pass-By	0%	0	0	0	0	0	0
		New Auto Trips		7	2	10	3	8	12
Total		Auto Trips		**57**	**63**	**119**	**80**	**71**	**151**
		Internal Capture		**8**	**5**	**12**	**8**	**8**	**15**
		Net Auto Trips		**49**	**58**	**107**	**72**	**63**	**136**
		Pass-By		**0**	**0**	**0**	**11**	**11**	**22**
		Net New Auto Trips		**49**	**58**	**107**	**61**	**52**	**114**

3.1.3 Trip Distribution

The distribution of traffic to / from the study area was determined through examination of the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the Kanata / Stittsville District as well as the approved *5731 Hazeldean Road Transportation Impact Study (March 2016)*.

Table 11 provides a summary of the estimated distribution for the traffic generated by the proposed development.

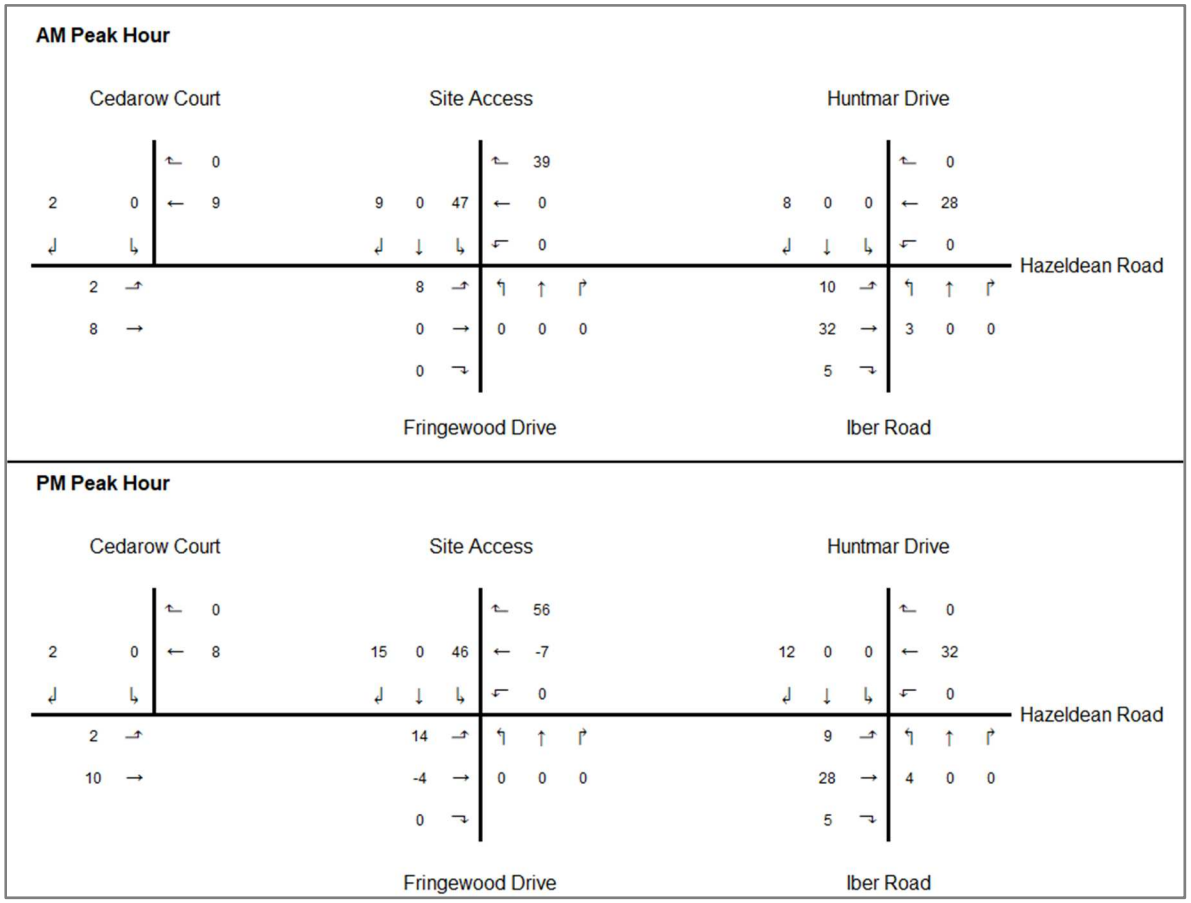
Table 11 - Traffic Distribution Assumptions

Cardinal Direction		Via (To / From)	
		Hazeldean Road (East)	**Hazeldean Road (West)**
North	5%	5%	0%
East	40%	40%	0%
South	5%	0%	5%
West	0%	0%	0%
Internal (Kanata / Stittsville)	50%	35%	15%
Total	**100%**	**80%**	**20%**

3.1.4 Trip Assignment

Site generated trips were assigned to the study area road network based on the trip distribution assumptions outlined in **Table 11**. New site trips are assigned to the road network and pass-by trips were then added to develop the net new site trips generated by the proposed development. **Figure 10** illustrates the net site generated trips for the proposed development after accounting for pass-by trips, during the AM and PM peak hours.

Figure 10 – Net Site Generated Trips



3.2 BACKGROUND NETWORK TRAVEL DEMAND

3.2.1 Transportation Network Plans

As outlined in **Table 4** in **section 2.1.3.1**, a number of road network projects are expected to occur within the vicinity of the proposed development. Through recent discussions with City of Ottawa staff, it is understood that the timelines for the roadway projects outlined in the City of Ottawa's *2013 Transportation Master Plan* have been pushed back one Phase (i.e. Phase 2 (2020 – 2025) projects are now Phase 3 (2026 -2031) projects, etc.). For this reason, it was assumed that there will not be any improvements to the roadway network that will affect the study area intersections prior to the 2029 ultimate (+5 year) horizon.

3.2.2 Background Growth

The existing traffic counts were grown at a rate of 2% annually, non-compounding, to represent background traffic volumes. This rate of background growth is consistent with that in the approved *5731 Hazeldean Road Transportation Impact Study (March 2016)*.

3.2.3 Other Developments

As outlined in **Section 2.1.3.2**, a number of background developments are planned in the vicinity of the subject site. The traffic volumes that these background developments will generated were obtained from their respective traffic studies and added to the roadway network as background traffic.

Appendix C contains the background traffic data and is provided for reference.

3.3 DEMAND RATIONALIZATION

The traffic forecasts indicate that the demand along Hazeldean Road is anticipated to approach or exceed the available capacity by the 2024 future background horizon. As traffic volumes start to increase along Hazeldean Road, delays at intersections will subsequently start to increase. Motorists will start to see their commute times increase which may lead to some changes in their behaviors with the intention of reducing commute times. The following subsections outline the potential ways in which motorists could change their behaviors, which would in turn help to reduce traffic volumes on the roads during peak hours, thus assisting with rationalizing the demands.

3.3.1 Rerouting of Traffic

Motorists may alter their regular route in order to select a route with less delays to reduce their overall commute time. There are only two major connections for the subject development out of the Stittsville community; Hazeldean Road and Highway 417. Fallowfield Road is also a connection out of Stittsville; however, it would require motorists to take a circuitous route in the southbound direction before heading east, which is not realistic.

With Highway 417 being regularly congested during the peak hours, it is unlikely that motorists will alter their route from Hazeldean Road onto the Highway, therefore rerouting of traffic is not a feasible solution for demand rationalization.

3.3.2 Reduction in Auto Modal Share

Motorists may alter their mode of transportation and opt to use public transit which would reduce number of vehicles on the road during the peak hours, thus improving the operations along Hazeldean Road. As the study area is currently well serviced by public transit, this is a viable option for demand rationalization. It was assumed that 10% of the traffic volumes will alter their mode of transportation from vehicles to transit in the future to reduce their commute times. This 10% reduction was applied to all three future horizons (2024 future background, 2024 total future, and 2029 ultimate) however, it is recognized that this reduction does not eliminate the capacity concerns along Hazeldean Road entirely, it merely reduces it.

3.3.3 Change in Travel Times

Motorists may start to alter their travel times to travel outside of the peak hour with the goal of reducing their commute time. This would reduce the demand on the network during the peak hour and subsequently increase the demand on the network just before and just after the peak hour, which is referred to as peak spreading. It was assumed that 10% of motorists will change their travel times to travel outside of the peak hour to reduce their commute. The traffic volumes along Hazeldean Road were therefore reduced by 10%, however, it is recognized that this reduction does not eliminate the capacity concerns along Hazeldean Road entirely, it merely reduces it.

4.0 STRATEGY

4.1 DEVELOPMENT DESIGN

4.1.1 Design for Sustainable Modes

Bicycle facilities: A total of 80 bicycle parking spaces are provided for the proposed development. These bicycle parking spaces are provided next to the retail / restaurant units as well as near the rear building.

Pedestrian facilities: Pedestrian connections are included on the site plan which will connect the proposed building to the existing sidewalks along Hazeldean Road.

Parking areas: A total of 490 vehicle parking spaces are provided. This consists of 414 underground vehicle parking spaces and 76 above grade vehicle parking spaces.

Transit facilities: Transit stops for OC Transpo routes 61, 62, 261, 263, 301 and 303 are currently located at the study intersections. There are sidewalks along both sides of Hazeldean Road as well as pedestrian crosswalks at the intersection of Hazeldean Road and Fringewood Drive for pedestrians to access these transit stops.

4.1.2 Circulation and Access

Two site accesses are proposed as part of the subject site; Site Access 1 will tie into the future extension of Fringewood Drive, approximately 110m north of Hazeldean Road, on the east side of the property and Site Access 2 will be located at the terminus of Cedarow Court on the west side of the property. Both accesses will be full movements accesses with no turning restrictions. Site Access 1 will be stop-controlled along the site access approach and Site Access 2 will simply be a continuation of Cedarow Court.

Within the vicinity of the subject site, pedestrian access is facilitated through the existing sidewalks along Hazeldean Road and Huntmar Drive. Sidewalk connections are proposed between Hazeldean Road and the proposed building as well as along the north leg of the Hazeldean Road at Fringewood Drive intersection to facilitate pedestrian access to and from the proposed development.

4.1.3 New Street Networks

Not applicable; exempted during screening and scoping.

4.2 PARKING

4.2.1 Parking Supply

Auto Parking - As per City of Ottawa Zoning By-law 2008-250 (Sections 101 and 102), the minimum parking space requirement is 0.25 vehicle spaces per dwelling unit, 3.4 vehicle spaces per 100m^2 of retail space (gross floor area), 10 vehicle spaces per 100m^2 of restaurant space (gross floor area), and 4 vehicle spaces per 100m^2 of medial space (gross floor area).

Based on the proposed land uses, a minimum of 104 vehicle spaces are required for the residential component, 17 vehicle spaces are required for the retail component, and 59 vehicle spaces are required for the restaurant component, and 21 vehicle spaces are required for the medial component for a total of 201 vehicle parking spaces for the proposed development.

The proposed site plan indicates there will be a total of 490 parking spaces provided, which meets the minimum requirements.

Bicycle Parking – As per City of Ottawa Zoning By-law 2008-250 (Section 111), the minimum bicycle parking rate of 0.25 bicycle parking spaces per dwelling unit, 1 bicycle parking space per 250m^2 of retail (gross floor area), 1 bicycle parking space per 250m^2 of restaurant (gross floor area), and 1 bicycle parking space per 100m^2 of medical (gross floor area).

Based on the proposed land uses, a minimum of 104 bicycle spaces are required for the residential component, 2 bicycle spaces are required for the retail component, 2 bicycle spaces are required for the restaurant component, and 5 bicycle spaces are required for the medical component, for a total of 113 bicycle spaces for the proposed development.

The proposed site plan indicates there will be 80 bicycle spaces provided, which does not meet the minimum requirements.

4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

4.3 BOUNDARY STREET DESIGN

4.3.1 Design Concept

As outlined in the City of Ottawa's *Official Plan* Schedule B, Hazeldean Road is designated as an Arterial Mainstreet and Huntmar Drive and Cedarow Court are both within the 'General Urban Area'. With these designations, the MMLOS targets are prescribed in the City of Ottawa's *Multi-Modal Level of Service (MMLOS) Guidelines*.

Hazeldean Road

The Pedestrian Level of Service (PLOS) target for Hazeldean Road is C. The Ultimate Cycling Network from the City of Ottawa's Transportation Master Plan (2013) designates Hazeldean Road as a spine cycling route, therefore, it is subject to a Bicycle Level of Service (BLOS) target of C. Transit service travelling along Hazeldean Road currently operates within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as truck route and therefore has a Truck Level of Service (TkLOS) target of D.

Due to the posted speed along Hazeldean Road, the PLOS target of C is not currently being met. Reducing the posted speed limit to 50 km/h would allow the segment to meet the PLOS target. Another option would be to reduce the volume of vehicles on the road so that the Average Annual Daily Traffic (AADT) is less than 3000 per lane. Due to the nature of arterial roads, reducing the speed limit or the decreasing the volume along Hazeldean Road are not feasible options. The BLOS, TLOS, and TkLOS targets along Hazeldean Road are currently being met.

Huntmar Drive

The Pedestrian Level of Service (PLOS) target for Huntmar Drive is C. The Ultimate Cycling Network from the City of Ottawa's Transportation Master Plan (2013) designates Huntmar Drive as a spine cycling route, therefore, it is subject to a Bicycle Level of Service (BLOS) target of C. Transit service travelling along Huntmar Drive currently operates within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Huntmar Drive is not designated as a truck route, and therefore Truck Level of Service (TkLOS) does not apply to this road segment.

The PLOS, BLOS, and TLOS targets are all currently being met along Huntmar Drive. As Huntmar Drive is not a truck route, the TkLOS does not apply to this road segment.

Cedarow Court

The Pedestrian Level of Service (PLOS) target for Cedarow Court is C. The Ultimate Cycling Network from the City of Ottawa's Transportation Master Plan (2013) has no cycling designation for Cedarow Court, therefore it is subject to a Bicycle Level of Service (BLOS) target of D. There is no transit service along Cedarow Court and therefore Transit Level of Service (TLOS) does not apply to this road segment. Cedarow Court is not designated as a truck route, and therefore Truck Level of Service (TkLOS) does not apply to this road segment.

As Cedarow Court does not currently have any pedestrian facilities, the PLOS target of C is not currently being met. Implementing a 1.8m wide sidewalk would allow the PLOS target to be met along this road segment. The BLOS target of B is currently being met along Cedarow Court. As Cedarow Court is neither a transit route nor a truck route, both the TLOS and TkLOS do not apply.

Table 12 presents the MMLOS conditions for all three roadway segments. As the existing and future conditions remain the same, the MMLOS results have been provided as one entry.

Appendix D contains the detailed MMLOS analysis.

Table 12 - Roadway Segment MMLOS

Intersection	PLOS		BLOS		TLOS		TkLOS	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Hazeldean Road	C	D	C	C	D	D	D	A
Huntmar Drive	C	C	C	C	D	D	N/A	
Cedarow Court	C	F	D	D	N/A		N/A	

4.4 ACCESS INTERSECTIONS DESIGN

4.4.1 Location and Design of Access

The proposed primary site access ties into the future north leg of the Hazeldean Road at Fringewood Drive intersection, approximately 110m north of Hazeldean Road. This site access is proposed to be a full movements access without any

turning restrictions. A secondary access is proposed to connect into Cedarow Court on the west side of the property. The secondary access is also a full movements access without any turning restrictions.

4.4.2 Intersection Control

Site Access 1 ties into the future north leg of the existing Hazeldean Road at Fringewood Drive intersection and will be stop-controlled on the site access approach. Site Access 2 ties into the terminus of Cedarow Court, therefore, based on the geometry, no traffic control is required at this location.

4.4.3 Intersection Design

Section 4.9.2 contains the detailed intersection and MMLOS analyses under all study horizons.

4.5 TRANSPORTATION DEMAND MANAGEMENT

4.5.1 Context for TDM

The proposed development is currently owned by Nautical Lands Group, however, the tenants for the retail, restaurant, and medical components are not yet known. As outlined in **Section 3.1.1**, the Traffic Assessment Zone (TAZ) in which the subject development resides calls for an auto driver mode share of approximately 50%, a transit mode share of approximately 25%, a bicycle / walking mode share of approximately 10%, and an auto passenger mode share of approximately 15%.

As the proposed development is not anticipated to generate a substantial amount of vehicle traffic as compared to the traffic that is already on the boundary road network, these auto modal shares do not make up a significant portion of the background network's traffic.

4.5.2 Need and Opportunity

In order to support the transit and active modal share targets outlined in **Table 9**, cycling and transit infrastructure will need to be included. This includes the provision of bicycle parking as well as ensuring convenient pedestrian connections are provided to sidewalk facilities leading to bus stop locations. These aforementioned facilities have been included on the site plan to support active modes.

4.5.3 TDM Program

The City of Ottawa TDM Checklists were used to determine what TDM measures could be implemented based on the available information.

The TDM checklists are contained in **Appendix E.**

4.6 NEIGHBOURHOOD TRAFFIC MANAGEMENT

Not applicable; exempted during screening and scoping.

4.7 TRANSIT

4.7.1 Route Capacity

An assumed transit modal share of 25% was adopted for all four land uses contained within the proposed development. The forecasted transit trips for the proposed development is 60 and 75 total transit trips during the AM and PM peak hours, respectively.

There are six OC Transpo transit routes within a 400m walking distance of the proposed site; routes 61, 62, 261, 263, 301, and 303. Route 61 is a Rapid route that operates at approximately 30-minute headways during the weekday morning and afternoon peak periods. Route 62 is also a Rapid route that operates at approximately 30-minute headways during the weekday morning and afternoon periods. Route 261 is a Connexion route that operates at approximately 30-minute headways during the weekday morning and afternoon peak periods. Route 263 is also a Connexion route that operates at approximately 30-minute headways during the weekday morning and afternoon peak periods. Routes 303 is a Local peak direction route that operates on Wednesdays and will therefore not be the primary routes for transit users to / from the subject development.

Based on the above information, which was obtained from OC Transpo's website, there are approximately 8 transit routes in the vicinity of the subject development during the morning and afternoon peak hours, respectively. Articulated buses and double-decker buses have seated capacities of 70 and 90 people; respectively, and therefore the hourly transit capacity will be 560 – 720 people during the AM peak hour and 700 – 900 people during the PM peak hour.

The proposed development is therefore anticipated to occupy between 8% and 11% of transit capacity during the AM peak hour and 11% - 13% of transit capacity during the PM peak hour.

4.7.2 Transit Priority

The proposed development will utilize the existing transit stops abutting the subject site and is therefore not expected to significantly impact the transit travel times of the existing routes or trigger the need for transit priority measures.

4.8 REVIEW OF NETWORK CONCEPT

Not applicable; exempted during screening and scoping.

4.9 INTERSECTION DESIGN

4.9.1 Intersection Control

The existing intersection control will be maintained as the default control for all three existing study area intersections. Any intersection improvements triggered through the intersection level of service analysis are highlighted and adopted accordingly. The signal timing plan for the Hazeldean Road at Huntmar Drive / Iber Road and the Hazeldean Road at Fringewood Drive were obtained from the City of Ottawa and used in the analysis for the subject TIA.

4.9.2 Intersection Design

An assessment of the study area intersections was undertaken to determine the operational characteristics of the study area intersections under the horizons identified in the Screening and Scoping report. Intersection operational analysis was facilitated by Synchro 10.0™ software package and the MMLOS analysis was completed for the signalized intersection for all modes and compared against the City of Ottawa's MMLOS targets.

4.9.2.1 2019 Existing Conditions

Figure 6 illustrates 2019 Existing AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 13 summarizes the results of the Synchro analysis under 2019 existing conditions.

Hazeldean Road at Huntmar Drive / Iber Road

While the intersection of Hazeldean Road at Huntmar Drive / Iber Road generally operates acceptably under 2019 existing conditions, it should be noted that there is little capacity remaining in the westbound through direction during the PM peak hour. As outlined in **Section 3.3**, demand rationalization was undertaken for the future traffic volumes, and therefore, the operations of this movement will likely improve in the future horizons.

Hazeldean Road at Fringewood Drive

The Hazeldean Road at Fringewood Drive intersection currently operates acceptably, and no improvements are required to supplement existing conditions.

Hazeldean Road at Cedarow Court

With Hazeldean Road being a four-lane arterial, Hazeldean Road at Cedarow Court currently operates at or above capacity with significant delays in the southbound direction during the PM peak hour. Restricting this intersection to a right-in / right-out would improve the operations on the southbound approach; however, this may have negative implications on the existing commercial uses along Cedarow Court. As such, no improvements to this intersection are recommended as part of the subject TIA.

Appendix F contains detailed intersection performance worksheets.

Table 13 - 2019 Existing Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Hazeldean Road at Huntmar Drive / Iber Road	Traffic Signals	EB	Left	A (B)	0.54 (0.63)	35.5 (80.2)	21.9 (42.7)
			Through / Right	A (C)	0.59 (0.73)	21.9 (30.7)	107.0 (122.5)
		WB	Left	A (C)	0.56 (0.80)	56.7 (65.3)	32.0 (#63.8)
			Through	A (D)	0.43 (0.89)	31.7 (46.1)	70.1 (#195.3)
			Right	A (A)	0.13 (0.32)	0.4 (5.1)	0.0 (17.3)
		NB	Left	A (C)	0.24 (0.80)	29.4 (59.3)	18.0 (#46.1)
			Through	C (B)	0.74 (0.67)	55.6 (47.3)	76.4 (88.3)
			Right	A (A)	0.53 (0.45)	8.6 (6.5)	21.2 (18.7)
		SB	Left	A (B)	0.59 (0.62)	42.0 (40.8)	33.6 (38.6)
			Through	A (D)	0.60 (0.82)	47.3 (57.0)	68.8 (111.5)
			Right	A (B)	0.29 (0.70)	2.4 (17.3)	3.2 (58.7)
		Overall Intersection		**C (D)**	**0.74 (0.89)**	**29.9 (40.4)**	-
Hazeldean Road at Fringewood Drive	Traffic Signals	EB	Through / Right	A (A)	0.41 (0.46)	7.1 (8.8)	62.5 (69.0)
		WB	Left	A (A)	0.06 (0.24)	1.0 (2.4)	0.7 (2.8)
			Through	A (A)	0.26 (0.60)	1.2 (5.0)	8.6 (38.9)
		NB	Left / Right	A (A)	0.44 (0.42)	19.5 (18.5)	18.5 (16.7)
		Overall Intersection		**A (A)**	**0.44 (0.60)**	**5.5 (6.7)**	-
Hazeldean Road at Cedarow Court	Minor Stop	EB	Left	A (B)	0.02 (0.05)	9.2 (14.9)	0.0 (0.6)
			Through	A (A)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
		WB	Through / Right	A (A)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Right	A (F)	0.05 (1.11)	18.3 (311.6)	1.2 (28.2)
		Overall Intersection		**A (A)**	-	**0.2 (5.7)**	-

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity
3. # - 95th percentile volume exceeds capacity, queue may be longer

Multi-Modal Level of Service Analysis

Hazeldean Road at Huntmar Drive / Iber Road

Based on the Land-Use Designations for Hazeldean Road and Huntmar Drive / Iber Road, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Huntmar Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Huntmar Drive is currently operating with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road and Huntmar Drive is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Huntmar Drive intersection is currently operating with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate turns at intersections,

and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road and Huntmar Drive would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

The transit level of service at the Hazeldean Road at Huntmar Drive intersection is currently operating with a TLOS of F, which does not meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

The Truck Level of Service (TkLOS) at the Hazeldean Road at Huntmar Drive intersection is currently operating with a TkLOS of B, which meets the target of D.

Table 14 outlines the 2019 existing multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Hazeldean Road at Fringewood Drive

Based on the Land-Use Designations for Hazeldean Road and Fringewood Drive, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Fringewood Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Fringewood Drive is currently operating with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Fringewood Drive intersection is currently operating with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road would need to be reduced to one

lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

The Transit Level of Service (TLOS) at the Hazeldean Road at Fringewood Drive intersection is currently operating with a TLOS of C, which meets the target value of D.

The Truck Level of Service (TkLOS) at the Hazeldean Road at Fringewood Drive intersection is currently operating with a TkLOS of D, which meets the target value of D.

Table 14 outlines the 2019 existing multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Table 14 - 2019 Existing Intersection MMLOS

Intersection	PLOS		BLOS		TLOS		TkLOS	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Hazeldean Road at Huntmar Drive / Iber Road	C	F	C	F	D	F	D	B
Hazeldean Road at Fringewood Drive	C	F	C	F	D	C	D	B

4.9.2.2 2024 Future Background Conditions

Figure 11 illustrates 2024 future background AM and PM peak hour traffic volumes at the study area intersections with demand rationalization in place as per **Section 3.3**.

Intersection Capacity Analysis

Table 15 summarizes the results of the Synchro analysis for the 2024 future background horizon.

Hazeldean Road at Huntmar Drive / Iber Road

As outlined in Section 3, the projected demands along Hazeldean Road were exceeding the available capacity under the 2024 future background horizon. As such, the demands were rationalized in order to determine provide a more realistic outcome of the traffic patterns in the future. With the demand rationalization in place, the intersection of Hazeldean Road at Huntmar Drive / Iber Road is projected to operate acceptably under 2024 future background conditions.

Hazeldean Road at Fringewood Drive

Consistent with the findings from the existing conditions, the Hazeldean Road at Fringewood Drive intersection is projected to operate acceptably under 2024 future background conditions.

Hazeldean Road at Cedarow Court

Consistent with the findings from the existing conditions, the southbound movement at the Hazeldean Road at Cedarow Court intersection is anticipated to operate at or above capacity with significant delays during the PM peak hour. Restricting this intersection to a right-in / right-out would allow the intersection to operate acceptably, however, this could have negative implications on the existing commercial uses along Cedarow Court. As such, no improvements to this intersection are recommended as part of the subject TIA.

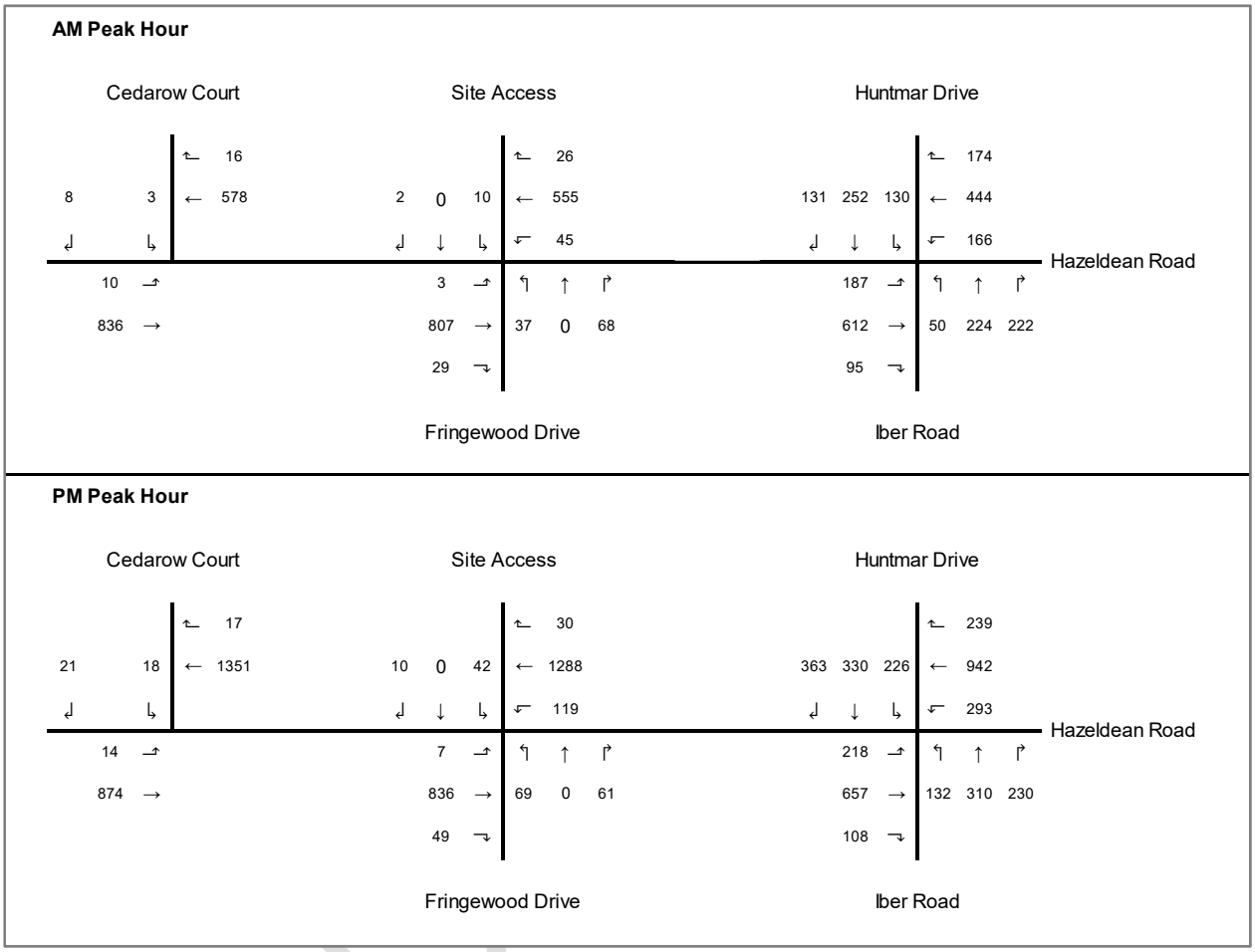
Appendix F contains detailed intersection performance worksheets.

Table 15 – 2024 Future Background Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Hazeldean Road at Huntmar Drive / Iber Road	Traffic Signals	EB	Left	A (B)	0.50 (0.67)	43.3 (76.3)	22.4 (44.2)
			Through / Right	A (B)	0.47 (0.64)	18.8 (28)	88 (85.2)
		WB	Left	A (C)	0.52 (0.73)	55.1 (61.8)	28.7 (52.7)
			Through	A (C)	0.35 (0.73)	28.4 (37.3)	58.4 (133.6)
			Right	A (A)	0.25 (0.33)	2.7 (4.9)	8.5 (16.9)
		NB	Left	A (A)	0.23 (0.55)	30.5 (35.2)	15.9 (32.6)
			Through	B (C)	0.70 (0.80)	54.9 (59.5)	67.6 (94.6)
			Right	A (A)	0.49 (0.45)	8.6 (7.4)	18.3 (18.3)
		SB	Left	A (D)	0.57 (0.85)	41.8 (58)	34.7 (63.4)
			Through	B (C)	0.68 (0.78)	51.9 (55.3)	75.2 (98.4)
			Right	A (B)	0.27 (0.63)	1.4 (14.3)	0 (43.4)
		Overall Intersection		**C (D)**	**0.70 (0.85)**	**29.0 (38.0)**	**-**
Hazeldean Road at Fringewood Drive	Traffic Signals	EB	Left	A (A)	0.01 (0.03)	6.3 (9.4)	1.3 (2.7)
			Through / Right	A (A)	0.35 (0.4)	7.7 (10.6)	52.7 (70.6)
		WB	Left	A (A)	0.09 (0.27)	1.4 (3.7)	2.2 (8.2)
			Through	A (A)	0.21 (0.49)	1.2 (3.5)	8.6 (42.2)
			Right	A (A)	0.02 (0.03)	0.2 (0.5)	0 (0.3)
		NB	Left / Through / Right	A (B)	0.51 (0.64)	30 (51.6)	25.8 (41.8)
		SB	Left	A (A)	0.10 (0.33)	48.8 (54.2)	7.3 (19.5)
			Through / Right	A (A)	0.04 (0.07)	40.9 (27.5)	5.3 (7.1)
		Overall Intersection		**A (A)**	**0.51 (0.64)**	**7.1 (9.6)**	**-**
Hazeldean Road at Cedarow Court	Minor Stop	EB	Left	A (B)	0.01 (0.03)	8.7 (12.4)	0 (6)
			Through	A (A)	0.0 (0.0)	0 (0)	0 (0)
		WB	Through / Right	A (A)	0.0 (0.0)	0 (0)	0 (0)
		SB	Left / Right	B (F)	0.03 (0.44)	14.2 (73.8)	6 (10.8)
		Overall Intersection		**A (A)**	**-**	**0.2 (1.3)**	**-**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity

Figure 11 – 2024 Future Background Traffic Volumes



Multi-Modal Level of Service Analysis

Hazeldean Road at Huntmar Drive / Iber Road

Based on the Land-Use Designations for Hazeldean Road and Huntmar Drive / Iber Road, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Huntmar Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Huntmar Drive is projected to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road and Huntmar Drive would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

The transit level of service at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a TLOS of F, which does not meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

The Truck Level of Service (TkLOS) at the Hazeldean Road at Huntmar Drive intersection is currently operating with a TkLOS of B, which meets the target of D.

Table 16 outlines the 2024 future background multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Hazeldean Road at Fringewood Drive

Based on the Land-Use Designations for Hazeldean Road and Fringewood Drive, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Fringewood Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Fringewood Drive is project to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

Due to high delays associated with the northbound approach, the Transit Level of Service (TLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate at a F, which fails to meet the targeted value of D. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

As the extension of Fringewood Drive north of Hazeldean Road will have only one receiving lane, the Truck Level of Service (TkLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a TkLOS of E, which fails to meet the target value of D. Adding two receiving lanes along the north leg would allow this intersection to meet the TkLOS target.

Table 16 outlines the 2024 future background multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Table 16 – 2024 Future Background Intersection MMLOS

Intersection	PLOS		BLOS		TLOS		TkLOS	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Hazeldean Road at Huntmar Drive / Iber Road	C	F	C	F	D	F	D	B
Hazeldean Road at Fringewood Drive	C	F	C	F	D	F	D	E

4.9.2.3 2024 Total Future Conditions

Figure 12 illustrates 2024 total future AM and PM peak hour traffic volumes at the study area intersections with demand rationalization in place as per **Section 3.3.**

Intersection Capacity Analysis

Table 17 summarizes the results of the Synchro analysis for the 2024 total future horizon.

Hazeldean Road at Huntmar Drive / Iber Road

Consistent with the findings from the 2024 future background horizon, the intersection of Hazeldean Road at Huntmar Drive / Iber Road is projected to operate acceptably under 2024 total future conditions.

Hazeldean Road at Fringewood Drive

Consistent with the findings from the 2024 future background conditions the Hazeldean Road at Fringewood Drive intersection is projected to operate acceptably under 2024 total future conditions.

Hazeldean Road at Cedarow Court

Consistent with the findings from the 2024 future background conditions, the southbound movement at the Hazeldean Road at Cedarow Court intersection is anticipated to operate at or above capacity with significant delays during the PM peak hour. Restricting this intersection to a right-in / right-out would allow the intersection to operate acceptably, however, this could have negative implications on the existing commercial uses along Cedarow Court. As such, no improvements to this intersection are recommended as part of the subject TIA.

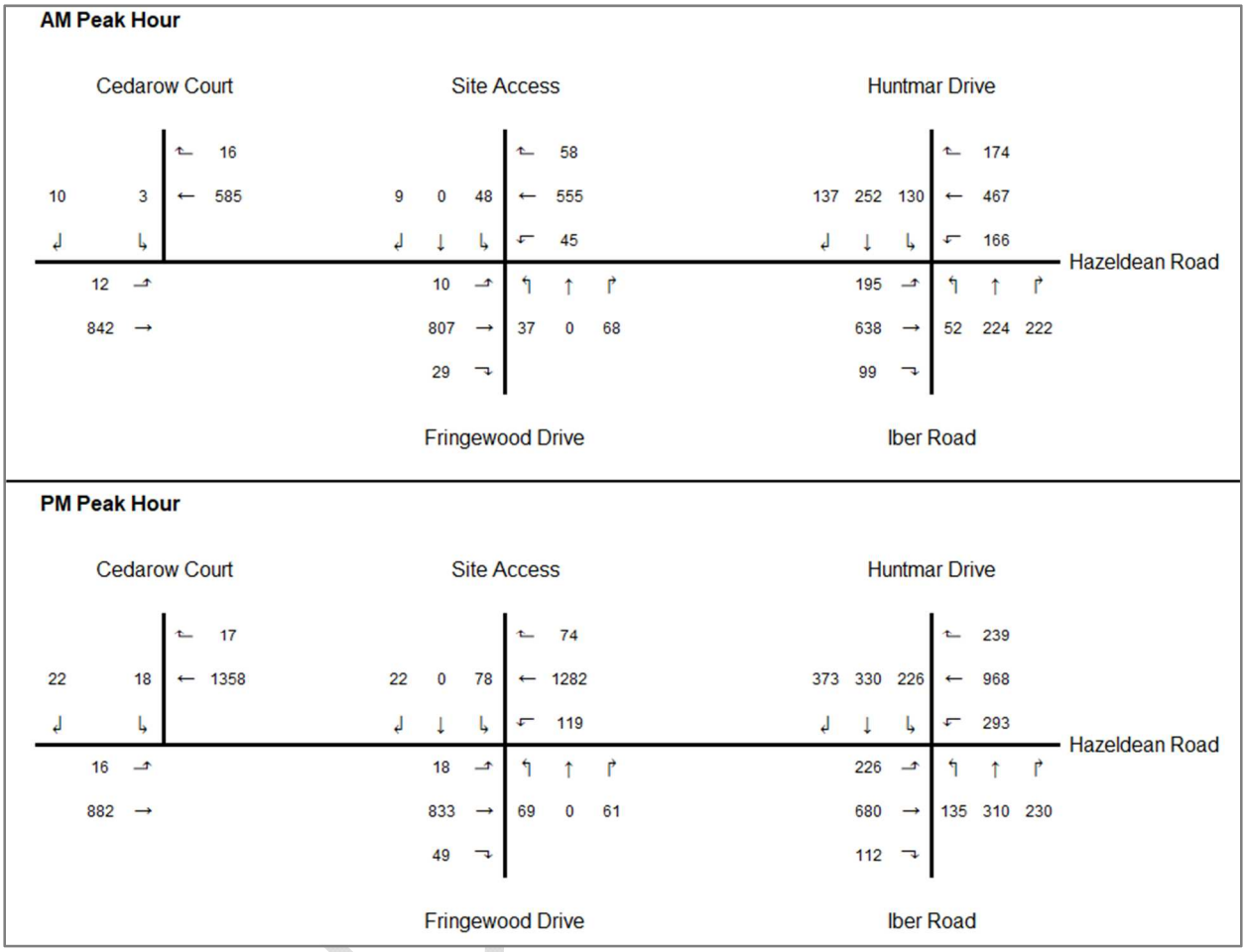
Appendix F contains detailed intersection performance worksheets.

Table 17 – 2024 Total Future Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Hazeldean Road at Huntmar Drive / Iber Road	Traffic Signals	EB	Left	A (B)	0.52 (0.68)	43.2 (75.5)	22.5 (45.3)
			Through / Right	A (B)	0.49 (0.66)	20.1 (29.1)	93.5 (104.8)
		WB	Left	A (C)	0.52 (0.73)	55.1 (62.1)	28.7 (52.7)
			Through	A (C)	0.37 (0.75)	28.8 (38.1)	61.6 (138.3)
			Right	A (A)	0.25 (0.33)	2.8 (4.9)	8.5 (16.9)
		NB	Left	A (A)	0.24 (0.57)	30.7 (36.1)	16.2 (33.6)
			Through	B (C)	0.70 (0.79)	54.9 (58.8)	67.6 (94.6)
			Right	A (A)	0.49 (0.45)	8.60 (7.3)	18.3 (18.3)
		SB	Left	A (D)	0.57 (0.87)	41.8 (60.8)	34.7 (53.0)
			Through	B (C)	0.68 (0.79)	51.9 (56.3)	75.2 (99.0)
			Right	A (B)	0.28 (0.65)	1.9 (15.6)	1.5 (46.6)
		Overall Intersection		**C (D)**	**0.70 (0.87)**	**29.3 (38.6)**	-
Hazeldean Road at Fringewood Drive	Traffic Signals	EB	Left	A (A)	0.02 (0.07)	6.8 (9.9)	2.7 (5.2)
			Through / Right	A (A)	0.35 (0.40)	7.9 (10.6)	53.6 (70.5)
		WB	Left	A (A)	0.09 (0.27)	1.4 (3.9)	2.2 (7.9)
			Through	A (A)	0.21 (0.49)	1.2 (3.9)	8.5 (44.1)
			Right	A (A)	0.05 (0.06)	0.3 (0.5)	0 (0.8)
		NB	Left / Through / Right	A (B)	0.50 (0.64)	29.5 (51.6)	25.7 (41.8)
		SB	Left	A (B)	0.44 (0.61)	61.6 (69.3)	22.2 (32.4)
			Through / Right	A (A)	0.08 (0.12)	30.1 (21.4)	6.9 (9.2)
		Overall Intersection		**A (B)**	**0.5 (0.64)**	**8.4 (10.3)**	-
Hazeldean Road at Cedarow Court	Minor Stop	EB	Left	A (B)	0.01 (0.03)	8.8 (12.5)	0 (0.6)
			Through	A (A)	0.0 (0.0)	0 (0)	0 (0)
		WB	Through / Right	A (A)	0.0 (0.0)	0 (0)	0 (0)
		SB	Left / Right	A (F)	0.03 (0.03)	13.8 (75)	0.6 (11.4)
		Overall Intersection		**A (A)**	-	**0.2 (1.4)**	-

Notes:
3. Table format: AM (PM)
4. v/c – represents the anticipated volume divided by the predicted capacity

Figure 12 – 2024 Total Future Traffic Volumes



Multi-Modal Level of Service Analysis

Hazeldean Road at Huntmar Drive / Iber Road

Based on the Land-Use Designations for Hazeldean Road and Huntmar Drive / Iber Road, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Huntmar Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Huntmar Drive is projected to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road and Huntmar Drive would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

The transit level of service at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a TLOS of F, which does not meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

The Truck Level of Service (TkLOS) at the Hazeldean Road at Huntmar Drive intersection is currently operating with a TkLOS of B, which meets the target of D.

Table 18 outlines the 2024 total future multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Hazeldean Road at Fringewood Drive

Based on the Land-Use Designations for Hazeldean Road and Fringewood Drive, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master*

Plan (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Fringewood Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Fringewood Drive is projected to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

Due to high delays associated with the northbound approach, the Transit Level of Service (TLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate at a F, which fails to meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

As the extension of Fringewood Drive north of Hazeldean Road will have only one receiving lane, the Truck Level of Service (TkLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a TkLOS of E, which fails to meet the target value of D. Adding two receiving lanes along the north leg would allow this intersection to meet the TkLOS target.

Table 18 outlines the 2024 total future multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Table 18 – 2024 Total Future Intersection MMLOS

Intersection	PLOS		BLOS		TLOS		TkLOS	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Hazeldean Road at Huntmar Drive / Iber Road	C	F	C	F	D	F	D	B
Hazeldean Road at Fringewood Drive	C	F	C	F	D	F	D	E

4.9.2.4 2029 Ultimate Conditions

Table 19 – 2029 Ultimate Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Hazeldean Road at Huntmar Drive / Iber Road	Traffic Signals	EB	Left	B (C)	0.62 (0.72)	49 (74)	27.6 (51.9)
			Through / Right	A (C)	0.55 (0.77)	21.7 (33.9)	104.2 (130.3)
		WB	Left	A (C)	0.55 (0.76)	55.5 (63.1)	30.4 (56.5)
			Through	A (D)	0.42 (0.87)	30.7 (46.1)	67.7 (170.3)
			Right	A (A)	0.26 (0.36)	3.2 (5.1)	9.9 (17.8)
		NB	Left	A (A)	0.27 (0.59)	30.4 (35.2)	17 (35)
			Through	C (D)	0.71 (0.82)	54.5 (60.4)	71.7 (101.7)
			Right	A (A)	0.50 (0.46)	8.1 (7.2)	18.8 (18.9)
		SB	Left	B (D)	0.61 (0.85)	43.7 (54.2)	35.7 (59.7)
			Through	B (C)	0.70 (0.79)	51.6 (54.4)	79.2 (105.8)
			Right	A (B)	0.3 (0.68)	2.5 (18)	3.7 (57.4)
		Overall Intersection		**C (D)**	**0.71 (0.87)**	**30.8 (41.2)**	**-**
Hazeldean Road at Fringewood Drive	Traffic Signals	EB	Left	A (A)	0.02 (0.08)	6.8 (10.7)	2.7 (5.4)
			Through / Right	A (A)	0.38 (0.44)	8.2 (11.4)	60.3 (80.6)
		WB	Left	A (A)	0.10 (0.30)	1.6 (3.5)	2.1 (7.3)
			Through	A (A)	0.23 (0.54)	1.5 (3.3)	9 (44.3)
			Right	A (A)	0.05 (0.06)	0.3 (0.4)	0 (0.5)
		NB	Left / Through / Right	A (B)	0.52 (0.66)	29.4 (52.5)	26.6 (43.6)
		SB	Left	A (B)	0.46 (0.60)	62.9 (67.7)	22.3 (32.2)
			Through / Right	A (A)	0.08 (0.10)	30 (21)	6.9 (9.1)
		Overall Intersection		**A (B)**	**0.52 (0.66)**	**8.5 (10.4)**	**-**
Hazeldean Road at Cedarow Court	Minor Stop	EB	Left	A (B)	0.01 (0.04)	8.9 (13.4)	0 (0.6)
			Through	A (A)	0.0 (0.0)	0.0 (0.0)	0 (0)
		WB	Through / Right	A (A)	0.0 (0.0)	0.0 (0.0)	0 (0)
		SB	Left / Right	C **(F)**	0.04 (0.67)	15.8 (128.7)	0.6 (17.4)
		Overall Intersection		**A (A)**	**-**	**0.2 (2.4)**	**0.6 (17.4)**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity

Figure 13 illustrates 2029 ultimate AM and PM peak hour traffic volumes at the study area intersections with demand rationalization in place per **Section 3.3.**

Intersection Capacity Analysis

Table 19 summarizes the results of the Synchro analysis for the 2029 ultimate horizon.

Hazeldean Road at Huntmar Drive / Iber Road

Consistent with the findings from the 2024 total future horizon, the intersection of Hazeldean Road at Huntmar Drive / Iber Road is projected to operate acceptably under 2029 ultimate conditions.

Hazeldean Road at Fringewood Drive

Consistent with the findings from the 2024 total future conditions, the Hazeldean Road at Fringewood Drive intersection is projected to operate acceptably under 2029 ultimate conditions.

Hazeldean Road at Cedarow Court

Consistent with the findings from the 2024 total future conditions, the southbound movement at the Hazeldean Road at Cedarow Court intersection is anticipated to operate at or above capacity with significant delays during the PM peak hour. Restricting this intersection to a right-in / right-out would allow the intersection to operate acceptably, however, this could have negative implications on the existing commercial uses along Cedarow Court. As such, no improvements to this intersection are recommended as part of the subject TIA.

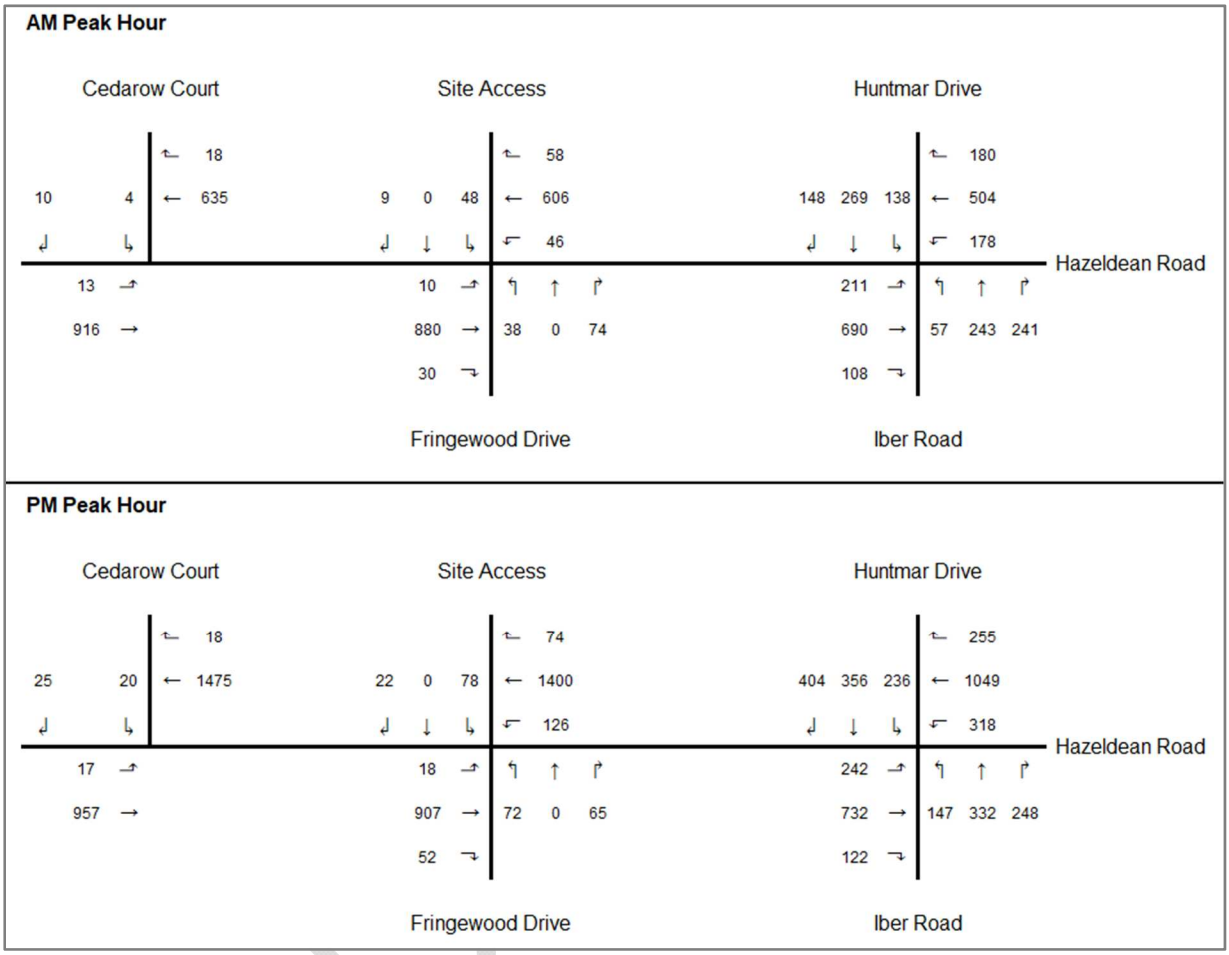
Appendix F contains detailed intersection performance worksheets.

Table 19 – 2029 Ultimate Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (m)
Hazeldean Road at Huntmar Drive / Iber Road	Traffic Signals	EB	Left	B (C)	0.62 (0.72)	49 (74)	27.6 (51.9)
			Through / Right	A (C)	0.55 (0.77)	21.7 (33.9)	104.2 (130.3)
		WB	Left	A (C)	0.55 (0.76)	55.5 (63.1)	30.4 (56.5)
			Through	A (D)	0.42 (0.87)	30.7 (46.1)	67.7 (170.3)
			Right	A (A)	0.26 (0.36)	3.2 (5.1)	9.9 (17.8)
		NB	Left	A (A)	0.27 (0.59)	30.4 (35.2)	17 (35)
			Through	C (D)	0.71 (0.82)	54.5 (60.4)	71.7 (101.7)
			Right	A (A)	0.50 (0.46)	8.1 (7.2)	18.8 (18.9)
		SB	Left	B (D)	0.61 (0.85)	43.7 (54.2)	35.7 (59.7)
			Through	B (C)	0.70 (0.79)	51.6 (54.4)	79.2 (105.8)
			Right	A (B)	0.3 (0.68)	2.5 (18)	3.7 (57.4)
		Overall Intersection		**C (D)**	**0.71 (0.87)**	**30.8 (41.2)**	**-**
Hazeldean Road at Fringewood Drive	Traffic Signals	EB	Left	A (A)	0.02 (0.08)	6.8 (10.7)	2.7 (5.4)
			Through / Right	A (A)	0.38 (0.44)	8.2 (11.4)	60.3 (80.6)
		WB	Left	A (A)	0.10 (0.30)	1.6 (3.5)	2.1 (7.3)
			Through	A (A)	0.23 (0.54)	1.5 (3.3)	9 (44.3)
			Right	A (A)	0.05 (0.06)	0.3 (0.4)	0 (0.5)
		NB	Left / Through / Right	A (B)	0.52 (0.66)	29.4 (52.5)	26.6 (43.6)
		SB	Left	A (B)	0.46 (0.60)	62.9 (67.7)	22.3 (32.2)
			Through / Right	A (A)	0.08 (0.10)	30 (21)	6.9 (9.1)
		Overall Intersection		**A (B)**	**0.52 (0.66)**	**8.5 (10.4)**	**-**
Hazeldean Road at Cedarow Court	Minor Stop	EB	Left	A (B)	0.01 (0.04)	8.9 (13.4)	0 (0.6)
			Through	A (A)	0.0 (0.0)	0.0 (0.0)	0 (0)
		WB	Through / Right	A (A)	0.0 (0.0)	0.0 (0.0)	0 (0)
		SB	Left / Right	C **(F)**	0.04 (0.67)	15.8 (128.7)	0.6 (17.4)
		Overall Intersection		**A (A)**	**-**	**0.2 (2.4)**	**0.6 (17.4)**

Notes:
3. Table format: AM (PM)
4. v/c – represents the anticipated volume divided by the predicted capacity

Figure 13 - 2029 Ultimate Traffic Volumes



Multi-Modal Level of Service Analysis

Hazeldean Road at Huntmar Drive / Iber Road

Based on the Land-Use Designations for Hazeldean Road and Huntmar Drive / Iber Road, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Huntmar Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Huntmar Drive is projected to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road and Huntmar Drive would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

The transit level of service at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a TLOS of F, which does not meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

The Truck Level of Service (TkLOS) at the Hazeldean Road at Huntmar Drive intersection is projected to operate with a TkLOS of B, which meets the target of D.

Table 20 outlines the 2029 ultimate multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Hazeldean Road at Fringewood Drive

Based on the Land-Use Designations for Hazeldean Road and Fringewood Drive, the Pedestrian Level of Service (PLOS) target for this intersection is C. The Ultimate Cycling Network from the City of Ottawa's *Transportation Master Plan* (2013) designates Hazeldean Road as a spine cycling route, therefore the Bicycle Level of Service (BLOS) target is C. Transit service travelling on Hazeldean Road and Fringewood Drive currently operate within mixed traffic, and as such, the Transit Level of Service (TLOS) target is D. Hazeldean Road is designated as a truck route and therefore has a Truck Level of Service (TkLOS) target of D.

The Pedestrian Level of Service (PLOS) at the intersection of Hazeldean Road at Fringewood Drive is projected to operate with a PLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross. Due to the nature of arterial roads, reducing the number of lanes along Hazeldean Road is not a feasible option.

The Bicycle Level of Service (BLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a BLOS of F, which is below the desired target of C. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds. Due to the nature of arterial roadways, the number of vehicle travel lanes is often more than one in each direction which increases the number of lanes cyclists must cross to navigate turning movements at the intersection. In addition, the posted speed limit is typically 60 km/h or greater along arterial roadways. These two factors limit the potential improvements to BLOS at signalized arterial intersections. In order to meet the BLOS target of C for this intersection, the number of lanes along Hazeldean Road would need to be reduced to one lane in each direction and the speed limit would need to be reduced to 50 km/hr. Alternatively, two-stage left-turn bike boxes could be implemented at the intersection or cycle tracks could be implemented along both road segments to meet the BLOS target of C.

Due to high delays associated with the northbound approach, the Transit Level of Service (TLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate at a F, which fails to meet the targeted value of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection.Increasing the number of lanes along Hazeldean Road would theoretically reduce the intersection delay and thus improve the TLOS, however, this is not a feasible solution as Hazeldean Road is not scheduled to be widened as per the City's TMP. In addition, widening Hazeldean Road would conversely reduce the operations for both cyclists and pedestrians.

As the extension of Fringewood Drive north of Hazeldean Road will have only one receiving lane, the Truck Level of Service (TkLOS) at the Hazeldean Road at Fringewood Drive intersection is projected to operate with a TkLOS of E, which fails to meet the target value of D. Adding two receiving lanes along the north leg would allow this intersection to meet the TkLOS target.

Table 20 outlines the 2029 ultimate multi-modal level of service results.

Appendix D contains the detailed MMLOS analysis.

Table 20 – 2029 Ultimate Intersection MMLOS

Intersection	PLOS		BLOS		TLOS		TkLOS	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Hazeldean Road at Huntmar Drive / Iber Road	C	F	C	F	D	F	D	B
Hazeldean Road at Fringewood Drive	C	F	C	F	D	F	D	E

5.0 CONCLUSION

This Transportation Impact Assessment (TIA) was prepared in support of a Site Plan application for a mixed-use proposed development located at 20 Cedarow Court. The proposed site is located at the northwest corner of the Hazeldean Road at Fringewood Drive intersection in the Stittsville community of Ottawa, Ontario. The site features a primary site access that ties into the future north leg of the Hazeldean Road at Fringewood Drive intersection. This site access is proposed to be stop-controlled along the site access approach and will be a full movements access without any turning restrictions. A secondary access is proposed to connect into Cedarow Court on the west side of the property. The secondary access is also a full movements access without any turning restrictions.

The subject development is anticipated to generate 107 and 114 two-way auto trips during the AM and PM peak hours, respectively. Development generated site trips are not anticipated to adversely impact traffic operations at all three study area intersections. All study area intersections are projected to operate acceptably under all study horizons.

The Multi-Modal Level of Service (MMLOS) assessment for roadway segments found that:

- Hazeldean Road, across the frontage of the subject development, currently meets the Bicycle, Transit, and Truck Level of Service targets, however, it does not meet the Pedestrian Level of Service target. Reducing the posted speed limit to 50 km/h would allow the segment to meet the PLOS target. Another option would be to reduce the volume of vehicles on the road so that the Average Annual Daily Traffic (AADT) is less than 3000 per lane. Due to the nature of arterial roads, reducing the speed limit or the decreasing the volume along Hazeldean Road are not feasible options.

- Huntmar Drive currently meets the Pedestrian, Bicycle, and Transit Level of Service targets. As Huntmar Drive is not a truck route, the TkLOS does not apply to this road segment.

- Cedarow Court currently does not meet the Pedestrian Level of Service (PLOS) target as there are no pedestrian facilities currently provided along this road. Implementing a 1.8m wide sidewalk would allow the PLOS target to be met. It does, however, meet the Bicycle Level of Service target. As Cedarow Court is neither a transit route nor a truck route, both the TLOS and TkLOS do not apply.

The Multi-Modal Level of Service assessment for signalized intersections found the following:

- The intersection of Hazeldean Road at Huntmar Drive currently does not meet the Pedestrian, Bicycle, and Transit level of service targets. It is, however, meeting the Truck Level of Service Target. In order to meet the Pedestrian and Bicycle targets at this intersection, the number of lanes along Hazeldean Road would have to be reduced and the speed limit would need to decrease, Conversely, in order to meet the Transit target, the number of lanes would need to increase to improve the delay at the intersection. These findings hold true in the analysis of the future horizons.

- The intersection of Hazeldean Road at Fringewood Drive currently does not meet the Pedestrian and Bicycle targets. It does, however, meet the Transit and Truck targets. To meet the Pedestrian and Bicycle targets, the number of lanes along Hazeldean Road would have to be reduced and the speed limit would need to decrease,

- Once the north leg of the Hazeldean Road at Fringewood Drive intersection is built, the intersection fails to meet the Truck and Transit level of service targets. Increasing the number of lanes along Hazeldean Road would reduce the delay experienced at this intersection and thus allow the Transit target to be met, however, this would decrease the Pedestrian and Bicycle levels of service. To meet the Truck target, an additional receiving lane on the north leg would have to be implemented.

Based on the transportation evaluation presented in this study, the proposed development located at 20 Cedarow Court can be supported and should be permitted to proceed from a transportation perspective.

APPENDICES

Appendix A TRAFFIC DATA

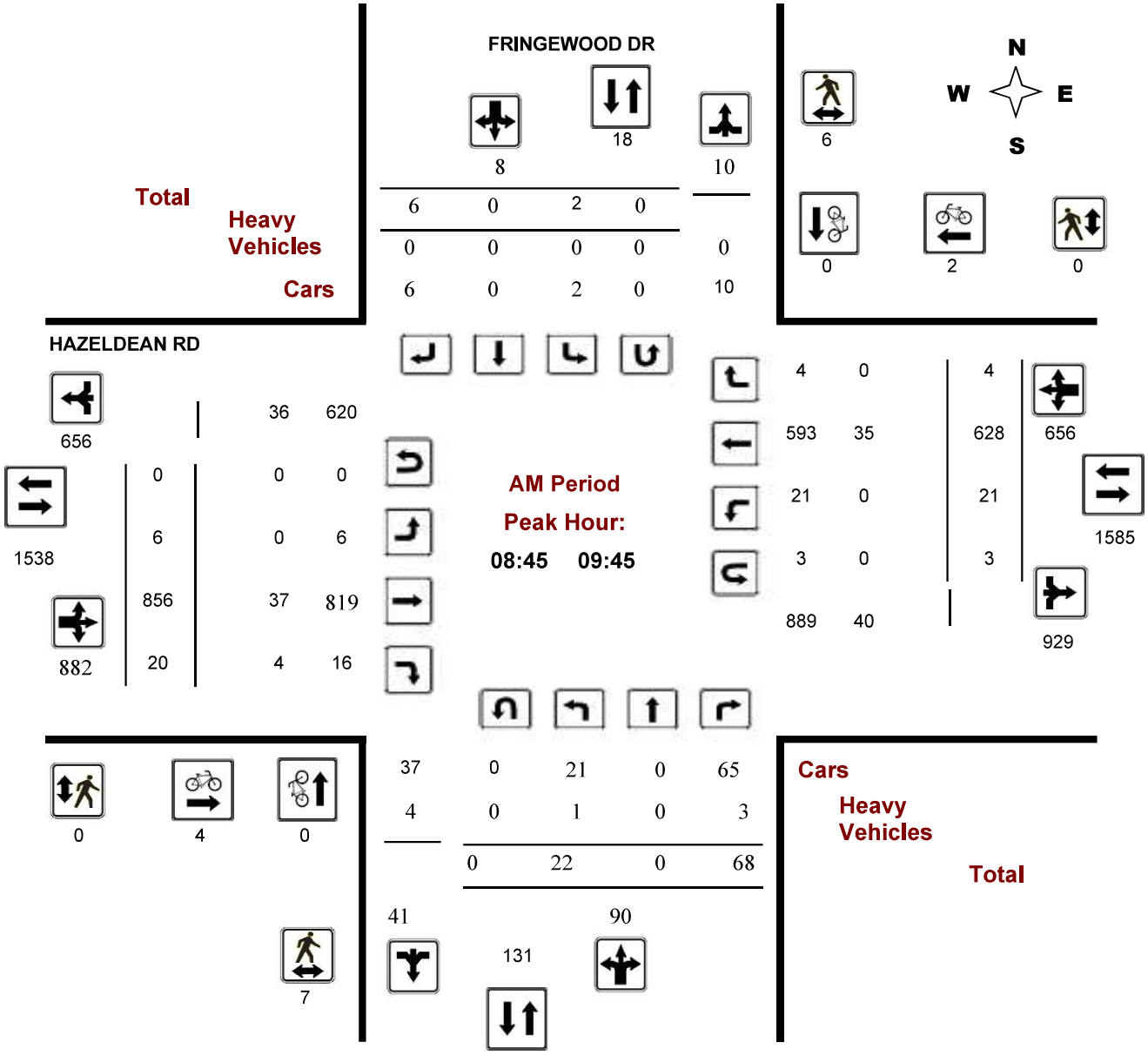
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HAZELDEAN RD @ FRINGEWOOD DR

Survey Date: Thursday, August 01, 2019 **WO No:** 38715

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



Comments

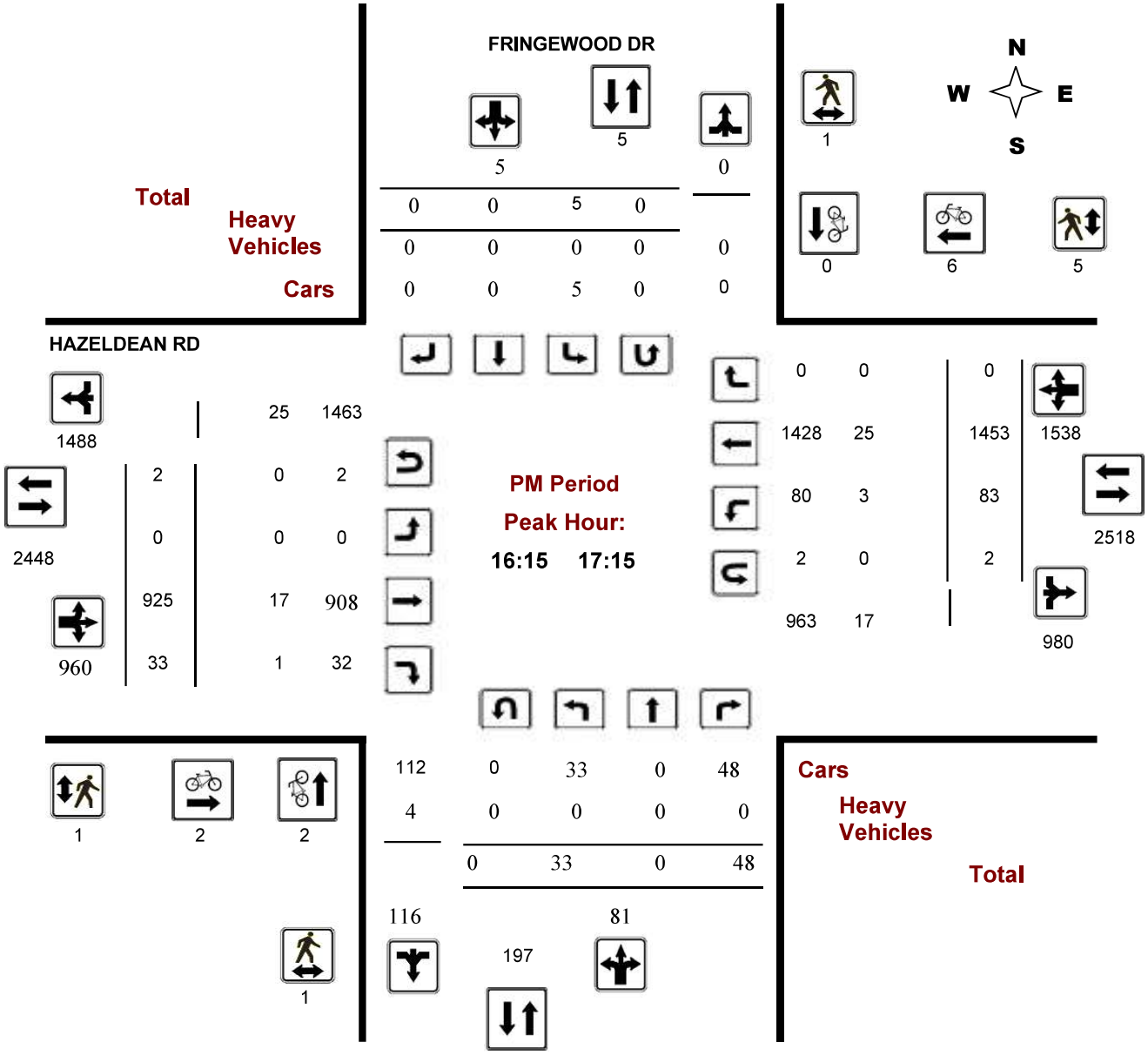
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HAZELDEAN RD @ FRINGEWOOD DR

Survey Date: Thursday, August 01, 2019 **WO No:** 38715

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



Comments

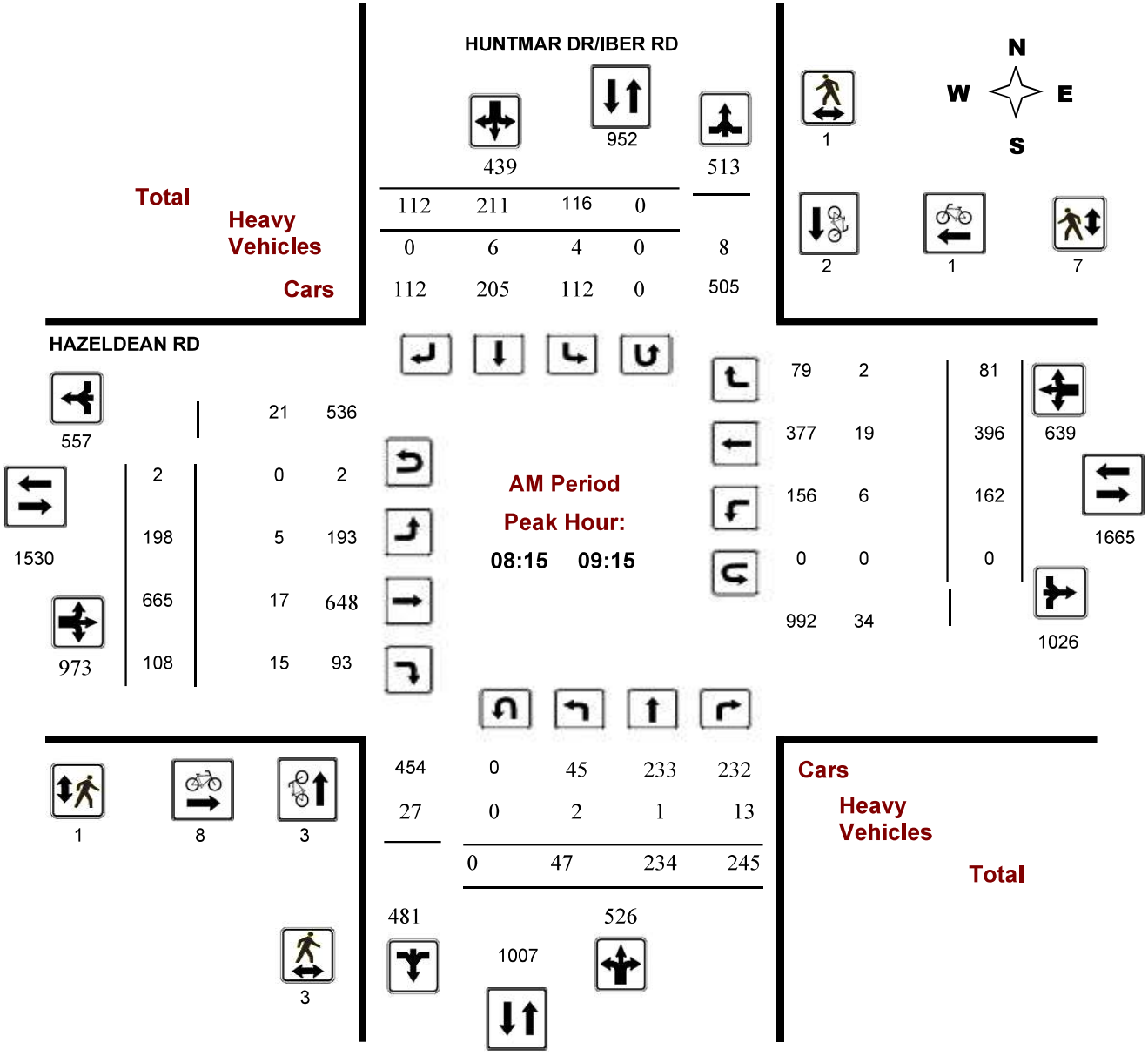
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HAZELDEAN RD @ HUNTMAR DR/IBER RD

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

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



Comments

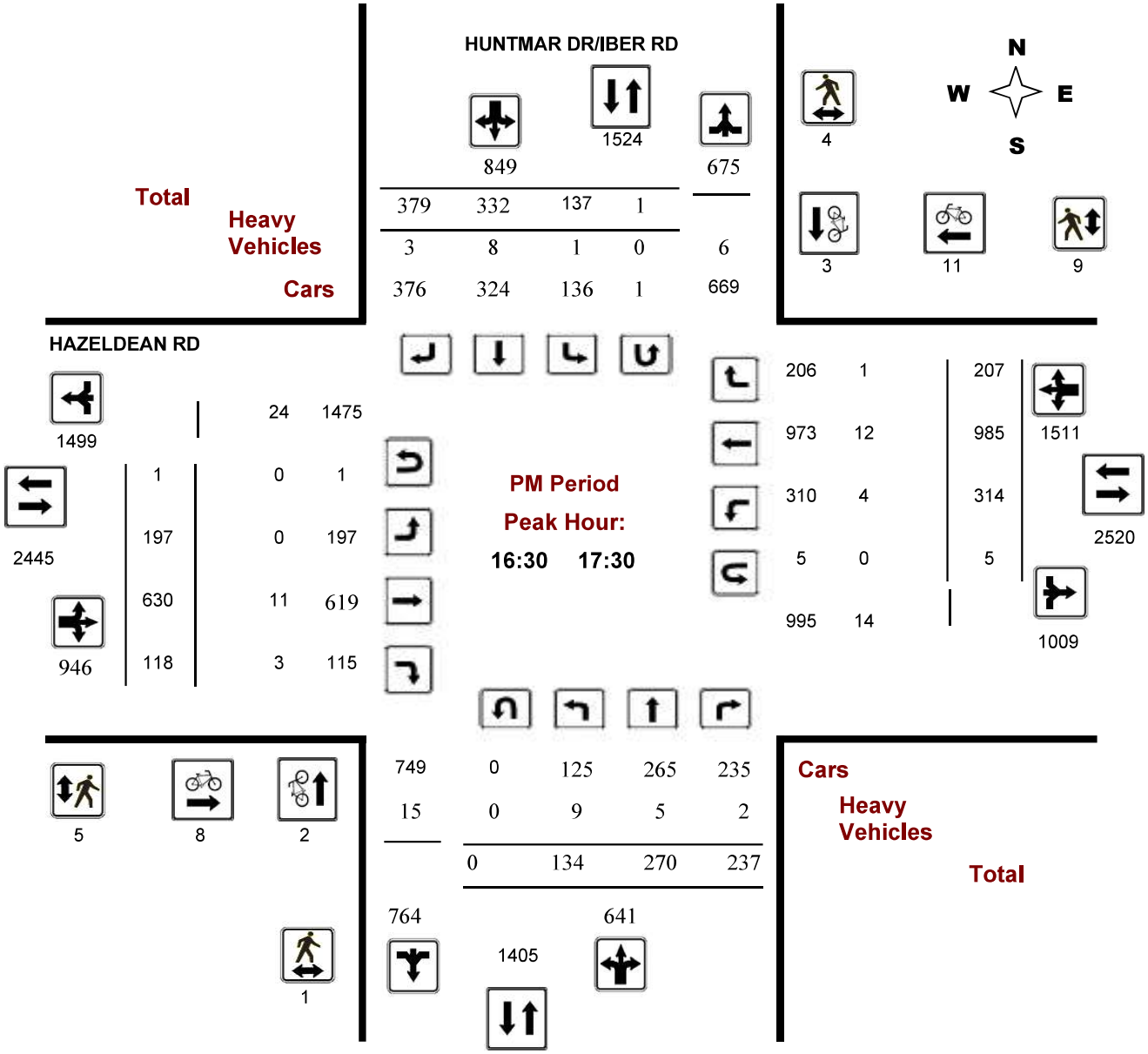
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

HAZELDEAN RD @ HUNTMAR DR/IBER RD

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

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



Comments

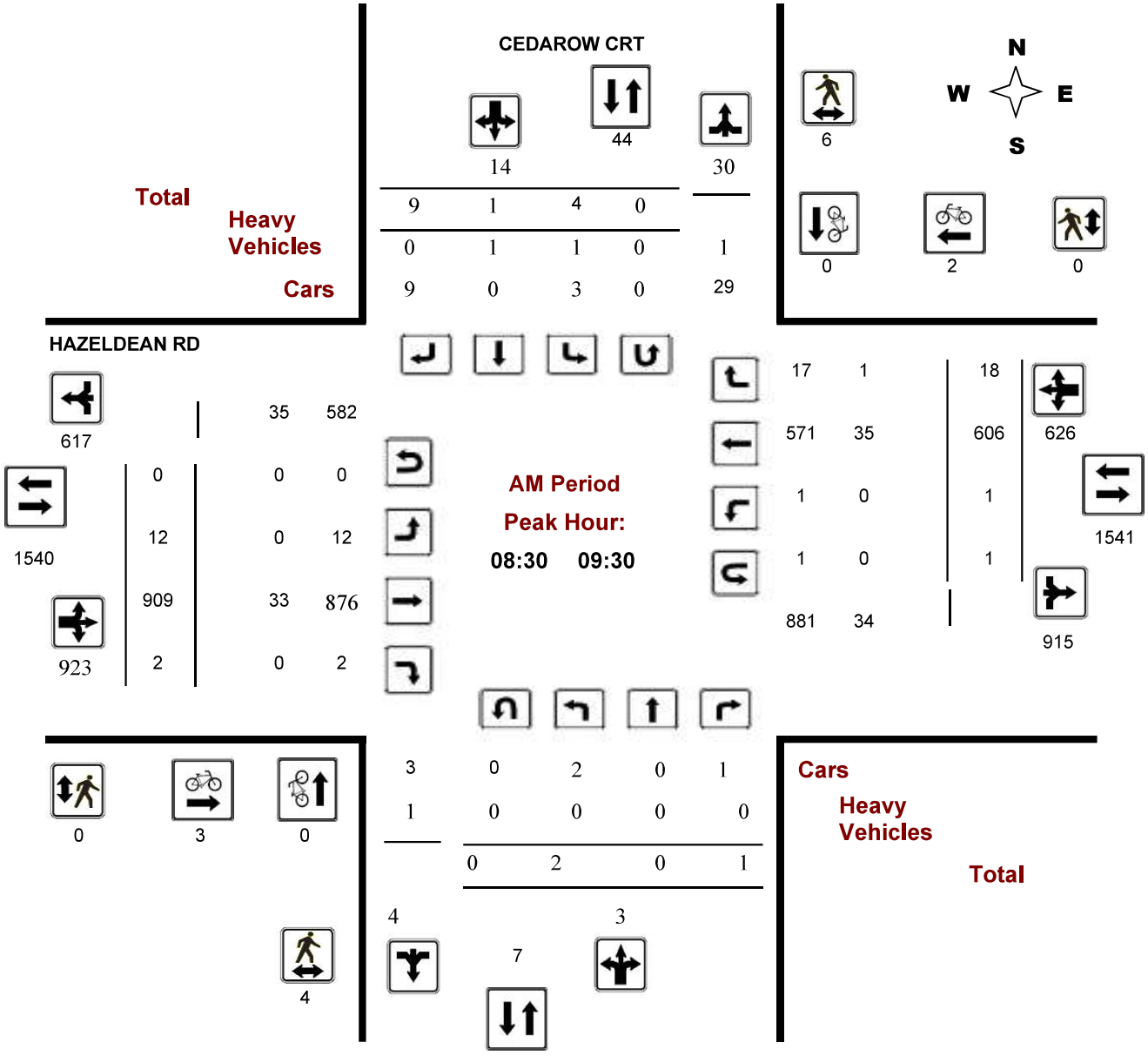
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CEDAROW CRT @ HAZELDEAN RD

Survey Date: Thursday, August 01, 2019 **WO No:** 38616

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



Comments

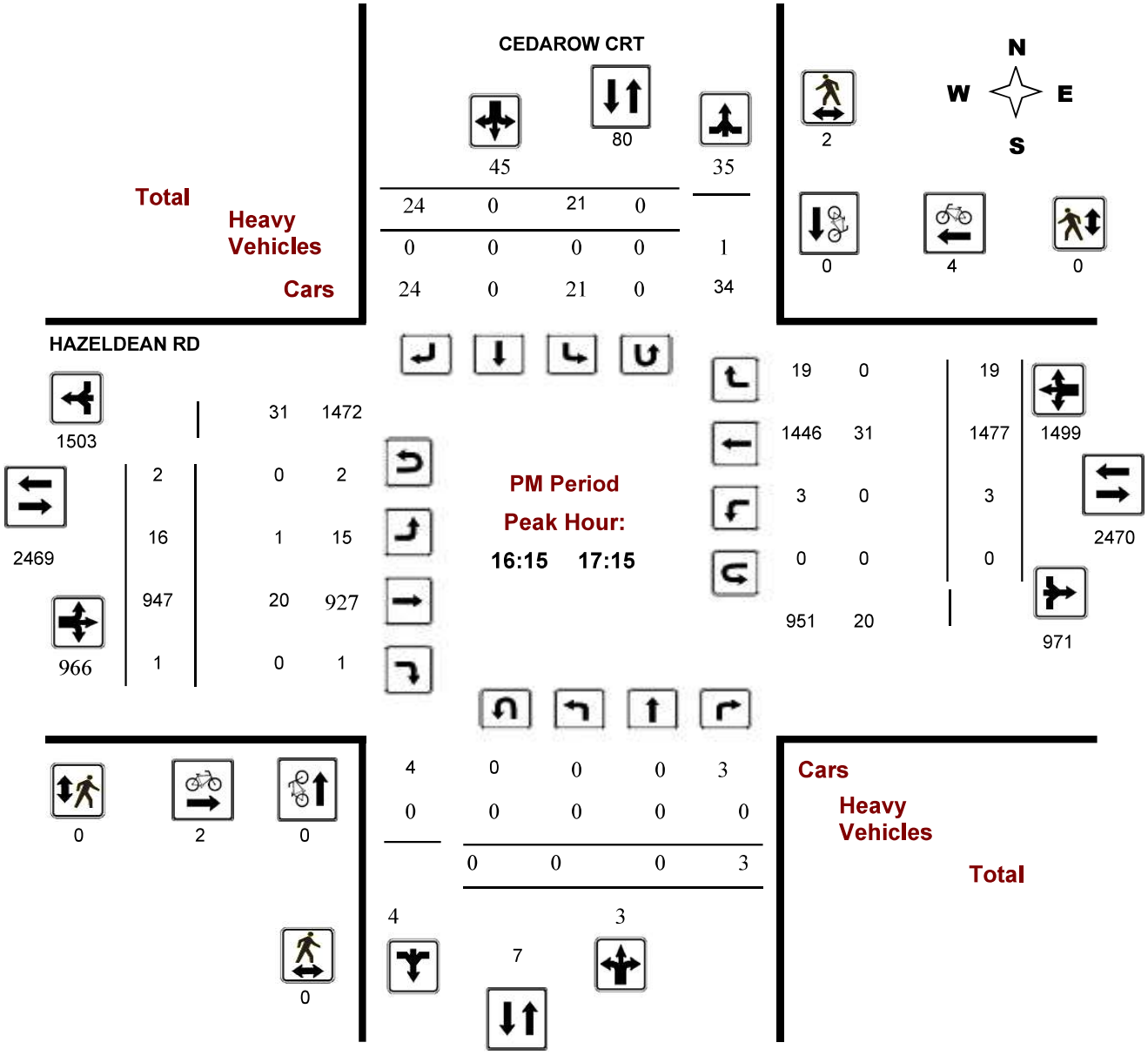
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CEDAROW CRT @ HAZELDEAN RD

Survey Date: Thursday, August 01, 2019 **WO No:** 38616

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



Comments

Appendix B COMMENT RESPONSE CORRESPONENCE

From:	Baggs, Rosanna
To:	O"Grady, Lauren
Cc:	Moroz, Peter; Angela Mariani
Subject:	FW: 20 Cedarow Court Step 3 TIA
Date:	Tuesday, September 10, 2019 9:43:32 AM

FYI

Rosanna Baggs, C.E.T.
Project Manager, Infrastructure Approvals | GPRJ Approbation demandes infrastructure
Development Review West Branch | Dir Services d'exam des dem d'amgt
Tel |Tél. : 613-580- 2424 ext. | poste 26388

From: Franklin, Carol <carol.franklin@ottawa.ca>
Sent: September 10, 2019 9:36 AM
To: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Cc: McMahon, Patrick <patrick.mcmahon@ottawa.ca>; Prevost, Pauline <Pauline.Prevost@ottawa.ca>
Subject: RE: 20 Cedarow Court Step 3 TIA

Hi Rosanna,

Yes, we are good with the responses. Given that the City has a good understanding of the LOS at the Huntmar and Maple Grove intersection, we will accept the exclusion.

Carol

From: Baggs, Rosanna
Sent: September 04, 2019 8:51 AM
To: Franklin, Carol <carol.franklin@ottawa.ca>
Cc: McMahon, Patrick <patrick.mcmahon@ottawa.ca>; Prevost, Pauline <Pauline.Prevost@ottawa.ca>
Subject: FW: 20 Cedarow Court Step 3 TIA

Hi Carol,

Please review the response below and let me know if they are satisfactory.

Rosanna Baggs, C.E.T.
Project Manager, Infrastructure Approvals | GPRJ Approbation demandes infrastructure
Development Review West Branch | Dir Services d'exam des dem d'amgt
Tel |Tél. : 613-580- 2424 ext. | poste 26388

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: September 04, 2019 8:47 AM
To: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Cc: Moroz, Peter <peter.moroz@stantec.com>; Angela Mariani <angela@nlgc.com>
Subject: RE: 20 Cedarow Court Step 3 TIA

Good morning Rosanna,

Please see my comment responses in green below.

Can you please verify with TES that these are acceptable so I can proceed with my Step 4 TIA?

Thank you,

Lauren O'Grady P.Eng.
Transportation Engineer

Direct: 613-784-2264
lauren.o'grady@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Sent: Friday, August 30, 2019 1:55 PM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Angela Mariani <angela@nlgc.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: Re: 20 Cedarow Court Step 3 TIA

Hi Lauren,

Please see the comments for the forecasting report:

Transportation Engineering Services
1. Given that this community will have residents able to walk and ride bicycles, as well as the close proximity of other commercial developments, revise the presented modal shares to include separate walking and cycling trips. The modal share for the subject development was taken from the recently

completed *5731 Hazeldean Road TIS* (March 2016) that is directly adjacent to it. This approved TIS included a negligible modal share for walking / cycling, and as such, the modal share for walking / cycling was included as 0% in the subject TIA. Upon further review, given that the subject development is considered 'senior adult housing' and not a 'care facility' like the 5731 Hazeldean Road development, the walking and cycling modal shares were increased from 0% to 5% for each mode. This will be reflected in the Step 4 TIA. This increase in active modal share will decrease the auto modal share from 60% to 50%.

2. The text in Section 3.1.2 indicates that pass-by reductions will only be applied to PM peak volumes, but Table 10 accounts for these reductions in both peak hours. Correct the error. This error will be corrected in the Step 4 TIA.

3. Provide the background trips generated in section 3.2.3 in an appendix for reference. Noted, this will be included in the Step 4 TIA.

4. Given the likelihood of outgoing trips using this route to reach Highway 417, evaluate Huntmar Drive and Maple Grove Road as a study area intersection. The proposed development is anticipated to generate 18 and 26 vehicles during the AM and PM peak hours, respectively, traveling north on Huntmar towards the Highway (refer to Figure 10 in the Step 3 TIA). This is a negligible amount of traffic as compared to the existing and future volumes, therefore, it will have a negligible impact on the intersection of Huntmar Drive and Maple Grove Road. Including this intersection as part of the subject study will not add any value, and as such, it is proposed to not be included as part of the Step 4 TIA.

5. PM peak volumes are high along Hazeldean Road on Figure 13. Despite this development is not being a major contributor to the overall through traffic, demand rationalization should be reconsidered when intersection LOS is completed as part of step 4. Depending on the results from the LOS analysis as part of the Step 4 TIA, demand rationalization may be reconsidered to adjust the volumes along Hazeldean Road.

If the above can be incorporated into Step 4, please proceed. Otherwise, please contact me to discuss.

Regards,

Rosanna Baggs, C.E.T.

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: Wednesday, August 21, 2019 9:56:54 AM
To: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Cc: Angela Mariani <angela@nlgc.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: 20 Cedarow Court Step 3 TIA

Good morning Rosanna,

Please see attached the Step 3 TIA for the proposed development located at 20 Cedarow Court in Stittsville. Please let me know if you have any questions or comments.

Thank you,

Lauren O'Grady P.Eng.
Transportation Engineer

Direct: 613-784-2264
lauren.o'grady@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

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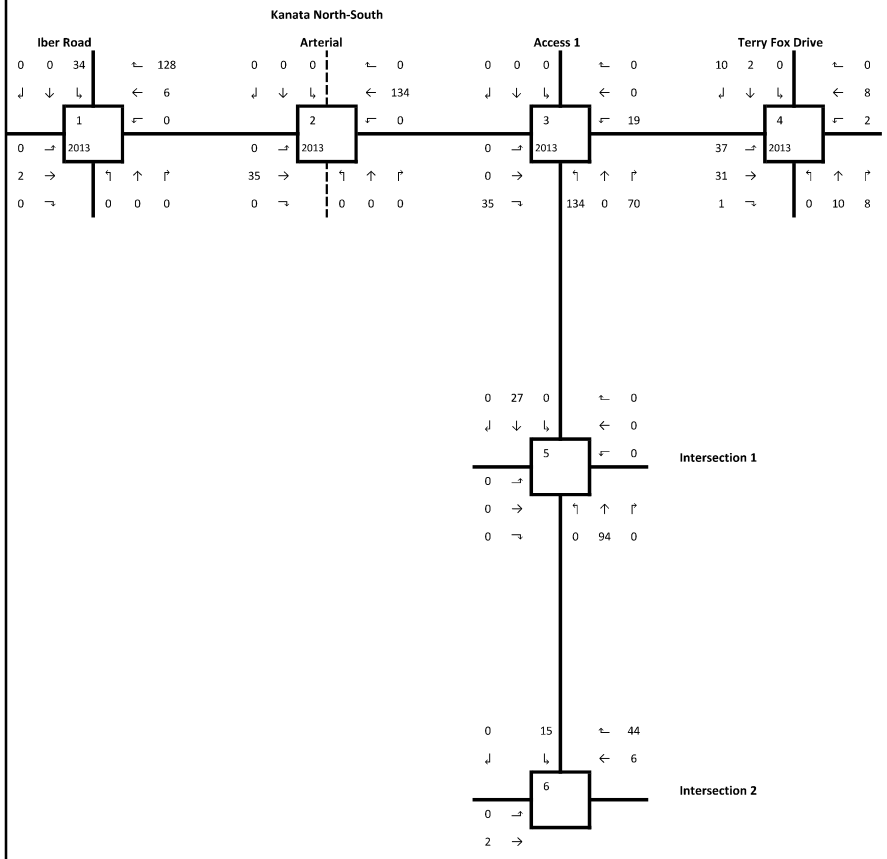
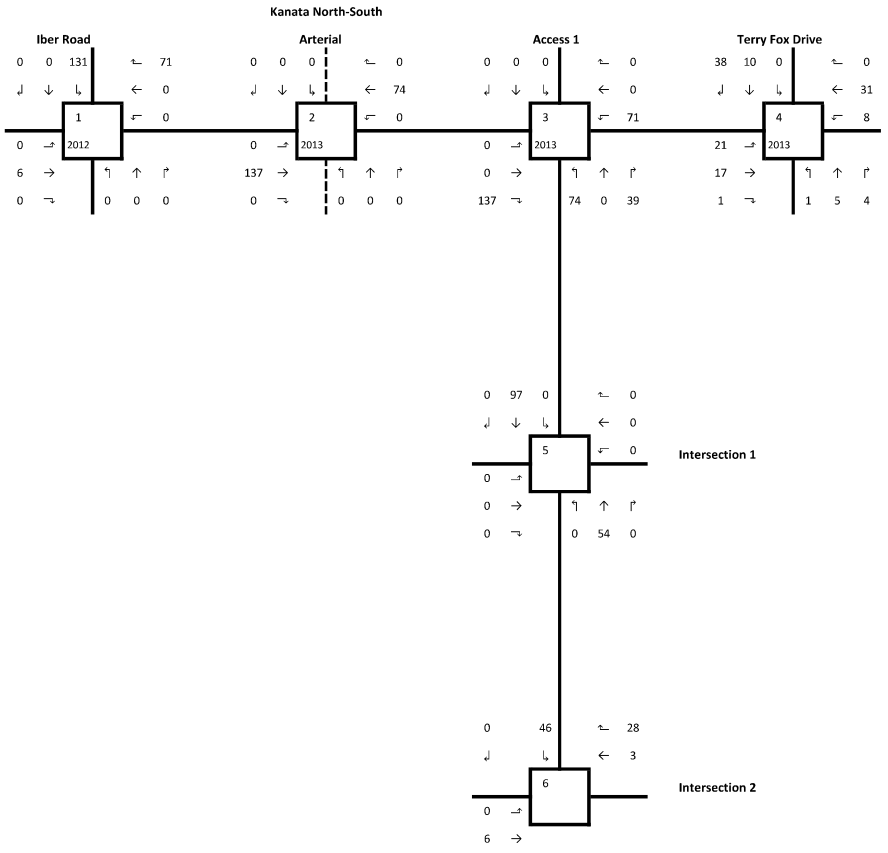
'

Appendix C BACKGROUND TRAFFIC VOLUMES

AM PEAK



PM PEAK

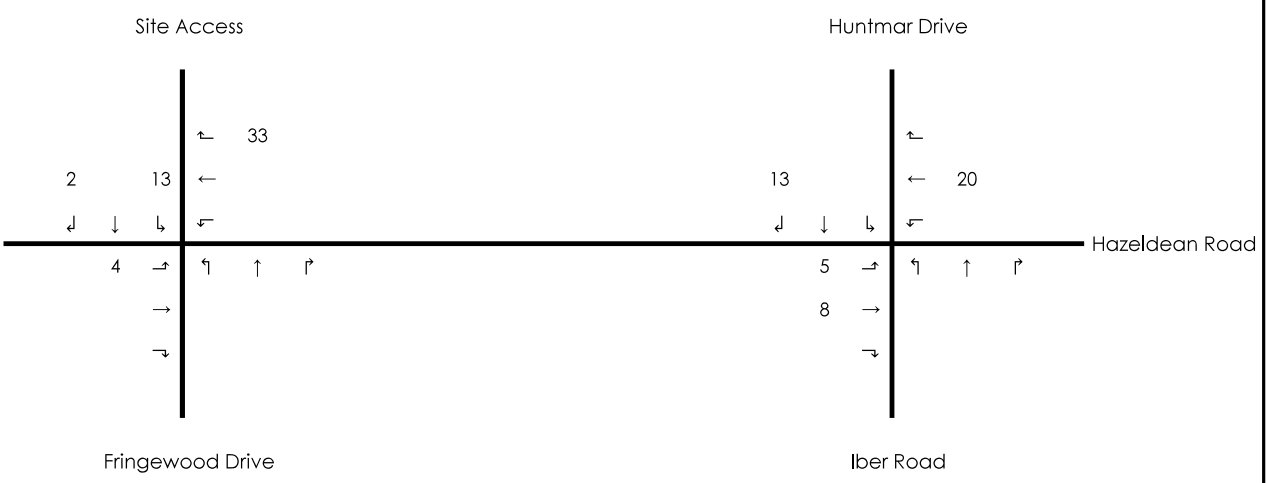


Stantec Consulting Ltd.
1331 Clyde Avenue
ON, Canada K2C 3G4
Tel: (613) 722-4420
www.stantec.com

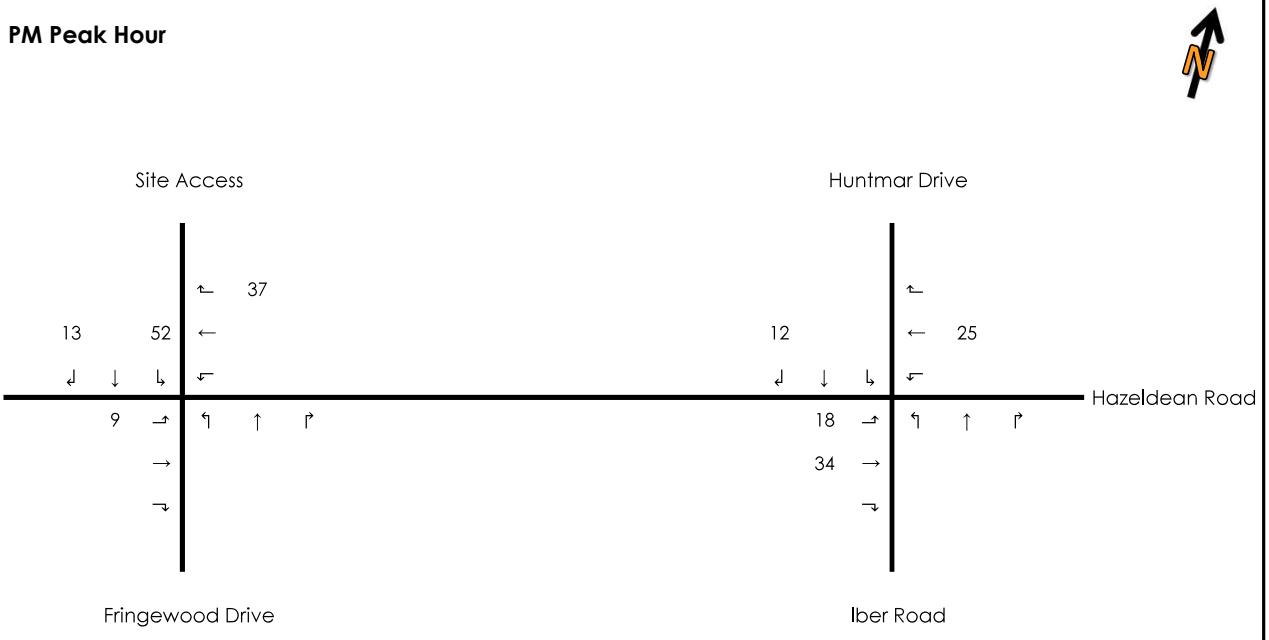
FIGURE: 12
TITLE: Site Traffic Assignment

CLIENT: Richcraft Homes
PROJECT: 590 Hazeldean Road

AM Peak Hour



PM Peak Hour



Stantec

Wellings Communities Holding Inc
and Extendicare (Canada) Inc.
5731 Hazeldean Road

Figure 8
Site Traffic Volumes

Figure 7: 'New' Site-Generated Traffic Volumes

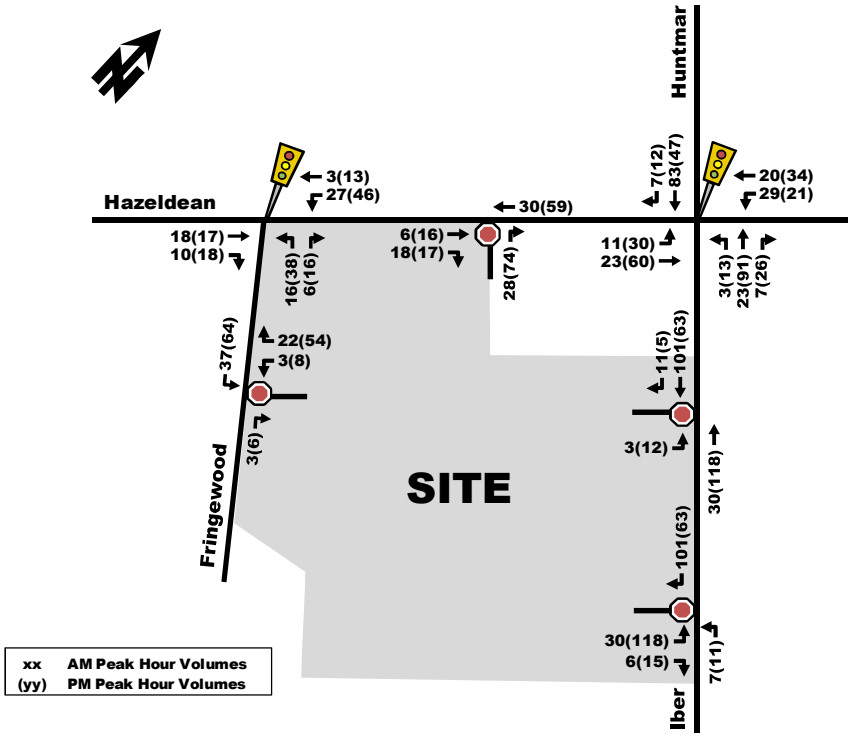
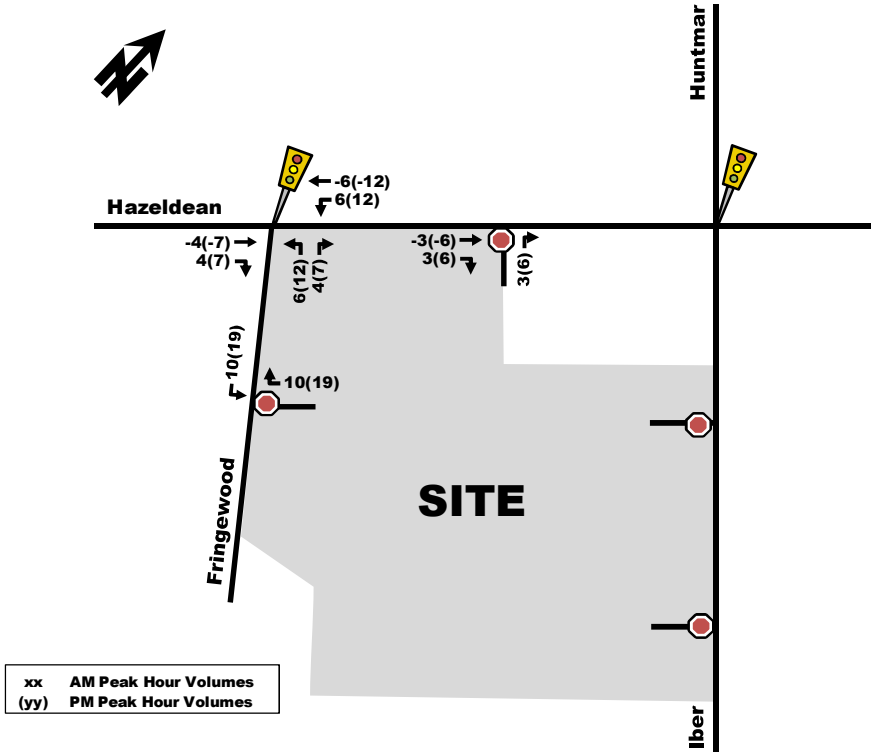


Figure 8: Site-Generated 'Pass-by' Traffic Volumes



Appendix D MULTI-MODAL LEVEL OF SERVICE ASSESSMENT

Appendix D MULTI-MODAL LEVEL OF SERVICE ASSESSMENT

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2019 Existing**	**Date**	**20-Sep-19**
Comments			

SEGMENTS		Hazeldean Road	Huntmar Drive	Cedarow Court
Pedestrian	Sidewalk Width Boulevard Width	≥ 2 m > 2 m	≥ 2 m > 2 m	no sidewalk n/a
	Avg Daily Curb Lane Traffic Volume	> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking	> 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h yes
	Level of Service	**D**	**C**	**F**
Bicycle	Type of Cycling Facility	Curbside Bike Lane	Curbside Bike Lane	Mixed Traffic
	Number of Travel Lanes	2 ea. dir. (w median)	2 ea. dir. (w median)	≤ 2 (no centreline)
	Operating Speed	>50 to 70 km/h	≤ 50 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS	**C**	**C**	**D**
	Bike Lane (+ Parking Lane) Width	≥ 1.8 m	≥ 1.8 m	
	Bike Lane Width LoS	**A**	**A**	**-**
	Bike Lane Blockages	Rare	Rare	
	Blockage LoS	**A**	**A**	**-**
	Level of Service	**C**	**C**	**D**
Transit	Facility Type	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service	**D**	**D**	**-**
Truck	Truck Lane Width	≤ 3.5 m		
	Travel Lanes per Direction	> 1		
	Level of Service	**A**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2024 Future Background**	**Date**	**20-Sep-19**
Comments			

SEGMENTS		Hazeldean Road	Huntmar Drive	Cedarow Court
Pedestrian	Sidewalk Width Boulevard Width	≥ 2 m > 2 m	≥ 2 m > 2 m	no sidewalk n/a
	Avg Daily Curb Lane Traffic Volume	> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking	> 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h yes
	Level of Service	**D**	**C**	**F**
Bicycle	Type of Cycling Facility	Curbside Bike Lane	Curbside Bike Lane	Mixed Traffic
	Number of Travel Lanes	2 ea. dir. (w median)	2 ea. dir. (w median)	≤ 2 (no centreline)
	Operating Speed	>50 to 70 km/h	≤ 50 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS	**C**	**C**	**D**
	Bike Lane (+ Parking Lane) Width	≥ 1.8 m	≥ 1.8 m	
	Bike Lane Width LoS	**A**	**A**	**-**
	Bike Lane Blockages	Rare	Rare	
	Blockage LoS	**A**	**A**	**-**
	Level of Service	**C**	**C**	**D**
Transit	Facility Type	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service	**D**	**D**	**-**
Truck	Truck Lane Width	≤ 3.5 m		
	Travel Lanes per Direction	> 1		
	Level of Service	**A**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2024 Total Future**	**Date**	**20-Sep-19**
Comments			

SEGMENTS		Hazeldean Road	Huntmar Drive	Cedarow Court
Pedestrian	Sidewalk Width Boulevard Width	≥ 2 m > 2 m	≥ 2 m > 2 m	no sidewalk n/a
	Avg Daily Curb Lane Traffic Volume	> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking	> 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h yes
	Level of Service	**D**	**C**	**F**
Bicycle	Type of Cycling Facility	Curbside Bike Lane	Curbside Bike Lane	Mixed Traffic
	Number of Travel Lanes	2 ea. dir. (w median)	2 ea. dir. (w median)	≤ 2 (no centreline)
	Operating Speed	>50 to 70 km/h	≤ 50 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS	**C**	**C**	**D**
	Bike Lane (+ Parking Lane) Width	≥ 1.8 m	≥ 1.8 m	
	Bike Lane Width LoS	**A**	**A**	**-**
	Bike Lane Blockages	Rare	Rare	
	Blockage LoS	**A**	**A**	**-**
	Level of Service	**C**	**C**	**D**
Transit	Facility Type	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service	**D**	**D**	**-**
Truck	Truck Lane Width	≤ 3.5 m		
	Travel Lanes per Direction	> 1		
	Level of Service	**A**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2029 Ultimate**	**Date**	**20-Sep-19**
Comments			

SEGMENTS		Hazeldean Road	Huntmar Drive	Cedarow Court
Pedestrian	Sidewalk Width Boulevard Width	≥ 2 m > 2 m	≥ 2 m > 2 m	no sidewalk n/a
	Avg Daily Curb Lane Traffic Volume	> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking	> 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h yes
	Level of Service	**D**	**C**	**F**
Bicycle	Type of Cycling Facility	Curbside Bike Lane	Curbside Bike Lane	Mixed Traffic
	Number of Travel Lanes	2 ea. dir. (w median)	2 ea. dir. (w median)	≤ 2 (no centreline)
	Operating Speed	>50 to 70 km/h	≤ 50 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS	**C**	**C**	**D**
	Bike Lane (+ Parking Lane) Width	≥ 1.8 m	≥ 1.8 m	
	Bike Lane Width LoS	**A**	**A**	**-**
	Bike Lane Blockages	Rare	Rare	
	Blockage LoS	**A**	**A**	**-**
	Level of Service	**C**	**C**	**D**
Transit	Facility Type	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service	**D**	**D**	**-**
Truck	Truck Lane Width	≤ 3.5 m		
	Travel Lanes per Direction	> 1		
	Level of Service	**A**	**-**	**-**

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2019 Existing**	**Date**	**25-Sep-19**
Comments			

	INTERSECTIONS	Hazeldean at Huntmar				Hazeldean at Fringewood			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	7	7	3	3	6	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Protected	Protected	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Smart Channel	No Channel	Smart Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	10-15m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**41**	**37**	**16**	**12**	**70**	**70**	**28**	**45**
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**D**
	Cycle Length	120	120	120	120	120	120	120	120
	Effective Walk Time	9	9	7	7	14	14	10	10
	Average Pedestrian Delay	**51**	**51**	**53**	**53**	**47**	**47**	**50**	**50**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**
	Level of Service	**E**	**E**	**F**	**F**	**E**	**E**	**F**	**E**
		F				**F**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP		Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	> 50 m Introduced right turn lane	Bike lane shifts to the left of right turn					
	Dedicated Right Turning Speed	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h					
	Cyclist Through Movement	**F**	**D**	**F**	**Not Applicable**	**-**		**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**-**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach	1 lane crossed	1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed		No lane crossed	≥ 2 lanes crossed	
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h		> 40 to ≤ 50 km/h	≥ 60 km/h	
	Left Turning Cyclist	**C**	**C**	**F**	**F**	**-**	**B**	**F**	**-**
	Level of Service	**F**	**D**	**F**	**F**	**-**	**B**	**F**	**-**
		F				**F**			
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec		≤ 20 sec	≤ 10 sec	≤ 10 sec
	Level of Service	**F**	**F**	**F**	**F**	**-**	**C**	**B**	**B**
		F				**C**			
Truck	Effective Corner Radius	> 15 m	10 - 15 m	> 15 m	10 - 15 m		10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2		≥ 2	≥ 2	≥ 2
	Level of Service	**A**	**B**	**A**	**B**	**-**	**B**	**B**	**B**
		B				**B**			

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2024 Future Background**	**Date**	**25-Sep-19**
Comments			

	INTERSECTIONS	Hazeldean at Huntmar				Hazeldean at Fringewood			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	7	7	3	3	6	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Protected	Protected	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Smart Channel	No Channel	Smart Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	10-15m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**41**	**37**	**16**	**12**	**70**	**70**	**20**	**37**
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
	Cycle Length	120	120	120	120	120	120	120	120
	Effective Walk Time	17	17	9	9	58	58	11	11
	Average Pedestrian Delay	**44**	**44**	**51**	**51**	**16**	**16**	**50**	**50**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**B**	**B**	**E**	**E**
	Level of Service	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
		F				**F**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	> 50 m Introduced right turn lane	Bike lane shifts to the left of right turn				> 50 m Introduced right turn lane	
	Dedicated Right Turning Speed	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h				>25 to 30 km/h	
	Cyclist Through Movement	**F**	**D**	**F**	**Not Applicable**			**D**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach	1 lane crossed	1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**C**	**C**	**F**	**F**	**B**	**B**	**F**	**F**
	Level of Service	**F**	**D**	**F**	**F**	**B**	**B**	**F**	**F**
		F				**F**			
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec		> 40 sec	≤ 20 sec	≤ 10 sec
	Level of Service	**F**	**F**	**F**	**F**	**-**	**F**	**C**	**B**
		F				**F**			
Truck	Effective Corner Radius	> 15 m	10 - 15 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	1	≥ 2
	Level of Service	**A**	**B**	**A**	**B**	**B**	**B**	**E**	**B**
		B				**E**			
Auto	Volume to Capacity Ratio								
	Level of Service	**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2024 Total Future**	**Date**	**25-Sep-19**
Comments			

	INTERSECTIONS	Hazeldean at Huntmar				Hazeldean at Fringewood			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	7	7	3	3	6	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Protected	Protected	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Smart Channel	No Channel	Smart Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	10-15m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**41**	**37**	**16**	**12**	**70**	**70**	**20**	**37**
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
	Cycle Length	120	120	120	120	120	120	120	120
	Effective Walk Time	15	15	9	9	57	57	12	12
	Average Pedestrian Delay	**46**	**46**	**51**	**51**	**17**	**17**	**49**	**49**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**B**	**B**	**E**	**E**
	Level of Service	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
		F				**F**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	> 50 m Introduced right turn lane	Bike lane shifts to the left of right turn				> 50 m Introduced right turn lane	
	Dedicated Right Turning Speed	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h				>25 to 30 km/h	
	Cyclist Through Movement	**F**	**D**	**F**	**Not Applicable**			**D**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach	1 lane crossed	1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**C**	**C**	**F**	**F**	**B**	**B**	**F**	**F**
	Level of Service	**F**	**D**	**F**	**F**	**B**	**B**	**F**	**F**
		F				**F**			
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec		> 40 sec	≤ 10 sec	≤ 20 sec
	Level of Service	**F**	**F**	**F**	**F**	**-**	**F**	**B**	**C**
		F				**F**			
Truck	Effective Corner Radius	> 15 m	10 - 15 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	1	≥ 2
	Level of Service	**A**	**B**	**A**	**B**	**B**	**B**	**E**	**B**
		B				**E**			

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**20 Cedarow Court**
Scenario	**2029 Ultimate**	**Date**	**25-Sep-19**
Comments			

	INTERSECTIONS	Hazeldean at Huntmar				Hazeldean at Fringewood			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	7	7	3	3	6	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Protected	Protected	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Smart Channel	No Channel	Smart Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	10-15m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**41**	**37**	**16**	**12**	**70**	**70**	**20**	**37**
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
	Cycle Length	120	120	120	120	120	120	120	120
	Effective Walk Time	16	16	10	10	59	59	10	10
	Average Pedestrian Delay	**45**	**45**	**50**	**50**	**16**	**16**	**50**	**50**
	Pedestrian Delay LoS	**E**	**E**	**E**	**E**	**B**	**B**	**E**	**E**
	Level of Service	**E**	**E**	**F**	**F**	**C**	**C**	**F**	**E**
		F				**F**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	> 50 m Introduced right turn lane	Bike lane shifts to the left of right turn				> 50 m Introduced right turn lane	
	Dedicated Right Turning Speed	>25 to 30 km/h	>25 to 30 km/h	>25 to 30 km/h				>25 to 30 km/h	
	Cyclist Through Movement	**F**	**D**	**F**	**Not Applicable**			**D**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach	1 lane crossed	1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**C**	**C**	**F**	**F**	**B**	**B**	**F**	**F**
	Level of Service	**F**	**D**	**F**	**F**	**B**	**B**	**F**	**F**
		F				**F**			
Transit	Average Signal Delay	> 40 sec	> 40 sec	> 40 sec	> 40 sec		> 40 sec	≤ 10 sec	≤ 20 sec
	Level of Service	**F**	**F**	**F**	**F**	**-**	**F**	**B**	**C**
		F				**F**			
Truck	Effective Corner Radius	> 15 m	10 - 15 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	1	≥ 2
	Level of Service	**A**	**B**	**A**	**B**	**B**	**B**	**E**	**B**
		B				**E**			

Appendix E TRANSPORTATION DEMAND MANAGEMENT CHECKLIST

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	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
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)*	☑

	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)*	☑
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)*	☑
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)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
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	☐
	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	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *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)*	☑
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)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
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	☐
	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)*	☑
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)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
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	☐
	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)	☐

	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	☐
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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	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	☐
	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	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	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)*	☐
	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	☐

		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	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	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)	☐
	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	☐

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

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

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

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

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		1. TDM PROGRAM MANAGEMENT	
		1.1 Program coordinator	
BASIC	★ 1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
		1.2 Travel surveys	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
		2. WALKING AND CYCLING	
		2.1 Information on walking/cycling routes & destinations	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	☐
		2.2 Bicycle skills training	
		Commuter travel	
BETTER	★ 2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
		2.3 Valet bike parking	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances	☐
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☐
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☐
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
BETTER		3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4.	**RIDESHARING**	
		4.1	**Ridematching service**	
			Commuter travel	
BASIC	★	4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2	**Carpool parking price incentives**	
			Commuter travel	
BETTER		4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3	**Vanpool service**	
			Commuter travel	
BETTER		4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5.	**CARSHARING & BIKESHARING**	
		5.1	**Bikeshare stations & memberships**	
BETTER		5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☐
			Commuter travel	
BETTER		5.1.2	Provide employees with bikeshare memberships for local business travel	☐
		5.2	**Carshare vehicles & memberships**	
			Commuter travel	
BETTER		5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER		5.2.2	Provide employees with carshare memberships for local business travel	☐
		6.	**PARKING**	
		6.1	**Priced parking**	
			Commuter travel	
BASIC	★	6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC		6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☐
			Visitor travel	
BETTER		6.1.3	Charge for short-term parking (hourly)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7.	**TDM MARKETING & COMMUNICATIONS**	
		7.1	**Multimodal travel information**	
			Commuter travel	
BASIC	★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	☐
			Visitor travel	
BETTER	★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2	**Personalized trip planning**	
			Commuter travel	
BETTER	★	7.2.1	Offer personalized trip planning to new/relocating employees	☐
		7.3	**Promotions**	
			Commuter travel	
BETTER		7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8.	**OTHER INCENTIVES & AMENITIES**	
		8.1	**Emergency ride home**	
			Commuter travel	
BETTER	★	8.1.1	Provide emergency ride home service to non-driving commuters	☐
		8.2	**Alternative work arrangements**	
			Commuter travel	
BASIC	★	8.2.1	Encourage flexible work hours	☐
BETTER		8.2.2	Encourage compressed workweeks	☐
BETTER	★	8.2.3	Encourage telework	☐
		8.3	**Local business travel options**	
			Commuter travel	
BASIC	★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4	**Commuter incentives**	
			Commuter travel	
BETTER		8.4.1	Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5	**On-site amenities**	
			Commuter travel	
BETTER		8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	☐

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

Legend

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
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)*	☑

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
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)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☐
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
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	☐
	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	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑ bicycle storage is provided in the below grade parking lot
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)*	☐
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☐
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑ bicycle storage is provided in the below grade parking lot
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑ at grade: 94 standard, 4 accessible below grade: 189 (incl. accessibility) Site Plan date: July 3, 2019
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

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

Legend

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

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

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

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

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

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

Appendix F INTERSECTION PERFORMANCE WORKSHEETS

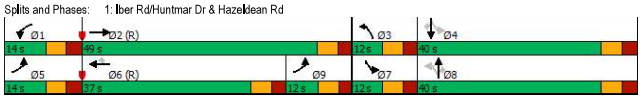
F.1 2019 EXISTING CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	665	108	162	463	81	55	234	245	116	211	131
Future Volume (vph)	198	665	108	162	463	81	55	234	245	116	211	131
Satd. Flow (prot)	3288	3319	0	3288	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.950			0.950			0.466			0.363		
Satd. Flow (perm)	3288	3319	0	3288	3390	1517	831	1784	1517	648	1784	1517
Satd. Flow (RTOR)		18				215			266			212
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	220	859	0	180	514	90	61	260	272	129	234	146
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5 9	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5 9	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)		5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)		36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)		49.0		14.0	37.0	37.0	12.0	40.0	40.0	12.0	40.0	40.0
Total Split (%)		42.6%		12.2%	32.2%	32.2%	10.4%	34.8%	34.8%	10.4%	34.8%	34.8%
Yellow Time (s)		3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)		2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag		Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode		C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	14.2	49.7		11.2	40.2	40.2	28.7	22.7	22.7	29.9	25.1	25.1
Actuated g/C Ratio	0.12	0.43		0.10	0.35	0.35	0.25	0.20	0.20	0.26	0.22	0.22
v/c Ratio	0.54	0.59		0.56	0.43	0.13	0.24	0.74	0.53	0.59	0.60	0.29
Control Delay	35.5	21.9		56.7	31.7	0.4	29.4	55.6	8.6	42.0	47.3	2.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	21.9		56.7	31.7	0.4	29.4	55.6	8.6	42.0	47.3	2.4
LOS	D	C		E	C	A	C	E	A	D	D	A
Approach Delay		24.6			33.8			31.4			33.1	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	19.4	76.7		20.0	46.5	0.0	9.9	55.4	1.1	21.8	49.0	0.0
Queue Length 95th (m)	21.9	107.0		32.0	70.1	0.0	18.0	76.4	21.2	33.6	68.8	3.2
Internal Link Dist (m)		229.0			410.3			90.3			231.1	
Turn Bay Length (m)	96.9			132.9		246.9	46.9		64.9	89.0		
Base Capacity (vph)	410	1445		320	1184	670	249	518	629	220	518	591
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.59		0.56	0.43	0.13	0.24	0.50	0.43	0.59	0.45	0.25

Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 62 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 29.9 — Intersection LOS: C
Intersection Capacity Utilization 69.1% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	903	20	21	628	0	22	0	68	0	0	0
Future Volume (vph)	0	903	20	21	628	0	22	0	68	0	0	0
Satd. Flow (prot)	1784	3380	0	1695	3390	1784	0	1790	0	0	1961	0
Flt Permitted				0.235				0.917				
Satd. Flow (perm)	1784	3380	0	419	3390	1784	0	1661	0	0	1961	0
Satd. Flow (RTOR)		3						88				
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1025	0	23	698	0	0	100	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA				
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	64.0	64.0		15.0	79.0	79.0	36.0	36.0		36.0	36.0	
Total Split (%)	55.7%	55.7%		13.0%	68.7%	68.7%	31.3%	31.3%		31.3%	31.3%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9			6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		84.4		91.7	91.6			10.3				
Actuated g/C Ratio		0.73		0.80	0.80			0.09				
v/c Ratio		0.41		0.06	0.26			0.44				
Control Delay		7.1		1.0	1.2			19.5				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		7.1		1.0	1.2			19.5				
LOS		A		A	A			B				
Approach Delay		7.1			1.2			19.5				
Approach LOS		A			A			B				
Queue Length 50th (m)		47.2		0.3	8.5			2.5				
Queue Length 95th (m)		62.5		m0.7	8.6			18.5				
Internal Link Dist (m)		192.4			229.0			159.2			123.2	
Turn Bay Length (m)				95.1								
Base Capacity (vph)		2480		432	2701			486				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.41		0.05	0.26			0.21				

Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 52 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 5.5 — Intersection LOS: A
Intersection Capacity Utilization 46.3% — ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Fringewood Dr & Hazeldean Rd

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	919	0	0	632	18	0	0	0	4	0	9
Future Vol, veh/h	12	919	0	0	632	18	0	0	0	4	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	701	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	1021	0	0	702	20	0	0	0	4	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	722	0	0	1021	0	0	1398	1769	511	1249	1759	361
Stage 1	-	-	-	-	-	-	1047	1047	-	712	712	-
Stage 2	-	-	-	-	-	-	351	722	-	537	1047	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	876	-	-	675	-	-	100	83	508	129	84	636
Stage 1	-	-	-	-	-	-	244	303	-	389	434	-
Stage 2	-	-	-	-	-	-	639	429	-	496	303	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	876	-	-	675	-	-	97	82	508	128	83	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	97	82	-	128	83	-
Stage 1	-	-	-	-	-	-	240	298	-	383	434	-
Stage 2	-	-	-	-	-	-	629	429	-	489	298	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	18.3
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	876	-	-	675	-	-	286
HCM Lane V/C Ratio	-	0.015	-	-	-	-	-	0.051
HCM Control Delay (s)	0	9.2	-	-	0	-	-	18.3
HCM Lane LOS	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.2

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2019 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	655	123	314	1017	207	138	270	237	137	332	391
Future Volume (vph)	205	655	123	314	1017	207	138	270	237	137	332	391
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	865	0	349	1130	230	153	300	263	152	369	434
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.5	36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)	22.0	44.0		22.0	44.0	44.0	12.0	42.0	42.0	12.0	42.0	42.0
Total Split (%)	18.3%	36.7%		18.3%	36.7%	36.7%	10.0%	35.0%	35.0%	10.0%	35.0%	35.0%
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.8	2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	13.2	42.4		15.9	45.1	45.1	36.3	30.3	30.3	36.3	30.3	30.3
Actuated g/C Ratio	0.11	0.35		0.13	0.38	0.38	0.30	0.25	0.25	0.30	0.25	0.25
v/c Ratio	0.63	0.73		0.80	0.89	0.32	0.80	0.67	0.45	0.62	0.82	0.70
Control Delay	80.2	30.7		65.3	46.1	5.1	59.3	47.3	6.5	40.8	57.0	17.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.2	30.7		65.3	46.1	5.1	59.3	47.3	6.5	40.8	57.0	17.3
LOS	F	C		E	D	A	E	D	A	D	E	B
Approach Delay		41.0			44.5			34.9			36.4	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	29.6	95.7		40.6	132.7	0.0	24.9	62.8	0.0	24.8	81.1	23.9
Queue Length 95th (m)	42.7	122.5		#63.8	#195.3	17.3	#46.1	88.3	18.7	38.6	111.5	58.7
Internal Link Dist (m)		229.0			410.3			90.3			231.1	
Turn Bay Length (m)	96.9			132.9		246.9	46.9		64.9	89.0		
Base Capacity (vph)	424	1181		444	1273	713	192	526	632	245	526	668
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.73		0.79	0.89	0.32	0.80	0.57	0.42	0.62	0.70	0.65

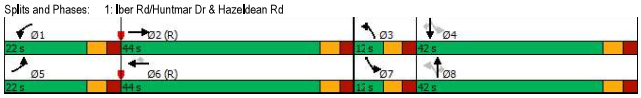
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 40.4 Intersection LOS: D

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2019 Existing PM

Intersection Capacity Utilization 83.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lanes, Volumes, Timings
2: Fringewood Dr & Hazeldean Rd

20 Cedarow Ct
2019 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	935	33	83	1463	0	33	0	48	0	0	0
Future Volume (vph)	0	935	33	83	1463	0	33	0	48	0	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1076	0	92	1626	0	0	90	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA				
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	64.0	64.0		20.0	84.0	84.0	36.0	36.0		36.0	36.0	
Total Split (%)	53.3%	53.3%		16.7%	70.0%	70.0%	30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9			6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		83.8		96.8	96.7			10.2				
Actuated g/C Ratio		0.70		0.81	0.81			0.08				
v/c Ratio		0.46		0.24	0.60			0.42				
Control Delay		8.8		2.4	4.9			18.5				
Queue Delay		0.0		0.0	0.1			0.0				
Total Delay		8.8		2.4	5.0			18.5				
LOS		A		A	A			B				
Approach Delay		8.8			4.8			18.5				
Approach LOS		A			A			B				
Queue Length 50th (m)		52.5		2.8	36.1			1.1				
Queue Length 95th (m)		69.0		m2.8	38.9			16.7				
Internal Link Dist (m)		192.4			229.0			159.2			123.2	
Turn Bay Length (m)				95.1								
Base Capacity (vph)		2356		463	2732			454				
Starvation Cap Reductn		0		0	185			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.46		0.20	0.64			0.20				

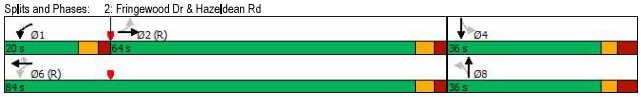
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 35 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 6.7 Intersection LOS: A

Lanes, Volumes, Timings
2: Fringewood Dr & Hazeldean Rd

20 Cedarow Ct
2019 Existing PM

Intersection Capacity Utilization 71.3% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Fringewood Dr & Hazeldean Rd



Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	947	0	0	1477	19	0	0	0	21	0	24
Future Vol, veh/h	16	947	0	0	1477	19	0	0	0	21	0	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	701	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1052	0	0	1641	21	0	0	0	23	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1662	0	0	1052	0	0	1909	2750	526	2214	2740	831
Stage 1	-	-	-	-	-	-	1088	1088	-	1652	1652	-
Stage 2	-	-	-	-	-	-	821	1662	-	562	1088	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	383	-	-	657	-	-	41	20	496	24	20	313
Stage 1	-	-	-	-	-	-	230	290	-	103	154	-
Stage 2	-	-	-	-	-	-	335	153	-	479	290	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	383	-	-	657	-	-	36	19	496	~ 23	19	313
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	19	-	~ 23	19	-
Stage 1	-	-	-	-	-	-	219	276	-	98	154	-
Stage 2	-	-	-	-	-	-	306	153	-	456	276	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	$ 311.6
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	383	-	-	657	-	-	45
HCM Lane V/C Ratio	-	0.046	-	-	-	-	-	1.111
HCM Control Delay (s)	0	14.9	-	-	0	-	-	$ 311.6
HCM Lane LOS	A	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	4.7

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

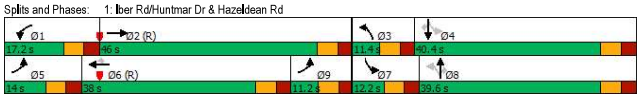
F.2 2024 FUTURE BACKGROUND CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	612	95	166	444	174	50	224	222	130	252	131
Future Volume (vph)	187	612	95	166	444	174	50	224	222	130	252	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	97,0		0,0	133,0		247,0	47,0		65,0	89,0		0,0
Storage Lanes	2		0	2		1	1		1	1		1
Taper Length (m)	53,0			67,0			43,0			26,0		
Lane Util. Factor	0,97	0,95	0,95	0,97	0,95	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Frt		0,980				0,850			0,850			0,850
Flt Protected	0,950			0,950			0,950			0,950		
Satd. Flow (prot)	3288	3322	0	3288	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0,950			0,950			0,427			0,401		
Satd. Flow (perm)	3288	3322	0	3288	3390	1517	762	1784	1517	716	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				215			222			212
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		252.9			434.4			114.3			255.0	
Travel Time (s)		15.2			26.1			6.9			15.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	612	95	166	444	174	50	224	222	130	252	131
Shared Lane Traffic (%)												
Lane Group Flow (vph)	187	707	0	166	444	174	50	224	222	130	252	131
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		9,9			9,9			5,0			5,5	
Link Offset(m)		0,0			0,0			0,0			0,0	
Crosswalk Width(m)		3,0			3,0			3,0			3,0	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Detector 1 Queue (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Detector 1 Delay (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Detector 2 Position(m)		28,7			28,7			28,7			28,7	
Detector 2 Size(m)		1,8			1,8			1,8			1,8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0,0			0,0			0,0			0,0	
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5 9	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5 9	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)		5,0		5,0	5,0	5,0	5,0	10,0	10,0	5,0	10,0	10,0
Minimum Split (s)		36,3		11,6	36,3	36,3	11,3	39,6	39,6	11,3	39,6	39,6
Total Split (s)		46,0		17,2	38,0	38,0	11,4	39,6	39,6	12,2	40,4	40,4
Total Split (%)		40,0%		15,0%	33,0%	33,0%	9,9%	34,4%	34,4%	10,6%	35,1%	35,1%
Maximum Green (s)		39,7		10,7	31,7	31,7	5,1	33,0	33,0	5,9	33,8	33,8
Yellow Time (s)		3,7		3,7	3,7	3,7	3,7	3,7	3,7	3,7	3,7	3,7
All-Red Time (s)		2,6		2,8	2,6	2,6	2,6	2,9	2,9	2,6	2,9	2,9
Lost Time Adjust (s)		0,0		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Total Lost Time (s)		6,3		6,5	6,3	6,3	6,3	6,6	6,6	6,3	6,6	6,6
Lead/Lag		Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)		3,0		3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Recall Mode		C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		7,0			7,0	7,0		7,0	7,0		7,0	7,0
Flash Dont Walk (s)		23,0			23,0	23,0		26,0	26,0		26,0	26,0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	13,1	51,5		11,1	43,0	43,0	26,2	20,8	20,8	28,9	23,9	23,9
Actuated g/C Ratio	0,11	0,45		0,10	0,37	0,37	0,23	0,18	0,18	0,25	0,21	0,21
v/c Ratio	0,50	0,47		0,52	0,35	0,25	0,23	0,70	0,49	0,57	0,68	0,27
Control Delay	43,3	18,8		55,1	28,4	2,7	30,5	54,9	8,6	41,8	51,9	1,4
Queue Delay	0,0	0,0		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Total Delay	43,3	18,8		55,1	28,4	2,7	30,5	54,9	8,6	41,8	51,9	1,4
LOS	D	B		E	C	A	C	D	A	D	D	A
Approach Delay		23,9			28,4			31,7			36,5	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	16,7	57,7		18,6	37,3	0,0	8,2	47,7	0,0	22,5	54,1	0,0
Queue Length 95th (m)	22,4	88,0		28,7	58,4	8,5	15,9	67,6	18,3	34,7	75,2	0,0
Internal Link Dist (m)		228,9			410,4			90,3			231,0	
Turn Bay Length (m)	97,0			133,0		247,0	47,0		65,0	89,0		
Base Capacity (vph)	379	1496		337	1268	701	214	511	593	230	524	595
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0,49	0,47		0,49	0,35	0,25	0,23	0,44	0,37	0,57	0,48	0,22

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 62 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0,70			
Intersection Signal Delay: 29,0		Intersection LOS: C	
Intersection Capacity Utilization 67,5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd

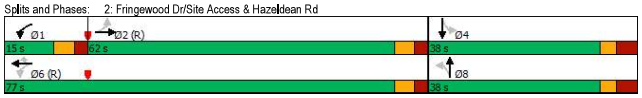


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	807	29	45	555	26	37	5	68	10	5	2
Future Volume (vph)	3	807	29	45	555	26	37	5	68	10	5	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (m)	3,7	3,7	3,7	3,7	3,7	3,7	3,7	4,8	3,7	3,7	4,5	3,7
Storage Length (m)	55,0		0,0	95,0		183,0	0,0		0,0	37,5		0,0
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (m)	25,0			48,0			2,5			2,5		
Lane Util. Factor	1,00	0,95	0,95	1,00	0,95	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Frt		0,995				0,850		0,917			0,957	
Flt Protected	0,950			0,950				0,983		0,950		
Satd. Flow (prot)	1695	3373	0	1695	3390	1517	0	1803	0	1695	1858	0
Flt Permitted	0,444			0,293				0,885		0,625		
Satd. Flow (perm)	792	3373	0	523	3390	1517	0	1623	0	1115	1858	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				37		68			2	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		216,4			252,9			183,1			147,4	
Travel Time (s)		13,0			15,2			16,5			13,3	
Peak Hour Factor	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Adj. Flow (vph)	3	807	29	45	555	26	37	5	68	10	5	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	836	0	45	555	26	0	110	0	10	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7,4			7,4			3,7			3,7	
Link Offset(m)		0,0			0,0			0,0			0,0	
Crosswalk Width(m)		3,0			3,0			3,0			3,0	
Two way Left Turn Lane												
Headway Factor	1,06	1,06	1,06	1,06	1,06	1,06	1,06	0,91	1,06	1,06	0,95	1,06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6,1	30,5		6,1	30,5	6,1	6,1	30,5		6,1	30,5	
Trailing Detector (m)	0,0	0,0		0,0	0,0	0,0	0,0	0,0		0,0	0,0	
Detector 1 Position(m)	0,0	0,0		0,0	0,0	0,0	0,0	0,0		0,0	0,0	
Detector 1 Size(m)	6,1	1,8		6,1	1,8	6,1	6,1	1,8		6,1	1,8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0		0,0	0,0	
Detector 1 Queue (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0		0,0	0,0	
Detector 1 Delay (s)	0,0	0,0		0,0	0,0	0,0	0,0	0,0		0,0	0,0	
Detector 2 Position(m)		28,7			28,7			28,7			28,7	
Detector 2 Size(m)		1,8			1,8			1,8			1,8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0,0			0,0			0,0			0,0	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	62.0	62.0		15.0	77.0	77.0	38.0	38.0		38.0	38.0	
Total Split (%)	53.9%	53.9%		13.0%	67.0%	67.0%	33.0%	33.0%		33.0%	33.0%	
Maximum Green (s)	55.8	55.8		8.9	70.8	70.8	31.1	31.1		31.1	31.1	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	7.0	7.0			7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0			19.0	19.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)	0	0			0	0	0	0		0	0	
Act Effct Green (s)	81.1	81.1		91.1	91.0	91.0		10.9		10.9	10.9	
Actuated g/C Ratio	0.71	0.71		0.79	0.79	0.79		0.09		0.09	0.09	
v/c Ratio	0.01	0.35		0.09	0.21	0.02		0.51		0.10	0.04	
Control Delay	6.3	7.7		1.4	1.2	0.2		30.0		48.8	40.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	6.3	7.7		1.4	1.2	0.2		30.0		48.8	40.9	
LOS	A	A		A	A	A		C		D	D	
Approach Delay		7.7			1.2			30.0			45.5	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	0.2	36.0		0.9	6.6	0.2		9.0		2.1	1.1	
Queue Length 95th (m)	1.3	52.7		2.2	8.6	0.0		25.8		7.3	5.3	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	558	2379		505	2683	1208		488		301	503	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.01	0.35		0.09	0.21	0.02		0.23		0.03	0.01	

Intersection Summary	
Area Type:	Other
Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 52 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 58.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	836	0	0	578	16	0	0	0	3	0	8
Future Vol, veh/h	10	836	0	0	578	16	0	0	0	3	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	836	0	0	578	16	0	0	0	3	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	594	0	0	836	0	0	1145	1450	418	1024	1442	297
Stage 1	-	-	-	-	-	-	856	856	-	586	586	-
Stage 2	-	-	-	-	-	-	289	594	-	438	856	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	978	-	-	794	-	-	154	130	584	190	131	699
Stage 1	-	-	-	-	-	-	319	373	-	463	495	-
Stage 2	-	-	-	-	-	-	694	491	-	567	373	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	978	-	-	794	-	-	151	129	584	188	130	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	151	129	-	188	130	-
Stage 1	-	-	-	-	-	-	316	369	-	458	495	-
Stage 2	-	-	-	-	-	-	686	491	-	561	369	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	14.2
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	978	-	-	794	-	-	401
HCM Lane V/C Ratio	-	0.01	-	-	-	-	-	0.027
HCM Control Delay (s)	0	8.7	-	-	0	-	-	14.2
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2024 FBG PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	657	108	293	942	239	132	310	230	226	330	363
Future Volume (vph)	218	657	108	293	942	239	132	310	230	226	330	363
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	218	765	0	293	942	239	132	310	230	226	330	363
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.5	36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)	17.2	42.8		20.6	46.2	46.2	14.6	39.6	39.6	17.0	42.0	42.0
Total Split (%)	14.3%	35.7%		17.2%	38.5%	38.5%	12.2%	33.0%	33.0%	14.2%	35.0%	35.0%
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.8	2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	11.9	42.8		14.7	45.6	45.6	34.7	26.1	26.1	39.6	28.6	28.6
Actuated g/C Ratio	0.10	0.36		0.12	0.38	0.38	0.29	0.22	0.22	0.33	0.24	0.24
v/c Ratio	0.67	0.64		0.73	0.73	0.33	0.55	0.80	0.45	0.85	0.78	0.63
Control Delay	76.3	28.0		61.8	37.3	4.9	35.2	59.5	7.4	58.0	55.3	14.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.3	28.0		61.8	37.3	4.9	35.2	59.5	7.4	58.0	55.3	14.3
LOS	E	C		E	D	A	D	E	A	E	E	B
Approach Delay		38.7			36.9			36.9			39.8	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	28.3	81.7		34.2	102.6	0.0	21.1	69.0	0.0	38.4	72.4	15.3
Queue Length 95th (m)	#44.2	85.2		#52.7	133.6	16.9	32.6	94.6	18.3	#63.4	98.4	43.4
Internal Link Dist (m)		228.9			410.4			90.3			231.0	
Turn Bay Length (m)	97.0			133.0		247.0	47.0		65.0	89.0		
Base Capacity (vph)	331	1193		414	1287	724	240	490	583	265	526	646
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.64		0.71	0.73	0.33	0.55	0.63	0.39	0.85	0.63	0.56

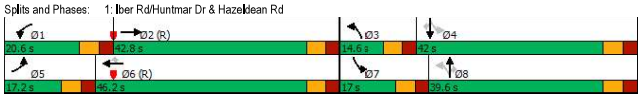
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 38.0 Intersection LOS: D

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2024 FBG PM

Intersection Capacity Utilization 85.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2024 FBG PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	836	49	119	1288	30	69	5	61	42	5	10
Future Volume (vph)	7	836	49	119	1288	30	69	5	61	42	5	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	885	0	119	1288	30	0	135	0	42	15	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	63.0	63.0		20.0	83.0	83.0	37.0	37.0		37.0	37.0	
Total Split (%)	52.5%	52.5%		16.7%	69.2%	69.2%	30.8%	30.8%		30.8%	30.8%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	79.2	79.2		93.1	93.0	93.0		13.9		13.9	13.9	
Actuated g/C Ratio	0.66	0.66		0.78	0.78	0.78		0.12		0.12	0.12	
v/c Ratio	0.03	0.40		0.27	0.49	0.03		0.64		0.33	0.07	
Control Delay	9.4	10.6		3.7	3.5	0.5		51.6		54.2	27.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	9.4	10.6		3.7	3.5	0.5		51.6		54.2	27.5	
LOS	A	B		A	A	A		D		D	C	
Approach Delay		10.6			3.5			51.6			47.2	
Approach LOS		B			A			D			D	
Queue Length 50th (m)	0.5	44.8		4.2	27.0	0.1		23.3		9.3	1.1	
Queue Length 95th (m)	2.7	70.6		m8.2	42.2	m0.3		41.8		19.5	7.1	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	253	2222		511	2626	1182		416		276	445	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.03	0.40		0.23	0.49	0.03		0.32		0.15	0.03	

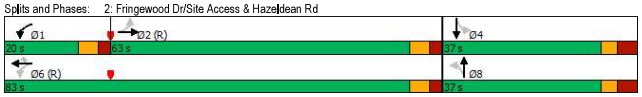
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 35 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 9.6 Intersection LOS: A

Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2024 FBG PM

Intersection Capacity Utilization 72.8% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	874	0	0	1351	17	0	0	0	18	0	21
Future Vol, veh/h	14	874	0	0	1351	17	0	0	0	18	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	874	0	0	1351	17	0	0	0	18	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1368	0	0	874	0	0	1578	2270	437	1825	2262	684
Stage 1	-	-	-	-	-	-	902	902	-	1360	1360	-
Stage 2	-	-	-	-	-	-	676	1368	-	465	902	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	498	-	-	768	-	-	74	40	567	48	40	391
Stage 1	-	-	-	-	-	-	299	355	-	156	215	-
Stage 2	-	-	-	-	-	-	409	213	-	547	355	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	498	-	-	768	-	-	69	39	567	47	39	391
Mov Cap-2 Maneuver	-	-	-	-	-	-	69	39	-	47	39	-
Stage 1	-	-	-	-	-	-	291	345	-	152	215	-
Stage 2	-	-	-	-	-	-	387	213	-	532	345	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	73.8
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	498	-	-	768	-	-	89
HCM Lane V/C Ratio	-	0.028	-	-	-	-	-	0.438
HCM Control Delay (s)	0	12.4	-	-	0	-	-	73.8
HCM Lane LOS	A	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	1.8

F.3 2024 TOTAL FUTURE CONDITIONS

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2024 TF AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	638	99	166	467	174	52	224	222	130	252	137
Future Volume (vph)	195	638	99	166	467	174	52	224	222	130	252	137
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	737	0	166	467	174	52	224	222	130	252	137
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5 9	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5 9	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)		5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)		36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)		46.0		17.2	38.0	38.0	11.4	39.6	39.6	12.2	40.4	40.4
Total Split (%)		40.0%		15.0%	33.0%	33.0%	9.9%	34.4%	34.4%	10.6%	35.1%	35.1%
Yellow Time (s)		3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)		2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag		Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode		C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	13.2	51.5		11.1	42.9	42.9	26.2	20.8	20.8	28.9	23.9	23.9
Actuated g/C Ratio	0.11	0.45		0.10	0.37	0.37	0.23	0.18	0.18	0.25	0.21	0.21
v/c Ratio	0.52	0.49		0.52	0.37	0.25	0.24	0.70	0.49	0.57	0.68	0.28
Control Delay	43.2	20.1		55.1	28.8	2.8	30.7	54.9	8.6	41.8	51.9	1.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	20.1		55.1	28.8	2.8	30.7	54.9	8.6	41.8	51.9	1.9
LOS	D	C		E	C	A	C	D	A	D	D	A
Approach Delay		24.9			28.6			31.7			36.2	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	16.7	62.5		18.6	39.7	0.0	8.6	47.7	0.0	22.5	54.1	0.0
Queue Length 95th (m)	22.5	93.5		28.7	61.6	8.5	16.2	67.6	18.3	34.7	75.2	1.5
Internal Link Dist (m)		228.9			410.4			90.3			231.0	
Turn Bay Length (m)	97.0			133.0		247.0	47.0		65.0	89.0		
Base Capacity (vph)	383	1496		337	1263	700	214	511	593	230	524	595
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.49		0.49	0.37	0.25	0.24	0.44	0.37	0.57	0.48	0.23

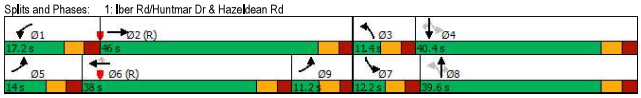
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 62 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 29.3 Intersection LOS: C

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2024 TF AM

Intersection Capacity Utilization 68.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2024 TF AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	807	29	45	555	58	37	5	68	48	5	9
Future Volume (vph)	10	807	29	45	555	58	37	5	68	48	5	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	836	0	45	555	58	0	110	0	48	14	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	62.0	62.0		15.0	77.0	77.0	38.0	38.0		38.0	38.0	
Total Split (%)	53.9%	53.9%		13.0%	67.0%	67.0%	33.0%	33.0%		33.0%	33.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	80.8	80.8		90.8	90.7	90.7		11.2		11.2	11.2	
Actuated g/C Ratio	0.70	0.70		0.79	0.79	0.79		0.10		0.10	0.10	
v/c Ratio	0.02	0.35		0.09	0.21	0.05		0.50		0.44	0.08	
Control Delay	6.8	7.9		1.4	1.2	0.3		29.5		61.6	30.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	6.8	7.9		1.4	1.2	0.3		29.5		61.6	30.1	
LOS	A	A		A	A	A		C		E	C	
Approach Delay		7.8			1.2			29.5			54.5	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	0.6	36.0		0.8	6.6	0.0		9.0		10.5	1.1	
Queue Length 95th (m)	2.7	53.6		2.2	8.5	0.0		25.7		22.2	6.9	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	556	2370		502	2674	1208		487		303	481	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.02	0.35		0.09	0.21	0.05		0.23		0.16	0.03	

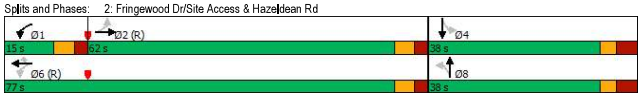
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 52 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 8.4 Intersection LOS: A

Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2024 TF AM

Intersection Capacity Utilization 58.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	842	0	0	585	16	0	0	0	3	0	10
Future Vol, veh/h	12	842	0	0	585	16	0	0	0	3	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	842	0	0	585	16	0	0	0	3	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	601	0	0	842	0	0	1159	1467	421	1038	1459	301
Stage 1	-	-	-	-	-	-	866	866	-	593	593	-
Stage 2	-	-	-	-	-	-	293	601	-	445	866	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	972	-	-	789	-	-	151	127	581	185	128	695
Stage 1	-	-	-	-	-	-	314	369	-	459	492	-
Stage 2	-	-	-	-	-	-	691	488	-	562	369	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	972	-	-	789	-	-	147	125	581	183	126	695
Mov Cap-2 Maneuver	-	-	-	-	-	-	147	125	-	183	126	-
Stage 1	-	-	-	-	-	-	310	365	-	453	492	-
Stage 2	-	-	-	-	-	-	681	488	-	555	365	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	13.8
HCM LOS			A	B

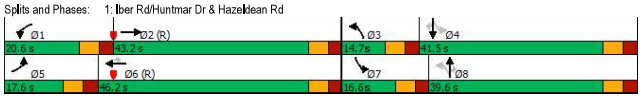
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	972	-	-	789	-	-	422
HCM Lane V/C Ratio	-	0.012	-	-	-	-	-	0.031
HCM Control Delay (s)	0	8.8	-	-	0	-	-	13.8
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	226	680	112	293	968	239	135	310	230	226	330	373
Future Volume (vph)	226	680	112	293	968	239	135	310	230	226	330	373
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	792	0	293	968	239	135	310	230	226	330	373
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.5	36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)	17.6	43.2		20.6	46.2	46.2	14.7	39.6	39.6	16.6	41.5	41.5
Total Split (%)	14.7%	36.0%		17.2%	38.5%	38.5%	12.3%	33.0%	33.0%	13.8%	34.6%	34.6%
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.8	2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	12.1	43.1		14.6	45.6	45.6	35.0	26.3	26.3	38.8	28.2	28.2
Actuated g/C Ratio	0.10	0.36		0.12	0.38	0.38	0.29	0.22	0.22	0.32	0.24	0.24
v/c Ratio	0.68	0.66		0.73	0.75	0.33	0.57	0.79	0.45	0.87	0.79	0.65
Control Delay	75.5	29.1		62.1	38.1	4.9	36.1	58.8	7.3	60.8	56.3	15.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.5	29.1		62.1	38.1	4.9	36.1	58.8	7.3	60.8	56.3	15.6
LOS	E	C		E	D	A	D	E	A	E	E	B
Approach Delay		39.4			37.5			36.7			41.1	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	29.3	86.4		34.2	106.7	0.0	21.6	68.8	0.0	38.5	72.6	17.4
Queue Length 95th (m)	#45.3	104.8		#52.7	138.3	16.9	33.6	94.6	18.3	#53.0	99.0	46.6
Internal Link Dist (m)		228.9			410.4			90.3			231.0	
Turn Bay Length (m)	97.0			133.0		247.0	47.0		65.0	89.0		
Base Capacity (vph)	338	1201		413	1287	724	238	490	583	260	518	641
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.66		0.71	0.75	0.33	0.57	0.63	0.39	0.87	0.64	0.58

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 38.6 Intersection LOS: D

Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd

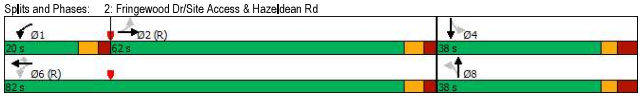


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	833	49	119	1282	74	69	5	61	78	5	22
Future Volume (vph)	18	833	49	119	1282	74	69	5	61	78	5	22
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	882	0	119	1282	74	0	135	0	78	27	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	62.0	62.0		20.0	82.0	82.0	38.0	38.0		38.0	38.0	
Total Split (%)	51.7%	51.7%		16.7%	68.3%	68.3%	31.7%	31.7%		31.7%	31.7%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	79.2	79.2		93.0	92.9	92.9		14.0		14.0	14.0	
Actuated g/C Ratio	0.66	0.66		0.78	0.77	0.77		0.12		0.12	0.12	
v/c Ratio	0.07	0.40		0.27	0.49	0.06		0.64		0.61	0.12	
Control Delay	9.9	10.6		3.9	3.9	0.5		51.6		69.3	21.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	9.9	10.6		3.9	3.9	0.5		51.6		69.3	21.4	
LOS	A	B		A	A	A		D		E	C	
Approach Delay		10.6			3.7			51.6			57.0	
Approach LOS		B			A			D			E	
Queue Length 50th (m)	1.4	44.8		4.7	29.9	0.2		23.3		17.8	1.1	
Queue Length 95th (m)	5.2	70.5		m7.9	44.1	m0.8		41.8		32.4	9.2	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	253	2220		512	2624	1191		425		285	457	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.07	0.40		0.23	0.49	0.06		0.32		0.27	0.06	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 35 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 10.7 Intersection LOS: B

Intersection Capacity Utilization 72.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	882	0	0	1358	17	0	0	0	18	0	22
Future Vol, veh/h	16	882	0	0	1358	17	0	0	0	18	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	882	0	0	1358	17	0	0	0	18	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1375	0	0	882	0	0	1593	2289	441	1840	2281	688
Stage 1	-	-	-	-	-	-	914	914	-	1367	1367	-
Stage 2	-	-	-	-	-	-	679	1375	-	473	914	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	495	-	-	762	-	-	72	39	564	47	39	389
Stage 1	-	-	-	-	-	-	294	350	-	155	213	-
Stage 2	-	-	-	-	-	-	408	211	-	541	350	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	495	-	-	762	-	-	66	38	564	46	38	389
Mov Cap-2 Maneuver	-	-	-	-	-	-	66	38	-	46	38	-
Stage 1	-	-	-	-	-	-	285	339	-	150	213	-
Stage 2	-	-	-	-	-	-	385	211	-	524	339	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	75
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	495	-	-	762	-	-	89
HCM Lane V/C Ratio	-	0.032	-	-	-	-	-	0.449
HCM Control Delay (s)	0	12.5	-	-	0	-	-	75
HCM Lane LOS	A	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	1.9

F.4 2029 ULTIMATE CONDITIONS

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2029 Ultimate AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	244	690	108	178	504	180	57	243	241	138	269	148
Future Volume (vph)	244	690	108	178	504	180	57	243	241	138	269	148
Satd. Flow (prot)	3288	3322	0	3288	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0,950			0,950			0,399			0,381		
Satd. Flow (perm)	3288	3322	0	3288	3390	1517	712	1784	1517	680	1784	1517
Satd. Flow (RTOR)		16				215			241			212
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	244	798	0	178	504	180	57	243	241	138	269	148
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5 9	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5 9	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)		5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)		36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)		45.5		17.9	38.0	38.0	11.4	39.6	39.6	12.0	40.2	40.2
Total Split (%)		39.6%		15.6%	33.0%	33.0%	9.9%	34.4%	34.4%	10.4%	35.0%	35.0%
Yellow Time (s)		3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)		2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag		Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode		C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	13.9	50.2		11.4	41.2	41.2	27.4	22.0	22.0	29.8	24.9	24.9
Actuated g/C Ratio	0.12	0.44		0.10	0.36	0.36	0.24	0.19	0.19	0.26	0.22	0.22
v/c Ratio	0.62	0.55		0.55	0.42	0.26	0.27	0.71	0.50	0.61	0.70	0.30
Control Delay	49.0	21.7		55.5	30.7	3.2	30.4	54.5	8.1	43.7	51.6	2.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	21.7		55.5	30.7	3.2	30.4	54.5	8.1	43.7	51.6	2.5
LOS	D	C		E	C	A	C	D	A	D	D	A
Approach Delay		28.1			30.1			31.3			36.6	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	20.6	70.5		20.0	44.7	0.0	9.3	51.6	0.0	23.7	57.7	0.0
Queue Length 95th (m)	27.6	104.2		30.4	67.7	9.9	17.0	71.7	18.8	35.7	79.2	3.7
Internal Link Dist (m)		228.9			410.4			90.3			231.0	
Turn Bay Length (m)	97.0			133.0		247.0	47.0		65.0	89.0		
Base Capacity (vph)	399	1458		350	1214	681	213	511	607	226	521	593
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.55		0.51	0.42	0.26	0.27	0.48	0.40	0.61	0.52	0.25

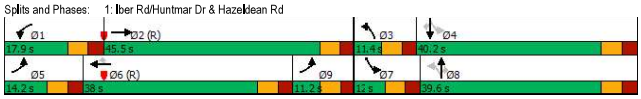
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 62 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

20 Cedarow Ct
2029 Ultimate AM

Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 30.8 — Intersection LOS: C
Intersection Capacity Utilization 72.1% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2029 Ultimate AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	880	30	46	606	58	38	5	74	48	5	9
Future Volume (vph)	10	880	30	46	606	58	38	5	74	48	5	9
Satd. Flow (prot)	1695	3373	0	1695	3390	1517	0	1801	0	1695	1755	0
Flt Permitted	0,423			0,267				0,886		0,601		
Satd. Flow (perm)	755	3373	0	476	3390	1517	0	1621	0	1072	1755	0
Satd. Flow (RTOR)		4				58		73			9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	910	0	46	606	58	0	117	0	48	14	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	63.0	63.0		15.0	78.0	78.0	37.0	37.0		37.0	37.0	
Total Split (%)	54.8%	54.8%		13.0%	67.8%	67.8%	32.2%	32.2%		32.2%	32.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	80.7	80.7		90.8	90.7	90.7		11.2		11.2	11.2	
Actuated g/C Ratio	0.70	0.70		0.79	0.79	0.79		0.10		0.10	0.10	
v/c Ratio	0.02	0.38		0.10	0.23	0.05		0.52		0.46	0.08	
Control Delay	6.8	8.2		1.6	1.5	0.3		29.4		62.9	30.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	6.8	8.2		1.6	1.5	0.3		29.4		62.9	30.0	
LOS	A	A		A	A	A		C		E	C	
Approach Delay		8.2			1.4			29.4			55.5	
Approach LOS		A			A			C			E	
Queue Length 50th (m)	0.6	40.3		1.0	7.4	0.0		9.5		10.5	1.1	
Queue Length 95th (m)	2.7	60.3		2.1	9.0	0.0		26.6		22.3	6.9	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	529	2367		470	2672	1207		478		280	465	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.02	0.38		0.10	0.23	0.05		0.24		0.17	0.03	

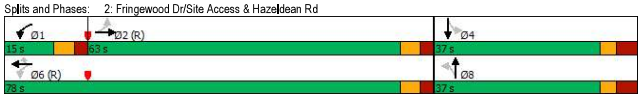
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 52 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

20 Cedarow Ct
2029 Ultimate AM

Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 8.5 — Intersection LOS: A
Intersection Capacity Utilization 60.8% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	916	0	0	635	18	0	0	0	4	0	10
Future Vol, veh/h	13	916	0	0	635	18	0	0	0	4	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	916	0	0	635	18	0	0	0	4	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	653	0	0	916	0	0	1260	1595	458	1128	1586	327
Stage 1	-	-	-	-	-	-	942	942	-	644	644	-
Stage 2	-	-	-	-	-	-	318	653	-	484	942	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	930	-	-	740	-	-	127	106	550	159	107	669
Stage 1	-	-	-	-	-	-	283	340	-	428	466	-
Stage 2	-	-	-	-	-	-	668	462	-	533	340	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	930	-	-	740	-	-	124	105	550	157	106	669
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	105	-	157	106	-
Stage 1	-	-	-	-	-	-	279	335	-	422	466	-
Stage 2	-	-	-	-	-	-	658	462	-	526	335	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	15.8
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	930	-	-	740	-	-	346
HCM Lane V/C Ratio	-	0.014	-	-	-	-	-	0.04
HCM Control Delay (s)	0	8.9	-	-	0	-	-	15.8
HCM Lane LOS	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

09/27/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	732	122	318	1049	255	147	332	248	236	356	404
Future Volume (vph)	242	732	122	318	1049	255	147	332	248	236	356	404
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	242	854	0	318	1049	255	147	332	248	236	356	404
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.5	36.3		11.6	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)	17.0	40.4		21.6	45.0	45.0	15.3	39.6	39.6	18.4	42.7	42.7
Total Split (%)	14.2%	33.7%		18.0%	37.5%	37.5%	12.8%	33.0%	33.0%	15.3%	35.6%	35.6%
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.8	2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.3		6.5	6.3	6.3	6.3	6.6	6.6	6.3	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	12.3	39.7		15.3	42.7	42.7	36.5	27.2	27.2	42.8	30.4	30.4
Actuated g/C Ratio	0.10	0.33		0.13	0.36	0.36	0.30	0.23	0.23	0.36	0.25	0.25
v/c Ratio	0.72	0.77		0.76	0.87	0.36	0.59	0.82	0.46	0.85	0.79	0.68
Control Delay	74.0	33.9		63.1	46.1	5.1	35.2	60.4	7.2	54.2	54.4	18.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.0	33.9		63.1	46.1	5.1	35.2	60.4	7.2	54.2	54.4	18.0
LOS	E	C		E	D	A	D	E	A	D	D	B
Approach Delay		42.7			43.0			37.1			39.6	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	31.3	99.1		37.1	126.4	0.0	22.8	73.9	0.0	38.8	77.5	25.2
Queue Length 95th (m)	#51.9	#130.3		#56.5	#170.3	17.8	35.0	101.7	18.9	#59.7	105.8	57.4
Internal Link Dist (m)		228.9			410.4			90.3			231.0	
Turn Bay Length (m)	97.0			133.0		247.0	47.0		65.0	89.0		
Base Capacity (vph)	335	1108		431	1206	703	249	490	596	278	536	650
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.77		0.74	0.87	0.36	0.59	0.68	0.42	0.85	0.66	0.62

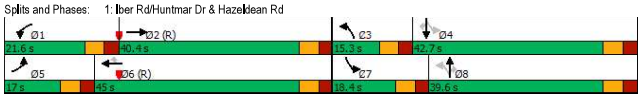
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 32 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 41.2 Intersection LOS: D

Lanes, Volumes, Timings
1: Iber Rd/Huntmar Dr & Hazeldean Rd

09/27/2019

Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Iber Rd/Huntmar Dr & Hazeldean Rd



Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

09/27/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	907	52	126	1400	74	72	5	65	78	5	22
Future Volume (vph)	18	907	52	126	1400	74	72	5	65	78	5	22
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	959	0	126	1400	74	0	142	0	78	27	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8			4		
Detector Phase	2	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	32.2	32.2		11.2	32.2	32.2	32.9	32.9		32.9	32.9	
Total Split (s)	65.0	65.0		19.0	84.0	84.0	36.0	36.0		36.0	36.0	
Total Split (%)	54.2%	54.2%		15.8%	70.0%	70.0%	30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.4	2.5	2.5	3.9	3.9		3.9	3.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.1	6.2	6.2		6.9		6.9	6.9	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	C-Max	C-Max		None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	78.5	78.5		92.5	92.4	92.4		14.5		14.5	14.5	
Actuated g/C Ratio	0.65	0.65		0.77	0.77	0.77		0.12		0.12	0.12	
v/c Ratio	0.08	0.44		0.30	0.54	0.06		0.66		0.60	0.12	
Control Delay	10.7	11.4		3.5	3.3	0.4		52.5		67.7	21.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	10.7	11.4		3.5	3.3	0.4		52.5		67.7	21.0	
LOS	B	B		A	A	A		D		E	C	
Approach Delay		11.4			3.1			52.5			55.7	
Approach LOS		B			A			D			E	
Queue Length 50th (m)	1.4	51.4		3.8	25.7	0.2		24.9		17.7	1.1	
Queue Length 95th (m)	5.4	80.6		m7.3	44.3	m0.5		43.6		32.2	9.1	
Internal Link Dist (m)		192.4			228.9			159.1			123.4	
Turn Bay Length (m)	55.0			95.0		183.0				37.5		
Base Capacity (vph)	224	2201		468	2610	1185		400		263	429	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.08	0.44		0.27	0.54	0.06		0.35		0.30	0.06	

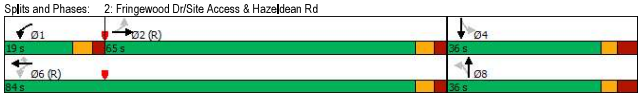
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 35 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 10.4 Intersection LOS: B

Lanes, Volumes, Timings
2: Fringewood Dr/Site Access & Hazeldean Rd

09/27/2019

Intersection Capacity Utilization 76.5% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Fringewood Dr/Site Access & Hazeldean Rd



Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	967	0	0	1475	18	0	0	0	20	0	25
Future Vol, veh/h	17	967	0	0	1475	18	0	0	0	20	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	700	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	967	0	0	1475	18	0	0	0	20	0	25

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1493	0	0	967	0	0	1739	2494	484	2002	2485	747
Stage 1	-	-	-	-	-	-	1001	1001	-	1484	1484	-
Stage 2	-	-	-	-	-	-	738	1493	-	518	1001	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	446	-	-	708	-	-	56	29	529	35	29	355
Stage 1	-	-	-	-	-	-	260	319	-	131	187	-
Stage 2	-	-	-	-	-	-	376	185	-	509	319	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	446	-	-	708	-	-	51	28	529	34	28	355
Mov Cap-2 Maneuver	-	-	-	-	-	-	51	28	-	34	28	-
Stage 1	-	-	-	-	-	-	250	307	-	126	187	-
Stage 2	-	-	-	-	-	-	350	185	-	490	307	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	0	128.7
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	446	-	-	708	-	-	68
HCM Lane V/C Ratio	-	0.038	-	-	-	-	-	0.662
HCM Control Delay (s)	0	13.4	-	-	0	-	-	128.7
HCM Lane LOS	A	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	2.9