EMERALD SUBDIVISION
6544 JACK PINE CRESCENT
GREELY, ONTARIO

TIA STRATEGY REPORT (REVISED)

June 24, 2022

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Consulting Transportation Engineers
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Prepared for:

9287043 Canada Corporation

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INTRODUCTION

The Emerald Subdivision will be situated on a parcel of land at the northwest portion of the Community of Greely. The subdivision proposes 73 single-family residential homes which will be constructed in two phases with completion expected by 2027. The subdivision will have three access points onto arterial and collector roads by way of local streets through existing subdivisions adjacent to the Emerald Subdivision.

The TIA Strategy Report will examine the operation of the subdivision's access points and connecting road segments. The report compiles the Screening (Step 1), Scoping (Step 2) and Forecasting (Step 3) Reports into a single document. The study will follow the City of Ottawa document, *Transportation Impact Assessment Guidelines (2017)*. Exhibit 1.1 in the Appendix presents the consultants Certification Form.

STEP 1 - SCREENING

A Screening Form has been prepared which is included as Exhibit 1.2 in the Appendix. The Screening Form has satisfied the trip Generation Trigger which required the study to proceed to the Scoping Document stage of the Transportation Impact Assessment (TIA). The following will address the requirements of the Scoping Document.

STEP 2 - SCOPING

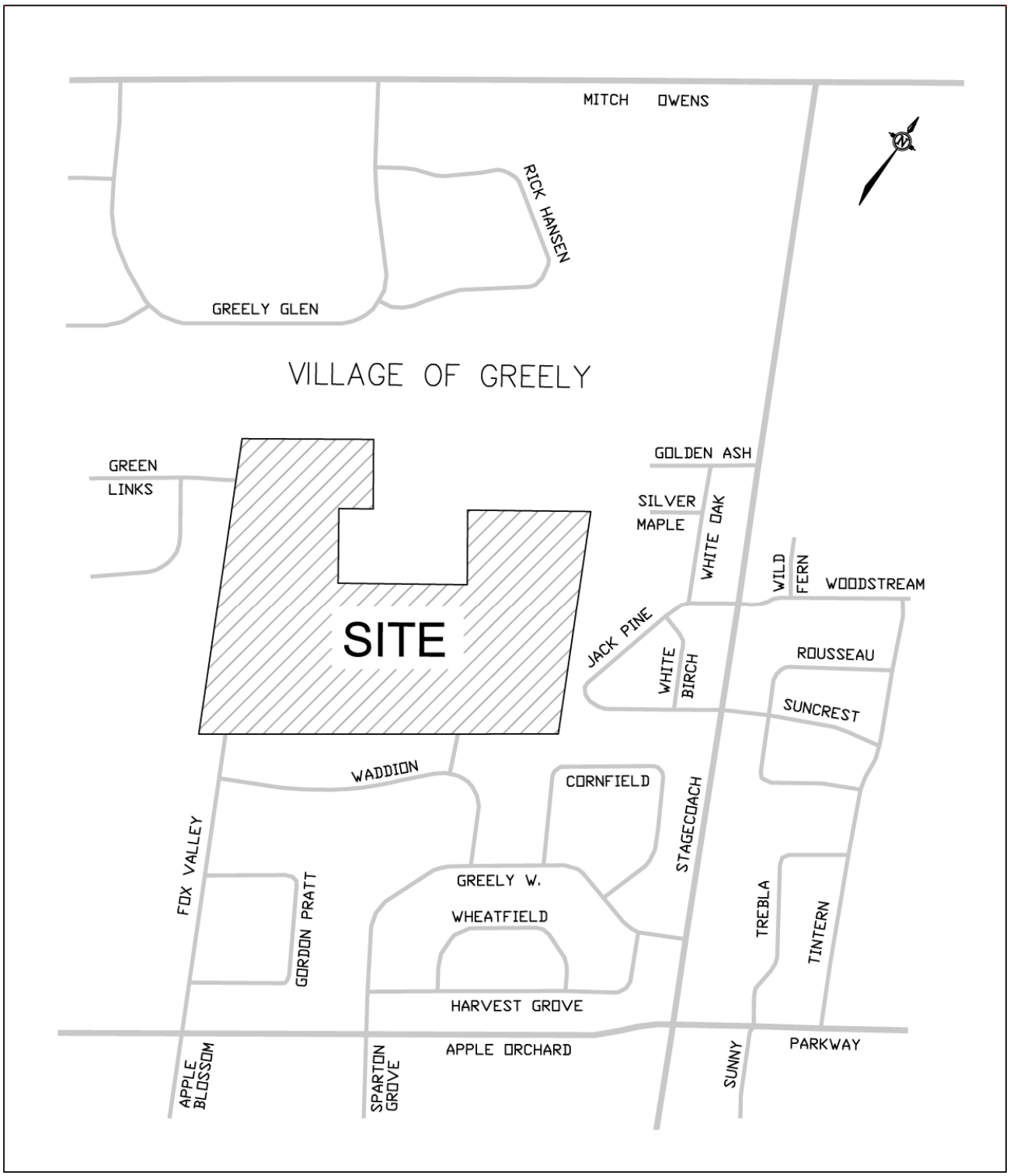
MODULE 2.1 – Existing and Planned Conditions

Element 2.1.1 – Proposed Development

The Emerald Subdivision is located on 35.0 ha of vacant land north of Apple Orchard Road and west of Stagecoach Road in the Community of Greely. The property has a "DR1" Zoning - Development Reserve Zone. The Site Plan proposes the subdivision to contain 73 single-family homes. Figure 2.1 provides location plan of the development.

The subdivision site will have three access points, all onto local streets connecting to collector and arterial roads. The first access would be along Jack Pine Crescent to Stagecoach Road, the second along Fox Valley Road to Apple Orchard Road, and the third along the new subdivision road called Green Links Way to Manotick Station Road.

FIGURE 2.1
SITE LOCATION PLAN



NOT TO SCALE

The Emerald Subdivision will be constructed in two phases, and is expected to have both phases completed and substantially occupied by the year 2027. Figure 2.2 provides a conceptual site plan of the total subdivision.

Element 2.1.2 – Existing Conditions

The site is located north of Apple Orchard Road and west of Stagecoach Road on vacant land within the residential community. The subdivision will have three accesses along local streets which will connect to the surrounding road network. The following will describe the access roads and major intersections within the study area.

JACK PINE CRESCENT

Jack Pine Crescent will provide access to Stagecoach Road for the east portion of the property. Jack Pine Crescent is a local street with a rural cross section and a pavement width of 6.5 m, gravel shoulders, with no sidewalks. The posted speed limit is 50 km./h.

FOX VALLEY ROAD

Fox Valley Road is a 7.0 m wide local road connecting the south portion of the property to Apple Orchard Road. The rural road has gravel shoulders with no pedestrian sidewalks. The road has a pedestrian pathway along the east side of the road from Apple Orchard Road to a point 75 m north of Gordon Pratt Crescent which is approximately 215 m south of the site. The speed limit is unposted.

GREEN LINKS WAY

Green Links Way is a local street constructed as part of the Emerald Links Country Estates Phase III subdivision. The street has been constructed and will provide access to the west portion of the property. Housing has not been built at the time this report is being prepared. Green Links Way is a local street with a rural cross-section and 7.0 m pavement surface with gravel shoulders. There are no sidewalks along the road.

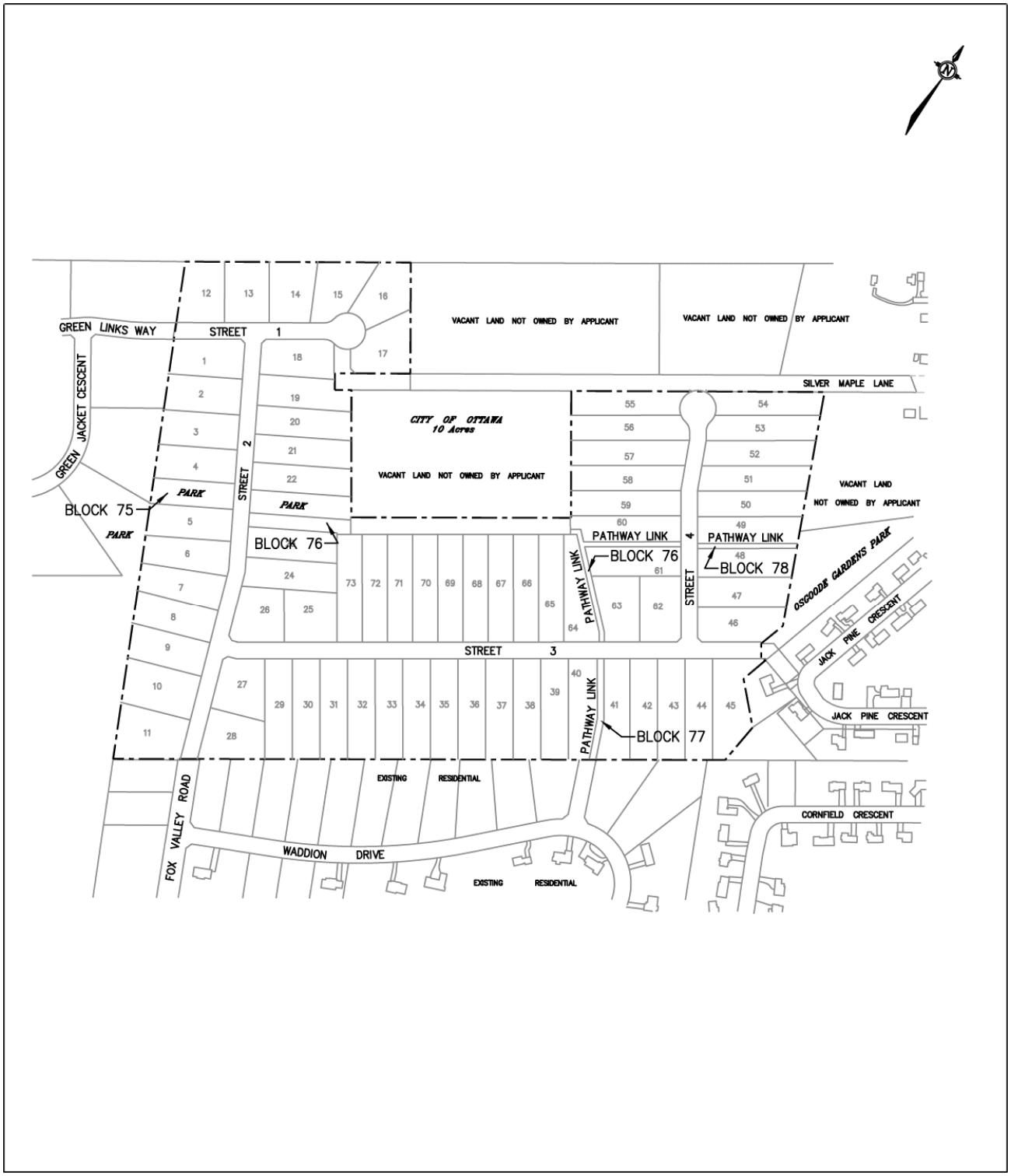
STAGECOACH ROAD

Stagecoach Road is a north-south road designated in the TMP as an arterial road. The road has a two lane rural cross-section and 1.5 m paved shoulders with gravel shoulders. The TMP identifies Stagecoach Road between Mitch Owens Road and Apple Orchard Road as a Spine Route in the Cycling Network-Primary Rural map. There are no sidewalks or dedicated cycling lanes along the road. The speed limit in the vicinity of the site is posted at 70 km./h.

APPLE ORCHARD ROAD

Apple Orchard Road is an east-west collector road. The road is a two lane rural road with gravel shoulders and a 7.0 m pavement width. There are no sidewalks along the road. Apple Orchard Road is a local cycling route with a speed limit posted at 70 km./h.

FIGURE 2.2
CONCEPTUAL SITE PLAN



NOT TO SCALE

MANOTICK STATION ROAD

Manotick Station Road is a north-south collector road with a rural cross-section. The road has a pavement width of 7.0 m with gravel shoulders and no sidewalks. The posted speed limit is 50 km./h. past Green Links Way, changing to 80 km./h. approximately 40 m south of the road. The Emerald Subdivision will link to Manotick Station Road through the new Green Links Way which was constructed in 2021.

INTERSECTION OF JACK PINE CRESCENT AND STAGECOACH ROAD

The Jack Pine/Stagecoach intersection is a two-way stop controlled intersection. Stagecoach Road forms the northbound/southbound approaches, and Jack Pine Crescent the eastbound and Suncrest Drive the westbound stop controlled approaches. Below is the existing lane configuration of the intersection:

Northbound Stagecoach Road	One shared left/through/right lane
Southbound Stagecoach Road	One shared left/through/right lane
Eastbound Jack Pine Crescent	One shared left/through/right lane (Stop Sign)
Westbound Suncrest Drive	One shared left/through/right lane (Stop Sign)

An aerial photograph of the Jack Pine/Stagecoach intersection showing the intersection geometry is provided below.

INTERSECTION OF JACK PINE CRESCENT AND STAGECOACH ROAD

INTERSECTION OF FOX VALLEY ROAD AND APPLE ORCHARD ROAD

The intersection of Fox Valley Road and Apple Orchard Road is a two-way stop controlled intersection providing access to the south portion of the subdivision. Apple Orchard Road forms the eastbound and westbound approaches, and Fox Valley Road the southbound and Apple Blossom Way the northbound approaches. There are no exclusive turn lanes at the intersection with stop signs placed at the northbound and southbound approaches. Below is the existing lane configuration of the intersection of Fox Valley Road and Apple Orchard Road:

Northbound Apple Blossom Way	One shared left/through/right lane (Stop Sign)
Southbound Fox Valley Crescent	One shared left/through/right lane (Stop Sign)
Eastbound Apple Orchard Road	One shared left/through/right lane
Westbound Apple Orchard Road	One shared left/through/right lane

The intersection lane geometry is provided below in an aerial photograph.

INTERSECTION OF FOX VALLEY ROAD AND APPLE ORCHARD ROAD

INTERSECTION OF GREEN LINKS WAY AND MANOTICK STATION ROAD

The intersection of Green Links Way and Manotick Station Road is a “T” intersection with Green Links Way forming the westbound stop controlled approach, and Manotick

Station Road the northbound and southbound approaches. Green Links Way has been constructed in 2021 as part of the Emerald Links Phase III subdivision and will provide access to the northwest portion of the Emerald Subdivision. At the time this report is being prepared, the road has been constructed along with the asphalt paved surface. No housing units have been completed. Below is the existing lane configuration to the Green Links/Manotick Station intersection:

Northbound Manotick Station Road	One shared through/right lane
Southbound Manotick Station Road	One shared left/through lane
Westbound Green Links Way	One shared left/right turn lane (Stop Sign)

An aerial photograph taken in 2019 is provided below showing the geometry of the Green Links/Manotick Station intersection.

INTERSECTION OF GREEN LINKS WAY AND MANOTICK STATION ROAD

INTERSECTION OF APPLE ORCHARD ROAD AND STAGECOACH ROAD

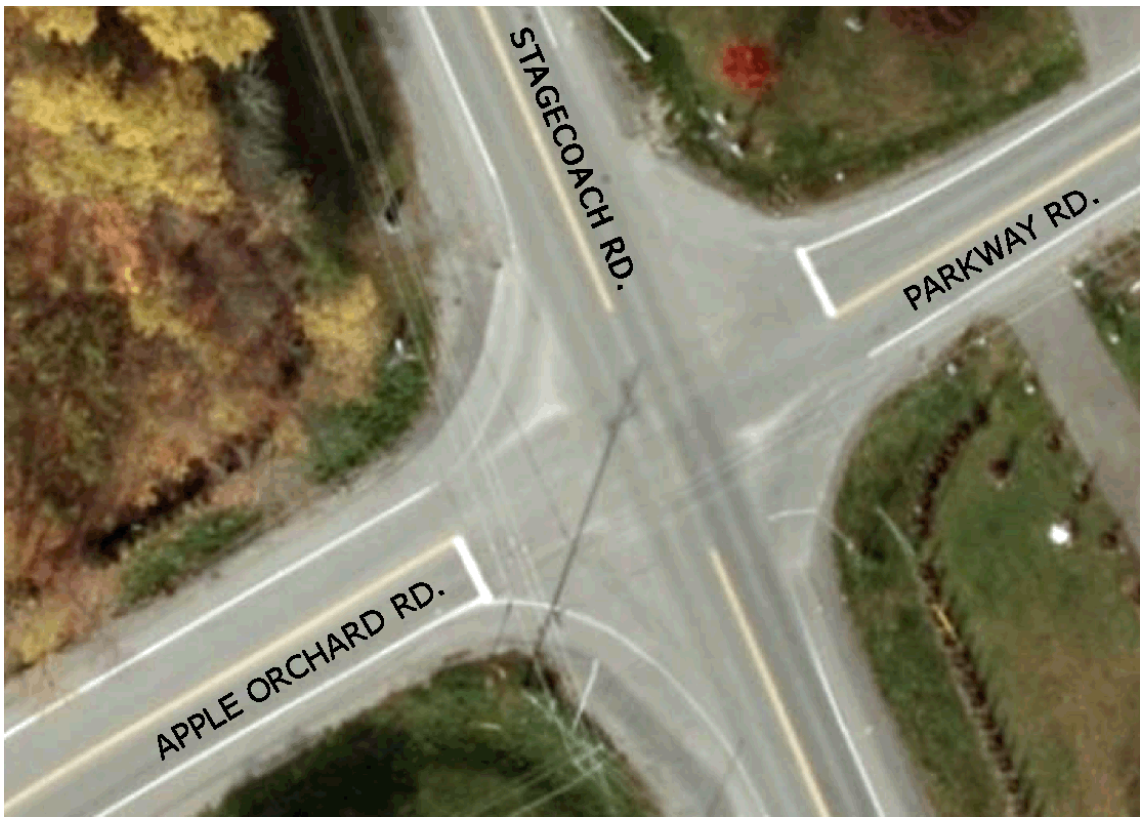
The intersection of Apple Orchard Road and Stagecoach Road has been recently changed from a two-way stop controlled intersection to an all-way stop controlled intersection. The intersection was modified in 2018 to align the eastbound Apple Orchard Road approach with the westbound Parkway Road approach. There are no

dedicated turn lanes at any of the approaches. Below is the existing lane configuration of the intersection of Apple Orchard Road and Stagecoach Road:

Northbound Stagecoach Road	One shared left/through/right lane (Stop Sign)
Southbound Stagecoach Road	One shared left/through/right lane (Stop Sign)
Eastbound Apple Orchard Road	One shared left/through/right lane (Stop Sign)
Westbound Parkway Road	One shared left/through/right lane (Stop Sign)

The lane geometry is shown in an aerial photograph of the Apple Orchard/Stagecoach intersection.

INTERSECTION OF APPLE ORCHARD ROAD AND STAGECOACH ROAD



The most recent traffic counts were obtained from the City of Ottawa for the intersections of Jack Pine/Stagecoach (2019) and Apple Orchard/Stagecoach (2018). Traffic counts have been conducted by the consultant at the Fox Valley/Apple Orchard and Green Links/Manotick Station intersections in 2021. Figure 2.3 shows the peak AM and PM hour intersection counts. The counts are provided in the Appendix.

TRANSIT

There is no regular OC Transpo transit service to the Greely Community.

COLLISION HISTORY

Collision reports were obtained from the City of Ottawa through Open Data Ottawa for the five year time period between the years January 1, 2015 and December 31, 2019. The collision reports were for the Jack Pine/Stagecoach, Fox Valley/Apple Orchard and Apple Orchard/Stagecoach intersections. The Green Links/Manotick Station intersection was not completed until 2021 and no collision data is available. Reported collisions were also obtained for the Stagecoach Road segment between Apple Orchard Road and Golden Ash Lane (Pebble Trail Way), and the Apple Orchard Road segment between Stagecoach Road and Manotick Station Road.

During the five year period, the Apple Orchard/Stagecoach intersection experienced 4 collisions, the Stagecoach Road segment 3 collisions, and the Apple Orchard Road segment 2 collisions. Exhibit 2.3 summarizes the collisions by year and type.

Element 2.1.3 – Planned Conditions

The *Transportation Master Plan 2013* (TMP) was examined to determine if there were any road or transit projects identified within the road network of the surrounding area.

The TMP did not identify any road modifications projects in the Affordable Network Plan for the surrounding area. The Apple Orchard/Stagecoach intersection was modified in 2018 to align Apple Orchard Road with Parkway Road. Traffic control signals may be installed at a future date when warranted.

The Greely Community does not have OC Transpo bus service. There are no transit projects identified in the TMP for the Greely area.

The following is the only significant development proposed or under construction within one kilometre of the site:

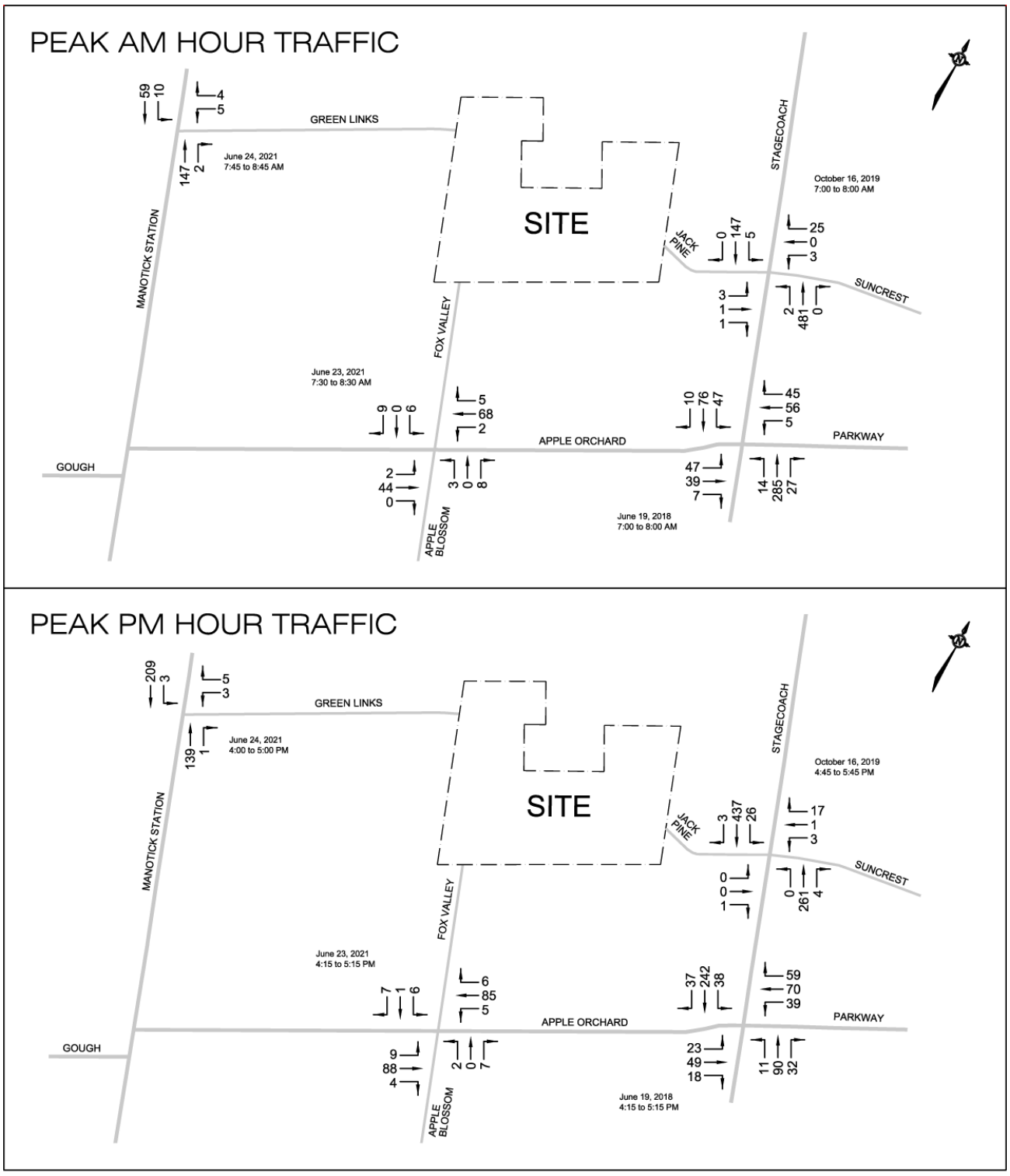
- The Emerald Links Country Estates Phase III subdivision is proposed adjacent to the west limit of the site. The subdivision proposes 43 single-family homes with one access onto Manotick Station Road, and a second access along Green Links Way which connects to Street 1 of the Emerald Subdivision. The subdivision is currently under construction and is expected to be completed by the 2027 build out date of the Emerald Subdivision.

MODULE 2.2 – Study Area and Time Periods

Element 2.2.1 – Study Area

The study area for the Emerald Subdivision will be confined to the site access points at the Jack Pine/Stagecoach, Fox Valley/Apple Orchard and Green Links/Manotick Station intersections. The Apple Orchard/Stagecoach intersection will also be included in the analysis. The intersections represent the subdivision access points and major intersections within one kilometre of the site.

FIGURE 2.3
PEAK AM AND PM HOUR TRAFFIC COUNTS



The study will examine the intersection geometry and roadway segments in accordance with the *Transportation Impact Assessment Guidelines (2017).* Traffic calming measures within the internal subdivision streets will be examined in accordance with the City of Ottawa *Traffic Calming Design Guidelines, April 2019*.

Element 2.2.2 – Time Periods

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

Element 2.2.3 – Horizon Years

The TIA will address the impact of the site generated trips from the proposed residential subdivision. The horizon year of the study will be the total completion of the development at the year 2027. The analysis will further examine the impact at the year 2032 which is five years beyond completion.

MODULE 2.3 – Exemptions Review

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

MODULE	ELEMENT	EXEMPTION CONSIDERATIONS
Design Review Component		
4.1 Development Design	4.1.2 Circulation and Access	**Not Required** – Only required for site plans
	4.1.3 New Street Networks	**Required** - Required for subdivisions
4.2 Parking	4.2.1 Parking Supply	**Not Required** – Only required for site plans
	4.2.2 Spillover Parking	**Not Required** - Only required for site plans
Network Impact Component		
4.5 Transportation Demand Management	All Elements	**Required** – TDM measures will be examined
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	**Required** – The site will have access onto arterial or collector roads through local streets from the subdivision
4.8 Network Concept		**Not Required** - The subdivision would not generate more than 200 person-trips per peak hour in excess of the volume permitted by established zoning

STEP 3 - FORECASTING

MODULE 3.1 - Development-generated Travel Demand

Element 3.1.1 – Trip Generation and Mode Shares

The Emerald Subdivision will consist of 73 single-family homes on a 35.0 ha parcel of land. The site will have access to Stagecoach Road, Apple Orchard Road and Manotick Station Road from three internal local streets.

The number of expected site generated trips utilized the trip statistical data documented in the *TRANS Trip Generation Manual, Summary Report October 2020*. The analysis used the Person-Trip Generation Rates from Table 3 of the TRANS document for ITE Land Use Code 210, "Single-detached". Peak period person-trips would occur between 7:00 AM and 9:30 AM, and between 3:30 PM and 6:00 PM. The person-trip rates for the AM and PM peak period are shown below in Table 3.1.

TABLE 3.1
PEAK PERIOD PERSON-TRIP GENERATION RATES AND TRIPS

Single-Family Housing	Peak AM Period	Peak PM Period
Trip Rate	2.05 T/Dwelling Units	2.48 T/Dwelling Units
Person-Trips (73 Units)	150 Person-Trips	181 Person-Trips

The Emerald Subdivision is located in the Rural Southeast sector of the region. The mode share of peak period trips was determined from Table 6 of the TRANS document for Single-Detached Housing located in Other Rural Districts sector. Since there is no transit service in the Greely area, the transit share shown in Table 6 was evenly distributed between the Auto Driver and Auto Passenger travel modes. Table 3.2 presents the peak period person-trips from the subdivision for various modes of travel.

The Mode Share of Table 3.2 presenting the peak period person-trips was adjusted to peak hour person-trips using the adjustment factors presented in Table 4 of the TRANS document. Table 3.3 shows the peak AM and PM hour person-trips.

TABLE 3.2
MODE SHARE SUMMARY (Peak Period Person-Trips)

FUTURE MODE SHARE TARGETS FOR SINGLE-DETACHED HOUSING				
Travel Mode	**AM % Peak Period**	**AM Per. Trips Peak Period**	**PM % Peak Period**	**PM Per. Trips Peak Period**
Auto Driver	72%	108	74%	134
Auto Passenger	26%	39	24%	43
Transit	0%	0	0%	0
Cycling	2%	3	2%	4
Walking	0%	0	0%	0
Total	100%	150 per. trips	100%	181 per. trips

TABLE 3.3
MODE SHARE SUMMARY (Peak AM and PM Hour Person-Trips)

PEAK AM AND PM HOUR PERSON-TRIPS		
Travel Mode	**Peak AM Hour**	**Peak PM Hour**
Auto Driver	52	59
Auto Passenger	20	19
Transit	0	0
Cycling	2	2
Walking	0	0

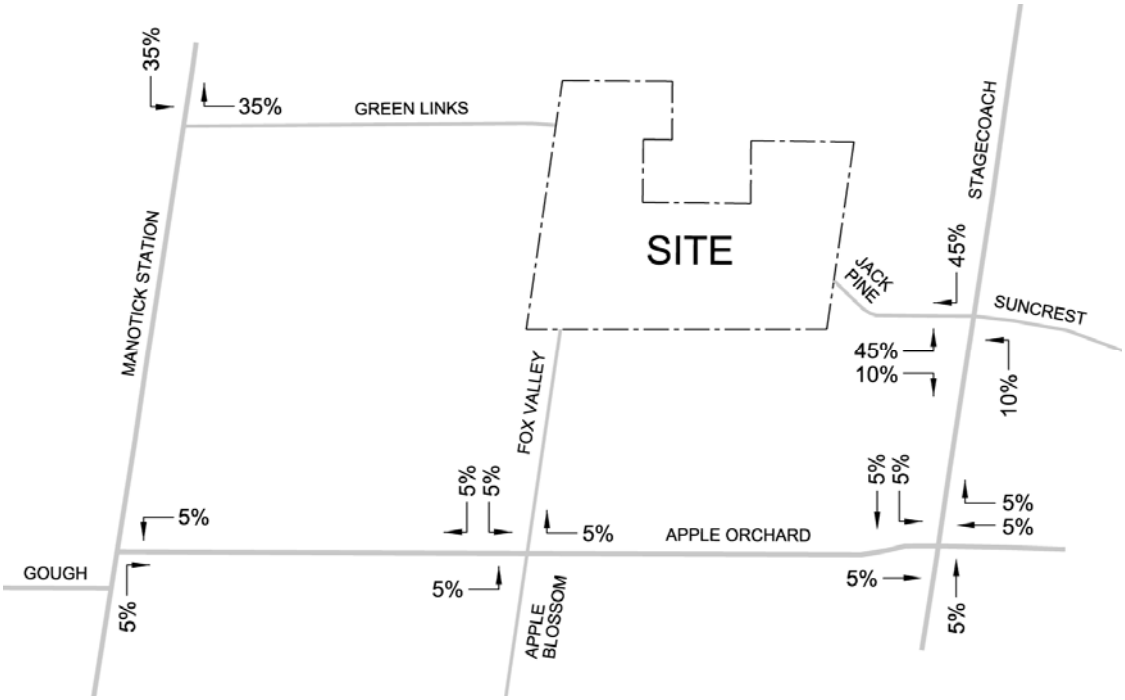
The TIA Guidelines allow for three Trip Reduction Factors. The three trip reductions would consist of trips from existing development on site, pass-by trips, and shared trips within the site between two or more uses. No trip reduction factors were applied for the following reasons:

1. The site is vacant with no existing development on site which would generate new trips.
2. The residential use would generate all primary trips with no pass-by trips.
3. The residential single-family home land use would be a single use with no shared trips between other uses on site.

Element 3.1.2 – Trip Distribution

The distribution of site generated vehicle-trips for the proposed Emerald Subdivision was determined from the traffic patterns from the peak hour traffic counts at surrounding intersections which would comprise mainly of trips to/from work. The trip pattern was applied to the access points to the subdivision assuming the shortest and most convenient route. The trip distribution for the residential trips during the weekday peak AM and PM hour is shown in the figure below.

SUBDIVISION TRIP DISTRIBUTION



Element 3.1.3 – Trip Assignment

The distribution of site generated vehicle-trips was determined by applying the directional distribution shown in Table 9 of the TRANS document for a single-detached housing type, to the Auto Driver trips shown in Table 3.3. Table 3.4 presents the distribution of vehicle-trips entering and exiting the subdivision.

TABLE 3.4
PEAK HOUR DISTRIBUTION OF VEHICLE-TRIPS

PEAK HOUR TRIPS / LAND USE	WEEKDAY PEAK AM HR.			WEEKDAY PEAK PM HR.		
	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
73 Single-Family Homes	52	16 (30%)	36 (70%)	59	37 (62%)	22 (38%)

The trip distribution, as discussed in Element 3.1.2, was applied to the peak AM and PM peak hour vehicle-trips shown in Table 3.4. Figure 3.1 presents the peak AM and PM hour residential trips to/from the site.

MODULE 3.2 - Background Network Travel Demands

Element 3.2.1 – Transportation Network Plans

The City of Ottawa *Transportation Master Plan (TMP) 2013* was reviewed to identify transit and roadway projects in the vicinity of the development. The east-west approaches (Apple Orchard and Parkway) of the Apple Orchard/Stagecoach intersection were aligned during an intersection modification in 2018. The intersection is an all-way stop controlled intersection with the possibility of traffic signals at a future date when warranted. There are no transportation projects identified in the TMP.

Element 3.2.2 – Background Growth

Peak hour traffic counts were taken by the consultant at the Fox Valley/Apple Orchard and Green Links/Manotick Station intersections in July 2021. To convert the 2021 counts to the expected pre-COVID-19 traffic volumes, a conversion factor was applied to the counts. Traffic counts were obtained from the United Counties of Prescott and Russell which were taken along Russell Road 1.5 km east of the Drouin/Russell intersection which would be influenced by Ottawa federal government employees working remotely. The July 2018 peak hour counts were compared to the counts taken September 2020 at the east approach to the Drouin/Russell intersection. The counts showed that the 2020 counts were 11 percent lower during the peak AM hour and 15 percent lower during the peak PM hour. The peak hour counts are shown below:

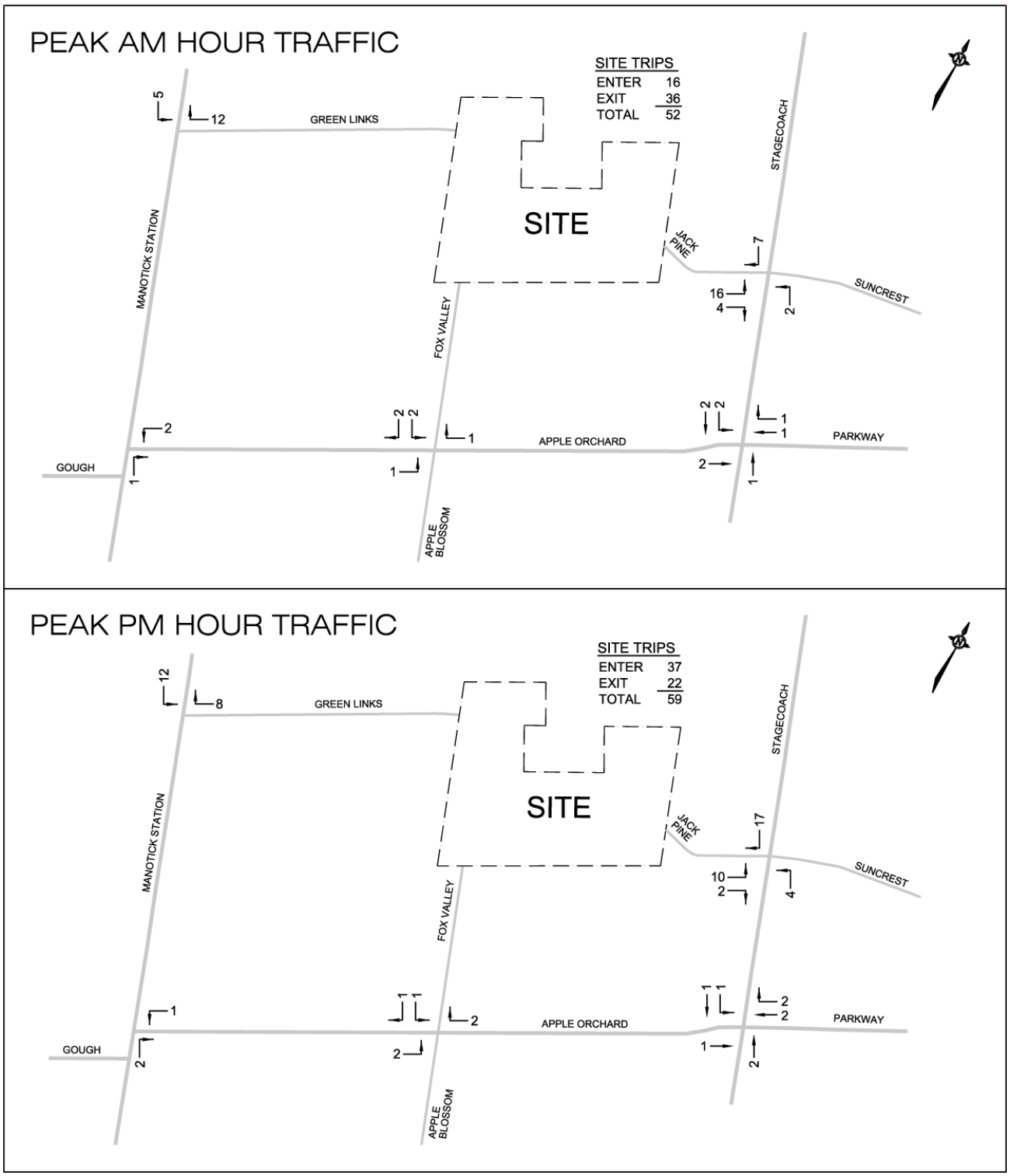
Count Date	**AM**	**PM**
July 2018	491	524
September 2020	441	457
	-11%	**-15%**

The study has therefore assumed a 20 percent COVID-19 adjustment factor which was applied to all approaches of the Fox Valley/Apple Orchard and Green Links/Manotick Station intersections which converted the counts to pre- COVID-19 traffic volumes.

The growth in background traffic at the intersections within the study area was determined by the following two methods:

- The examination of historical traffic counts obtained from the City of Ottawa at the Apple Orchard/Stagecoach intersection between the year of 2011 and 2018. The counts determined that the volume of background traffic decreased at an annual average compounded rate of between -2 and -3 percent.

FIGURE 3.1
PEAK AM AND PM HOUR SITE GENERATED TRIPS



NOT TO SCALE

- The trip trend of trips to/from the Rural Southeast area for auto driver trips was examined in the *National Capital Region Travel Trends* document prepared by the IBI Group. The document showed that the trip trend from the Rural Southeast area has increased at an annual average compounded rate of 0.88 percent for the peak AM hour between the years of 2005 and 2011.

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

Growth Factor at the Jack Pine/Stagecoach Intersection

2019 → 2027 = 1.083 Completion
2019 → 2032 = 1.138 Completion + 5 Years

Growth Factor at the Apple Orchard/Stagecoach Intersection

2018 → 2027 = 1.094 Completion
2018 → 2032 = 1.149 Completion + 5 Years

Growth Factor at Fox Valley/Apple Orchard and Green Links/Manotick Station Intersections

2021 → 2027 = 1.062 Completion
2021 → 2032 = 1.116 Completion + 5 Years

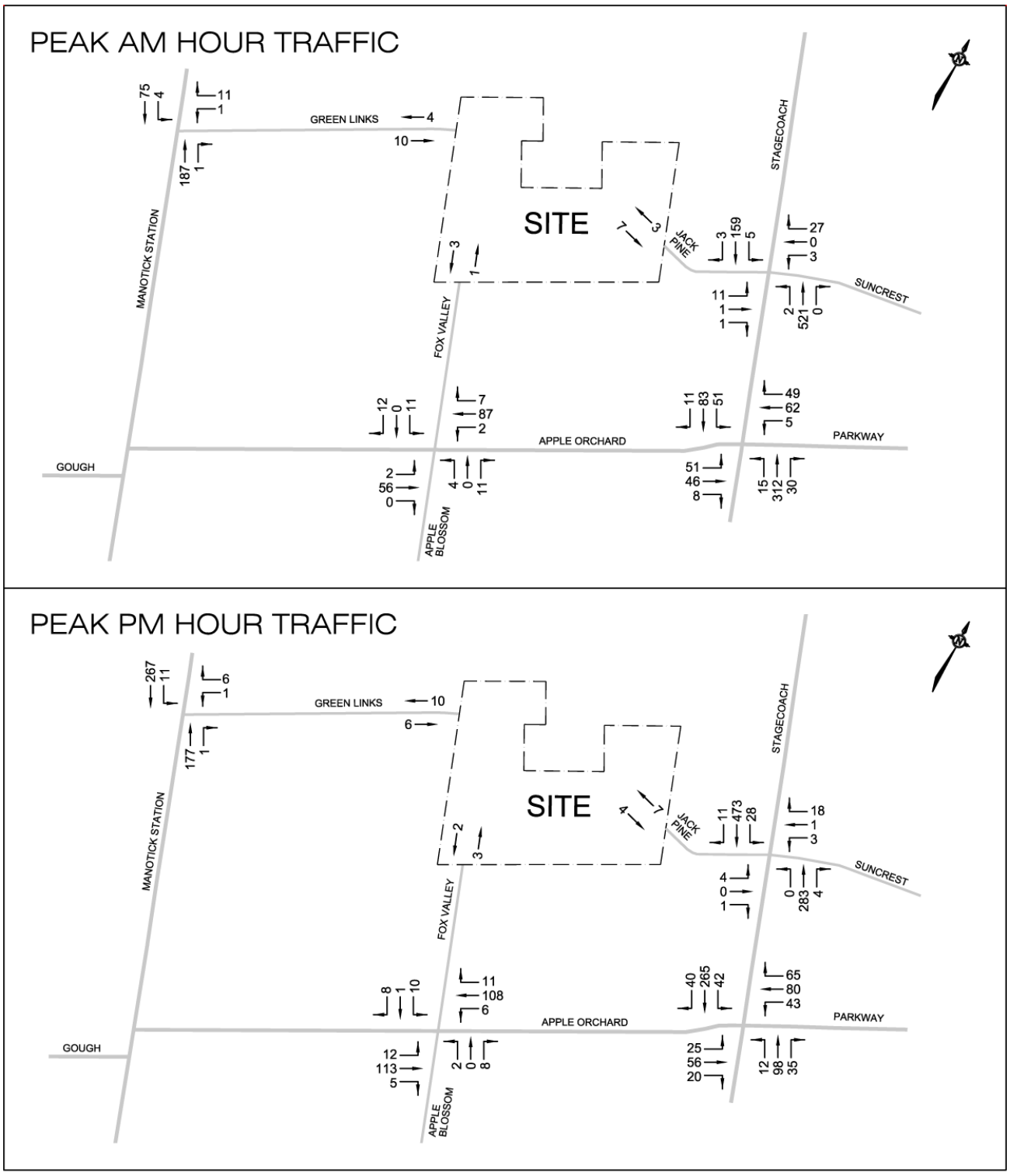
Element 3.2.3 – Other Developments

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

- The Emerald Links Country Estates Phase III subdivision is located adjacent to the west limit of the subdivision. The Emerald Links Country Estates will contain 43 single-family homes which are currently under construction. The development will have one access point onto Manotick Station Road, with access through the proposed Emerald Subdivision to Fox Valley Road and to Stagecoach Road by way of Jack Pine Crescent. Due to the size of the subdivision, no TIA study was required but trips were determined using the TRANS Trip Generation Manual for use in this study.

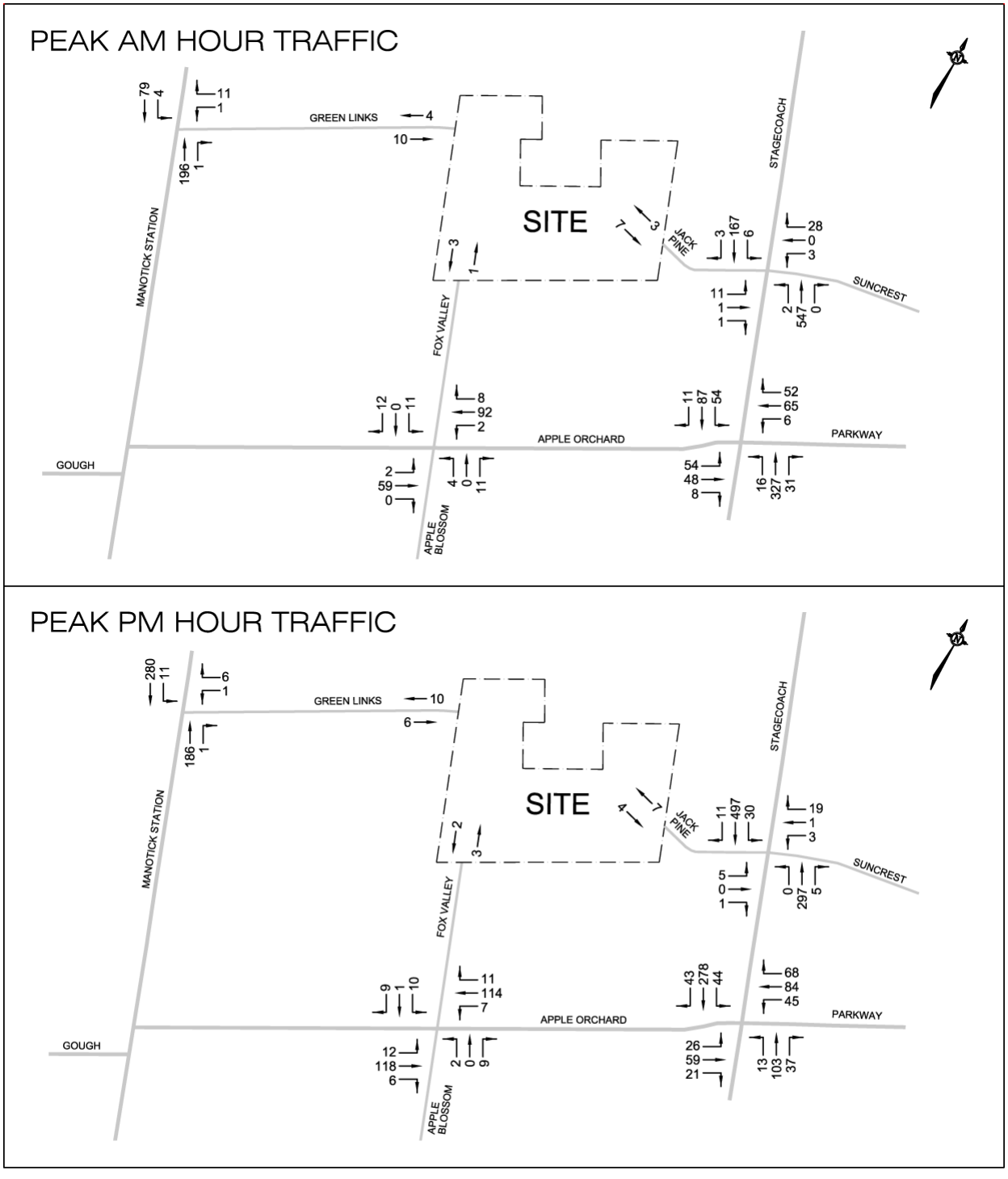
The COVID-19 adjustment, the annual average growth in background traffic, and the site generated trips from the Emerald Links Country Estates subdivision were applied to all approaches of the intersections examined in the study area. Figure 3.2 presents the 2027 peak AM and PM peak hour background vehicle traffic (does not include trips from the proposed Emerald Subdivision). Figure 3.3 shows the expected 2032 peak hour background traffic which represents five years beyond completion of the development.

FIGURE 3.2
2027 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

FIGURE 3.3
2032 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

MODULE 3.3 - Demand Rationalization

The Community of Greely is in a low density rural area. All roadways in the area handle a low volume of traffic and contain sufficient capacity for future development. The transportation network in the study area comprises of two lane rural roads. There are no exclusive turn lanes at any of the intersections, and all intersections are controlled by stop signs.

The trips generated by the site are expected to be low resulting in a minor impact on the surrounding road network. There would be no requirement to reduce travel demand due to insufficient infrastructure capacity. Any reduction in peak hour travel demand could be accomplished by providing OC Transpo transit service to Greely.

The total vehicular traffic is the sum of the peak hour site generated trips and the peak hour background traffic. The site generated trips would be the addition of the Emerald Subdivision trips from Figure 3.1, and the background traffic (Figure 3.2 for the year 2027 and Figure 3.3 for the year 2032). Figure 3.4 presents the total 2027 peak hour vehicular traffic and Figure 3.5 the total 2032 peak hour vehicular traffic.

STEP 4 – ANALYSIS

MODULE 4.1 – Development Design

Element 4.1.1 – Design for Sustainable Modes

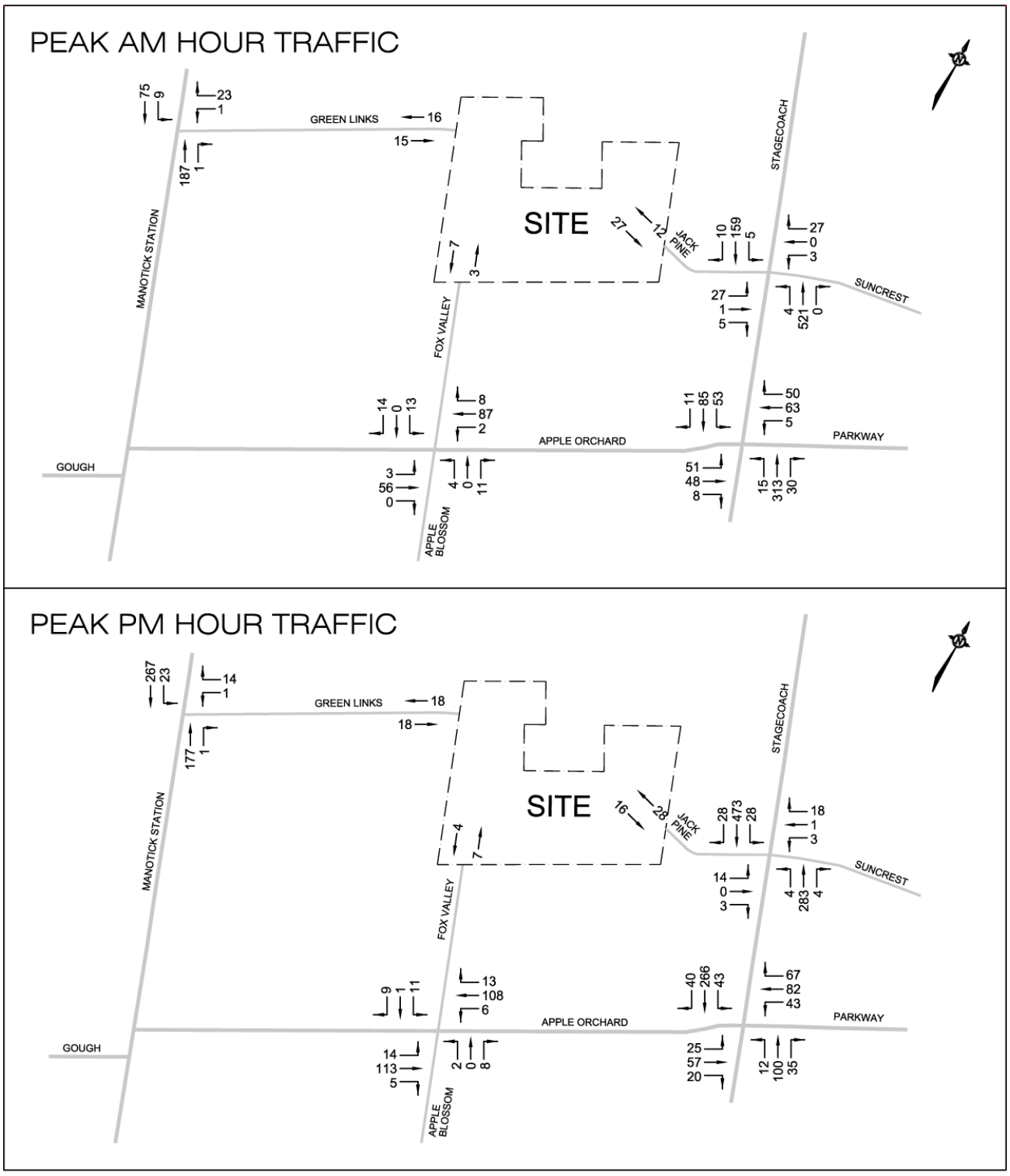
The Emerald Subdivision is located in a rural area where there is no regular OC Transpo transit service.

There are no sidewalks in the surrounding subdivisions. There is a pedestrian pathway along the east side of Fox Valley Road from Apple Orchard Road to a point 75 m north of Gordon Pratt Crescent which is approximately 215 m south of the site. There are no plans to extend the pathway.

There are three future pedestrian pathway connections from a vacant parcel of land bordering the north limit of the site through the proposed subdivision. The first pathway travels east/west from Block 76 and crosses Street 4 to Block 78 at the east border of the site. The second pathway travels north/south from Block 76 and crosses Street 3 to Block 77 at the south border of the site. The third travels east/west from Block 76 crossing Street 2 to a park in Block 75. Pedestrian crossing signs should be installed at the north and south approaches along Street 2 and Street 4, and at the east and west approaches along Street 3 alerting drivers of the pedestrian crossing. The signs would be designated as Ra-5R, with the adjacent picture showing the proposed sign.

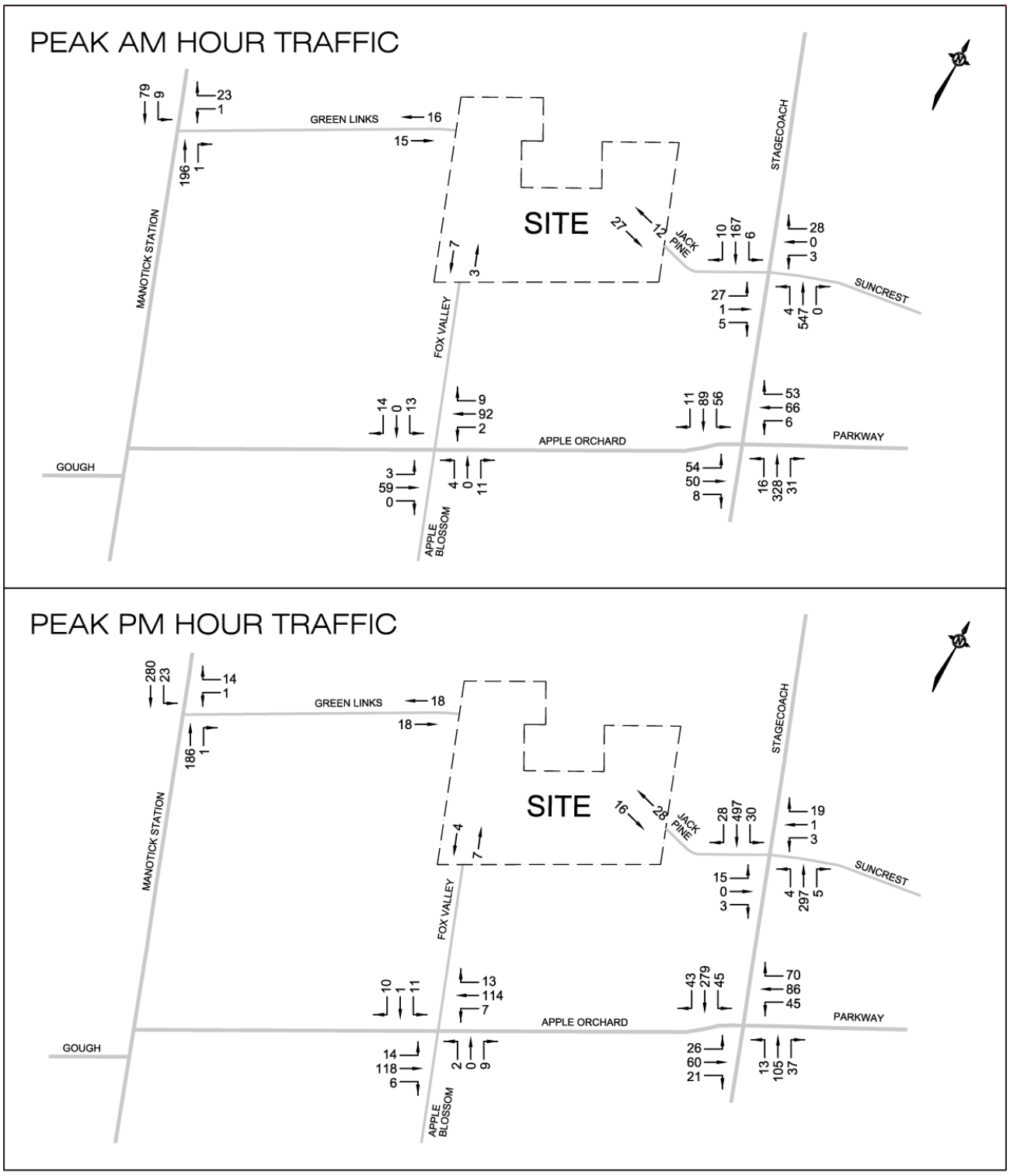
Ra-5R

FIGURE 3.4
2027 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

FIGURE 3.5
2032 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

Element 4.1.2 – Circulation and Access

Exempt as determined in the Scoping Document.

Element 4.1.3 – New Street Networks

The subdivision will comprise of single-family homes along rural local streets. The subdivision will have three access points with one entrance/exit in each of the east, west and south directions. The multiple access points would reduce the local traffic along the roads within the subdivision.

The interior subdivision streets would have a rural cross section with a 7.0 m paved surface and gravel shoulders. The pavement width, rural nature of the subdivision streets, and pedestrian crossings along Streets 2, 3, and 4 would tend to reduce the speed of traffic through the development.

MODULE 4.2 – Parking

Element 4.2.1 – Parking Supply

Exempt as determined in the Scoping Document.

Element 4.2.2 – Spillover Parking

Exempt as determined in the Scoping Document.

MODULE 4.3 – Boundary Street Design

The City of Ottawa Complete Streets concept allows for the safe movement of everyone whether they choose to walk, bike, drive, or take public transit. The boundary roads to the Emerald Subdivision would consist of Apple Orchard Road, Stagecoach Road and Manotick Station Road. These roads would be considered roadway links between signalized intersections. The multi-modal level of service for the street segments was determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines* and the Multi-Modal Level of Service - Segments Form. The following examined the MMLOS for the various modes of travel along the Stagecoach Road, Apple Orchard Road and Manotick Station Road street segments.

PEDESTRIAN LEVEL OF SERVICE (PLOS)

There are no sidewalks along Stagecoach Road, Apple Orchard Road or Manotick Station Road. The posted speed limits along the road segments is 70 km./h. for Stagecoach Road and Apple Orchard Road, and 80 km./h. along Manotick Station Road. Table 4.1 presents the level of service for the street segment adjacent to the subdivision, with the MMLOS analysis sheets provided in the Appendix as Exhibit 4.1, Exhibit 4.2, and Exhibit 4.3.

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

Street	Segment	Level of Service	Analysis
Stagecoach	Golden Ash Ln. to Apple Orchard Rd.	F	Exhibit 4.1
Apple Orchard	Manotick Station Rd. to Stagecoach Rd.	F	Exhibit 4.2
Manotick Station	Pebblewoods Dr. to Apple Orchard Rd.	F	Exhibit 4.3

BICYCLE LEVEL OF SERVICE (BLOS)

Apple Orchard Road and Manotick Station Road are both collector roads with rural cross sections and gravel shoulders. Stagecoach Road is designated as a Spine Route in the Ottawa TMP and is an arterial road with 1.5 m paved shoulders and gravel shoulders. There are no cycling facilities along the road segments. Table 4.2 presents the level of service for the road segments with the analysis sheets provided in the Appendix as Exhibits 4.1, 4.2, and 4.3.

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

Street	Segment	Level of Service	Analysis
Stagecoach	Golden Ash Ln. to Apple Orchard Rd.	F	Exhibit 4.1
Apple Orchard	Manotick Station Rd. to Stagecoach Rd.	F	Exhibit 4.2
Manotick Station	Pebblewoods Dr. to Apple Orchard Rd.	F	Exhibit 4.3

TRANSIT LEVEL OF SERVICE (TLOS)

The Greely Community is not served by regular transit service. The Transit Level of Service TLOS was not addressed in the study.

TRUCK LEVEL OF SERVICE (TkLOS)

Table 4.3 presents the Truck level of service for the road segments with the analysis sheets provided in the Appendix.

TABLE 4.3
TRUCK LEVEL OF SERVICE (TkLOS) – Street Segment

Street	Segment	Level of Service	Analysis
Stagecoach	Golden Ash Ln. to Apple Orchard Rd.	C	Exhibit 4.1
Apple Orchard	Manotick Station Rd. to Stagecoach Rd.	C	Exhibit 4.2
Manotick Station	Pebblewoods Dr. to Apple Orchard Rd.	C	Exhibit 4.3

Traffic collisions along the Stagecoach Road and Apple Orchard Road segments are shown in Table 2.1 of Element 2.1.2. Over the five year period between January 1, 2014 and December 31, 2018, 3 collisions were recorded along the Stagecoach Road segment and 2 along the Apple Orchard Road segment. The pattern of collisions did not identify any measures which could be taken to reduce the number of collisions.

The Stagecoach Road, Apple Orchard Road, and Manotick Station Road segments were analyzed to determine the level of service which was compared to the MMLOS targets for pedestrians, bicycles, and trucks. Regular transit service is not available in the Community of Greely, therefore the transit level of service for the road segments were not examined. The calculated Level of Service (LOS) as shown in Tables 4.1 to 4.3 is compared to the LOS targets for all modes of travel for a Village designation as designated in the Official Plan - Schedule A Rural Policy Plan. The LOS targets were obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*. Table 4.4 summarizes the MMLOS results for the road segments and targets.

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

ROAD SEGMENT	Level of Service (LOS) – 2032				
	Pedestrian	Bicycle	Transit	Auto	Truck
Calculated Stagecoach	F	F	N/A	-	C
Calculated Apple Orchard	F	F	N/A	-	C
Calculated Manotick Sta.	F	F	N/A	-	C
Target	C	C	N/A	-	D

Street Segment - Stagecoach Road, Apple Orchard Road and Manotick Station Road

The pedestrian LOS did not meet the target due to the operation speed and lack of sidewalks along Stagecoach Road, Apple Orchard Road and Manotick Station Road. Lowering the posted speed limit and providing sidewalks along the rural roads would increase the PLOS to meet target.

The bicycle LOS target was not met because of the operating speed of traffic along Stagecoach Road, Apple Orchard Road and Manotick Station Road. Lowering the posted speed limit or providing designated bike lanes would allow the BLOS to meet target.

MODULE 4.4 – Access Intersection Design

Element 4.4.1 – Location and Design of Access

The Emerald Subdivision will have three access points. The first will be the connection of Street 2 to the north end of Fox Valley Road. The second subdivision access will be from Street 3 connecting to the Jack Pine Crescent, which would connect to Stagecoach Road at the south approach of the crescent. The third access point would be from Street 1 connecting to the east extension of Green Links Way which will be constructed as part of the Emerald Links Country Estates subdivision.

The three Emerald Subdivision access points are shown as future local streets in Schedule C - Village Road Network from the *Village of Greely Community Design Plan*, April 2012.

Element 4.4.2 – Intersection Control

The three interior intersections of the subdivision would be controlled by two-way stop control signs. These intersections would include Street 1/Street 2, Street 2/Street 3, and Street 3/Street 4. The stop signs would be placed at the minor street approaches to the intersections at the following locations:

Intersection	Stop Sign Approach
Street 1 and Street 2	Northbound Street 2
Street 2 and Street 3	Westbound Street 3
Street 3 and Street 4	Southbound Street 4

Access to the subdivision is from the existing intersections of Fox Valley/Apple Orchard, Jack Pine/Stagecoach, and Green Links/Manotick Station. All three of the intersections are two-way stop controlled intersections. The collision reports provided in Exhibit 2.3 did not indicate a need to modify the traffic controls. The intersections were determined to operate well as two-way stop controlled intersections. The left turn movements at all approaches were low and would not trigger a left turn lane warrant analysis.

The intersection of Apple Orchard Road and Stagecoach Road was modified in 2018 to align Apple Orchard Road with Parkway Road with two-way stop controls at the eastbound-westbound approaches of Apple Orchard Road and Parkway Road. Recently the City has modified the traffic controls to an all-way stop controlled intersection. The City is monitoring the intersection to determine when traffic control signals are triggered.

Element 4.4.3 – Intersection Design

The operational analysis of the Fox Valley/Apple Orchard, Jack Pine/Stagecoach, Green Links/Manotick Station, and Apple Orchard/Stagecoach intersections were completed for the number of peak AM and PM hour vehicle trips using the existing traffic counts, at the year 2027 at the completion of the subdivision, and at the year 2032. Since all intersections examined were unsignalized, only the vehicle travel mode was considered.

VEHICLE LEVEL OF SERVICE (LOS) – Intersection Capacity Analysis

The analysis of the intersections will use the *Highway Capacity Software, Version 7.9.5,* which uses the capacity analysis procedure as documented in the *Highway Capacity Manual (HCM) 2010 and HCM 6th Edition*.

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

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

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

Jack Pine Crescent and Stagecoach Road Intersection

The Jack Pine/Stagecoach intersection is a two-way stop controlled intersection with Stagecoach Road forming the northbound and southbound approaches, and Jack Pine the eastbound and Suncrest Drive the westbound stop controlled approaches. All approaches consist of a single lane with no exclusive turn lanes.

The peak AM and PM hour operational analysis using the 2019 traffic counts determined that the northbound and southbound Stagecoach Road approaches functioned at a LOS “A”, and the eastbound Jack Pine Crescent and westbound Sunset Drive approaches at a LOS “B”. The operational work sheets are provided as Exhibits 4.4 and 4.5 with Table 4.5 summarizing the operation of the intersection.

TABLE 4.5
JACK PINE/STAGECOACH INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR 2019 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)		WEEKDAY PEAK PM HOUR 2019 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Jack Pine	B **C** *C* ***C*** (C)	0.01 **0.04** *0.05* ***0.11*** (0.12)	B **C** *C* ***C*** (C)	0.00 **0.02** *0.03* ***0.07*** (0.08)
WB Suncrest	B **B** *B* ***B*** (B)	0.06 **0.07** *0.07* ***0.07*** (0.07)	B **B** *B* ***B*** (B)	0.04 **0.04** *0.05* ***0.04*** (0.05)
NB Stagecoach	A **A** *A* ***A*** (A)	0.00 **0.00** *0.00* ***0.00*** (0.00)	A **A** *A* ***A*** (A)	0.00 **0.00** *0.00* ***0.00*** (0.00)
SB Stagecoach	A **A** *A* ***A*** (A)	0.01 **0.01** *0.01* ***0.01*** (0.01)	A **A** *A* ***A*** (A)	0.02 **0.02** *0.03* ***0.02*** (0.03)

The analysis using the 2027 and 2032 background traffic determined that the northbound and southbound Stagecoach Road approaches functioned at a LOS "A", the eastbound Jack Pine Crescent at a LOS "C", and the westbound Suncrest Drive approach at a LOS "B" during both the peak AM and PM hour. Exhibits 4.6 to 4.9 present the operational analysis which is summarized in Table 4.5.

For the expected 2027 and 2032 total traffic including trips from the proposed subdivision, the Jack Pine/Stagecoach intersection would operate at an acceptable level of service during both the peak AM and PM hours. For the peak AM hour the northbound and southbound approaches would function at a LOS "A", the eastbound approach at a LOS "C", and the westbound approach at a LOS "B". The 95th percentile queue showed that during the peak AM hour the eastbound queue would be 0.4 vehicles, westbound 0.2 vehicles, and the northbound and southbound Stagecoach Road queue of 0.2 vehicles. The analysis sheets for the 2027 and 2032 total traffic are provided as Exhibits 4.10 to 4.13.

Fox Valley Road and Apple Orchard Road Intersection

The Fox Valley/Apple Orchard intersection is a two-way stop controlled intersection with Apple Orchard Road forming the eastbound and westbound approaches, and Fox Valley Road and Apple Blossom Way the southbound and northbound stop controlled approaches. All approaches to the intersection are single lanes with shared lane movements.

The 2021 peak AM and PM hour traffic counts (Figure 2.3) determined that all approaches functioned at a Level of Service (LOS) "A" during both the peak AM and PM hours. The operational analysis sheets are provided in the Appendix as Exhibit 4.14 for the peak AM hour and Exhibit 4.15 for the peak PM hour. The operation of the intersection is summarized in Table 4.6.

TABLE 4.6
FOX VALLEY/APPLE ORCHARD INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR 2021 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)		WEEKDAY PEAK PM HOUR 2021 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Apple Orchard	A **A** *A* ***A*** (A)	0.00 **0.00** *0.00* ***0.00*** (0.00)	A **A** *A* ***A*** (A)	0.01 **0.01** 0.01 **0.01** (0.01)
WB Apple Orchard	A **A** *A* ***A*** (A)	0.00 **0.00** *0.00* ***0.00*** (0.00)	A **A** *A* ***A*** (A)	0.00 **0.00** *0.01* ***0.00*** (0.01)
NB Apple Blossom	A **A** *A* ***A*** (A)	0.01 **0.02** *0.02* ***0.02*** (0.02)	A **A** *A* ***A*** (A)	0.01 **0.01** *0.01* ***0.01*** (0.01)
SB Fox Valley	A **A** *A* ***A*** (A)	0.02 0.03 *0.03* ***0.03*** (0.03)	A **B** *B* ***B*** (B)	0.02 **0.03** *0.03* ***0.03*** (0.03)

At the year 2027 when the Emerald Subdivision is expected to be completed, all approaches to the intersection functioned at a LOS "A" during the peak AM hour background traffic (not including any trips from the subdivision), and during the peak PM hour the northbound, eastbound and westbound approaches functioned at a LOS "A" and southbound Fox Valley Road approach at a LOS "B". The approaches to the intersection functioned at the same level of service for the expected 2032 traffic as the 2027 background traffic. The analysis sheets are provided as Exhibit 4.16 to 4.19 with the operation of the intersection summarized in Table 4.6.

Following the development of the subdivision in 2027, the total traffic including site trips (Figure 3.4) determined that all approaches functioned at a LOS "A" during the peak AM hour, and during the peak PM hour all approaches functioned at a LOS "A" with the exception of the southbound Fox Valley Road approach which functioned at a LOS "B". The approaches to the intersection functioned at the same level of service for the 2032 total traffic (Figure 3.5) as the 2027 traffic. During the peak AM hour the 95th percentile queue was 0.0 vehicles for the eastbound and westbound approaches, and 0.1 vehicles for the northbound Apple Blossom Way and southbound Fox Valley Road approaches. The 2027 and 2032 total traffic analysis sheets are provided as Exhibit 4.20 to 4.23.

Green Links Way and Manotick Station Road Intersection

The proposed subdivision will have a west access to Manotick Station Road along Green Links Way which has been constructed as part of the Emerald Links Country Estates subdivision. The intersection is a two-way stop controlled "T" intersection with Manotick Station Road forming the northbound and southbound approaches, and Green Links Way the westbound stop controlled approach. All approaches are a single lane with no exclusive turn lanes.

With little development at this time, the 2021 traffic counts were mainly construction related traffic. The operational analysis determined that the southbound Manotick Station approach and westbound Green Links Way approach would both function at a

LOS "A" during the peak AM and PM hours. The analysis sheets are provided as Exhibit 4.24 and 4.25 with Table 4.7 summarizing the operation of the intersection.

TABLE 4.7
GREEN LINKS/MANOTICK STATION INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR 2021 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)		WEEKDAY PEAK PM HOUR 2021 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
WB Green Links	A **A** *A* ***A*** (A)	0.01 **0.02** *0.02* ***0.03*** (0.03)	A **A** *A* ***A*** (A)	0.01 **0.01** *0.01* ***0.02*** (0.02)
SB Manotick Sta.	A **A** *A* ***A*** (A)	0.01 **0.00** *0.00* ***0.01*** (0.01)	A **A** *A* ***A*** (A)	0.00 **0.01** *0.01* ***0.02*** (0.02)

Following full development of the Emerald Links Country Estates subdivision, the 2027 and 2032 background traffic (not including the Emerald Subdivision) determined that all approaches to the intersection would continue to operate at a LOS "A". The analysis sheets are provided as Exhibit 4.26 to 4.29 with the results shown in Table 4.7.

The Emerald Subdivision is expected to be completed by 2027. Following full development, all approaches to the intersection would function at a LOS "A" for the 2027 and 2032 traffic. The analysis sheets are provided as Exhibits 4.30 to 4.33. During the peak PM hour the 95th percentile queue was 0.1 vehicles at both the southbound Manotick Station Road and westbound Green Links Way approaches. The results are summarized in Table 4.7.

Apple Orchard and Stagecoach Road Intersection

The intersection of Apple Orchard/Stagecoach was modified in 2018 to align the eastbound Apple Orchard Road approach with the westbound Parkway Road approach. At that time the intersection was controlled by two-way traffic control signs, but has been recently modified to an all-way stop controlled intersection.

The operation of the intersection has been examined for the 2018 traffic (following realignment), and assuming an all-way stop controlled intersection. The 2018 analysis determined that during the peak AM hour the eastbound, westbound, and southbound approaches functioned at a LOS "A" and northbound Stagecoach Road approach at a LOS "B". During the peak PM hour the eastbound and northbound approaches functioned at a LOS "A" and westbound and southbound approaches at a LOS "B". Table 4.8 summarizes the 2018 operation of the intersection with the analysis sheets provided as Exhibit 4.34 for the peak AM hour and 4.35 for the peak PM hour.

TABLE 4.8
APPLE ORCHARD/STAGECOACH INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR 2018 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)		WEEKDAY PEAK PM HOUR 2018 Existing **2027 Background** *2032 Background* ***2027 Total*** (2032 Total)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Apple Orchard	A **B** *B* ***B*** (B)	0.16 **0.18** *0.20* ***0.19*** (0.20)	A **B** *B* ***B*** (B)	0.15 **0.18** *0.19* ***0.18*** (0.19)
WB Parkway	A **A** *B* ***A*** (B)	0.17 **0.19** *0.21* ***0.19*** (0.21)	B **B** *B* ***B*** (B)	0.26 **0.31** *0.33* ***0.32*** (0.34)
NB Stagecoach	B **B** *B* ***B*** (B)	0.48 **0.54** *0.57* ***0.54*** (0.57)	A **A** *B* ***A*** (B)	0.20 **0.23** *0.25* ***0.24*** (0.25)
SB Stagecoach	A **A** *B* ***B*** (B)	0.21 **0.23** *0.25* ***0.24*** (0.26)	B **B** *B* ***B*** (C)	0.47 **0.53** *0.57* ***0.54*** (0.58)

At the 2027 and 2032 background traffic, all approaches functioned at a LOS “A” to “B”. The analysis sheets are provided in Exhibit 4.36 to 4.39 and summarized in Table 4.8.

The analysis for the total 2027 peak AM hour traffic determined that the northbound, southbound and eastbound approaches functioned at a LOS “B”, and westbound Parkway Road approach at a LOS “A”. During the peak PM hour the eastbound, westbound and southbound approaches functioned at a LOS “B” and northbound Stagecoach Road approach at a LOS “A”. Exhibits 4.40 and 4.41 provide the analysis and Table 4.8 a summary of the operation of the intersection.

For the total 2032 traffic, all approaches would function at a LOS “B” during the peak AM hour. During the peak PM hour the northbound, eastbound and westbound approaches would function at a LOS “B”, and the southbound Stagecoach Road approach at a LOS “C”. Table 4.8 summarizes the operation of the intersection. The 95th percentile queue determined that in the peak AM hour the northbound Stagecoach Road approach queue was 3.7 vehicles and eastbound Apple Orchard Road 0.7 vehicles. During the peak PM hour the queue at the southbound Stagecoach Road was 3.7 vehicles and westbound Parkway Road 1.5 vehicles. The analysis sheets are provided as Exhibit 4.42 for the peak AM hour and 4.43 for the peak PM Hour.

MULTI-MODAL LEVEL OF SERVICE (MMLOS) - Intersections

As documented in the *Multi-Modal Level of Service (MMLOS) Guidelines*, only signalized intersections are considered for the multi-modal intersection LOS measures. Vehicle LOS was determined utilizing the HCM guidelines and the HCS software.

MODULE 4.5 – Transportation Demand Management

Element 4.5.1 – Context for TDM

The site is located on 35.0 ha parcel of land which will have one access point onto an arterial road, and two access points onto collector roads. The subdivision will contain 73 single-family homes which would generate a small number of trips to each of the three access points. The surrounding development consists of single-family residential homes.

Due to the rural location of the subdivision, there is no OC Transpo transit service, and no sidewalks or cycling lanes in the vicinity of the site. Trips from the site would be primarily by vehicle with some cycling trips.

Element 4.5.2 – Need and Opportunity

The site would generate a small number of new trips which would have a minor impact on the surrounding road network. The adjacent roads currently function at an acceptable level of service with reserve capacity.

Element 4.5.3 – TDM Program

The study utilizes the following TDM Measures Checklist for the subdivision which examines the implementation of facilities that are supportive of sustainable modes.

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)*	☐ N/A
	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)*	☐ N/A
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐ N/A
		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	☐ N/A
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐ N/A
		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)*	☐ N/A
		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)	☒ No fare OC Transpo service is provided on Thursdays from the Greely Community Centre to Billings Bridge and South keys by Route 304
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐ N/A
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐ N/A

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

MODULE 4.6 – Neighbourhood Traffic Management

Element 4.6.1 – Adjacent Neighbourhoods

The Emerald Subdivision will access collector and arterial road through connecting local streets within the subdivision. The TIA Guidelines state that the future traffic thresholds for a local street would be 120 vehicles during the peak hour. The total 2032 traffic (Figure 3.5) determined a maximum during the peak PM hour of 39 vehicles along Fox Valley Road and 51 vehicles along Jack Pine Crescent. The expected 2032 traffic determined that the proposed subdivision trips would not change the role or classification of the local connecting streets.

MODULE 4.7 - Transit

Element 4.7.1 – Route Capacity

With no existing regular transit service within the Community of Greely, transit demands for the area are not applicable.

Element 4.7.2 – Transit Priority

With no existing regular transit service within the Community of Greely, transit priority measures to decrease travel time are not applicable.

MODULE 4.8 – Review of Network Concept

Exempt as determined in the Scoping Document.

MODULE 4.9 – Intersection Design

Element 4.9.1 – Intersection Control

The Jack Pine/Stagecoach, Fox Valley/Apple Orchard, and Green Links/Manotick Station intersections are all two-way stop controlled intersections. The existing traffic

counts determined that the volume of traffic at each approach is low and would not trigger the requirement of traffic control signals.

The Apple Orchard/Stagecoach intersection was recently modified from a two-way stop controlled intersection to an all-way stop controlled intersection. The City is currently monitoring the intersection for future traffic control signals.

Element 4.9.2 – Intersection Design

The intersections examined in the study would comprise of Jack Pine/Stagecoach, Fox Valley/Apple Orchard, and Green Links/Manotick Station which are two-way stop controlled intersections. The Apple Orchard/Stagecoach intersection is an all-way stop controlled intersection. The MMLOS Guidelines state that only signalized intersections are considered for the intersection LOS measures.

The HCM states that for two-way stop controlled intersections the vehicle LOS is defined for each minor movement and not defined as an intersection as a whole. For an all-way stop controlled intersection the vehicle LOS methodology analyzes each intersection approach independently. For this study only the 2032 peak hour vehicle LOS analysis was determined. Table 4.9 presents the vehicle LOS as a range for the intersection approaches shown in Tables 4.5 to 4.8. The vehicle LOS target was obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines.*

TABLE 4.9
MULTI-MODAL (MMLOS) INTERSECTION SUMMARY TABLE - Intersection

INTERSECTION	Level of Service (LOS) – 2032				
	Pedestrian	Bicycle	Transit	Auto	Truck
Jack Pine/Stagecoach	-	-	-	A-C	-
Fox Valley/Apple Orchard	-	-	-	A-B	-
Green Links/Manotick Sta.	-	-	-	A	-
Apple Orchard/Stagecoach	-	-	-	B-C	-
Target	-	-	-	D	-

The operational analysis of the intersections in the vicinity of the Emerald Subdivision determined that the trips generated by the subdivision would have a minor impact on the surrounding roadway network. The development of the proposed subdivision site would not trigger any modifications to the roadway geometry or intersection controls for the Jack Pine/Stagecoach, Fox Valley/Apple Orchard, Green Links/Manotick Station, and Apple Orchard/Stagecoach intersections.

The City of Ottawa will be monitoring the warrants for the future installation of traffic controls at the Apple Orchard/Stagecoach intersection.

SUMMARY

A Plan of Subdivision has been prepared for the development of a 35.0 ha of vacant land. The subdivision will be constructed in two phases containing 73 single-family homes. The subdivision is expected to be completed and occupied by the year 2027.

The subdivision will have three access points to Stagecoach Road, Apple Orchard Road and Manotick Station Road. The connections will be through local streets in adjacent subdivisions.

The Transportation Impact Assessment report has established a study area to include the Jack Pine/Stagecoach, Fox Valley/Apple Orchard, Green Links/Manotick Station and Apple Orchard/Stagecoach intersections. The operational analysis was completed for the weekday peak AM and PM hours at the completion of the subdivision in 2027, and at five years beyond completion at the year 2032. The TIA analysis has examined all modes of transportation along the Stagecoach Road, Apple Orchard Road and Manotick Station Road street segments, and the operation at major intersections within the study area. The transportation analysis has determined the following:

1. The proposed subdivision would consist of 73 housing units and is expected to generate 16 vehicle trips arriving and 36 vehicle trips departing during the weekday peak AM hour, and 37 vehicle trips arriving and 22 vehicle trips departing during the weekday peak PM hour.

2. The Multi-Modal Level of Service (MMLOS) was completed for the Stagecoach Road, Apple Orchard Road and Manotick Station Road street segments. The bicycle and pedestrian modes did not meet the target levels due mainly to the rural nature of the subdivision and surrounding area. The pedestrian level of service PLOS could be improved by lowering the speed limit and providing sidewalks. The bicycle level of service BLOS could be improved by lowering the speed limit and providing bike lanes. Peak AM and PM hour traffic counts at the Apple Orchard/Stagecoach and Fox Valley/Apple Orchard intersections in June determined the count of pedestrians and cyclists to be very low.

3. The subdivision will have three access points onto the surrounding road network utilizing the Jack Pine/Stagecoach, Fox Valley/Apple Orchard, and Green Links/Manotick Station intersections. The 2032 peak AM and PM hour operational analysis determined that all three intersections functioned at an acceptable level of service and would not require any intersection modifications due to the development of the subdivision. The Apple Orchard/Stagecoach intersection, located approximately 1.0 km. from the subdivision access point, is currently an all-way stop controlled intersection which would operate at an acceptable level of service during peak hours. The Emerald Subdivision would

not trigger any requirements for intersection modifications at the Apple Orchard/Stagecoach intersection. The City is monitoring the intersection to determine when traffic would trigger the warrants for the installation of traffic control signals.

4. The interior roadway layout of the subdivision provides three intersections. It is recommended that the Street 1/Street 2, Street 2/Street 3, and Street 3/Street 4 intersections be constructed as two-way stop controlled intersections. The intersections are “T” intersections with the stop signs placed at the minor street approaches.

5. There is a future pathway link through the subdivision along Blocks 76 and 77 which connects Waddion Drive to the south with a vacant parcel of land to the north. The pathway would cross Street 3 at a location 465 m east of Street 2 and 105 m west of Street 4. There is an east-west pathway from the Osgoode Gardens Park to the east which travels along Block 78, crosses Street 4, then through Block 76 to the vacant park north of the subdivision. A second east-west path travels from a park in the Emerald Links Country Estates through Block 75, crosses Street 2, then through Block 76 to the open space to the north. The crossings would be clearly marked by a pedestrian crossing sign (Ra-5R) placed at each approach to the crossing alerting motorists to the pedestrian pathway.

Prepared by:

David J. Halpenny

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

APPENDIX

CERTIFICATION FORM

SCREENING FORM

TRAFFIC COUNTS

COLLISION SUMMARY

MULTI-MODAL LEVEL OF SERVICE - Segment Forms

OPERATIONAL ANALYSIS WORK SHEETS - Intersections

EXHIBIT 1.1
CERTIFICATION FORM

Transportation Impact Assessment Guidelines

Certification Form for TIA Study PM

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

- [X] I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
- [X] I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
- [X] I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
- [X] I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise
  - [X] is either transportation engineering
  - [ ] or transportation planning .

[1,2] License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

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

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

Name : David J. Halpenny

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

D J Halpenny

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

Office Contact Information (Please Print)	
Address:	P.O. Box 774
City / Postal Code:	Manotick ON K4M 1A7
Telephone / Extension:	613-692-8662
E-Mail Address:	David@DJHalpenny.com

Stamp

EXHIBIT 1.2
SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	Village of Greely. One of seven parcels with address 6544 Jack Pine Cr.
Description of Location	Emerald Subdivision - 6544 Jack Pins Crescent (See Figure 2.1)
Land Use Classification	"DR1" Zoning – Development Reserve Zone
Development Size (units)	73 Single-Family Housing Units (See Figure 2.2)
Development Size (ha)	35.0 ha Lot Area
Number of Accesses and Locations	Three accesses. One access onto Fox Valley Road, second onto Jack Pine Crescent, and third onto Green Links Way
Phase of Development	Two Phases of development
Buildout Year	2027

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

2. Trip Generation Trigger

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

Land Use Type	Minimum Development Size
Single-Family homes	40 units

	Yes	No
73 Single-Family units > 40 Minimum Development Size	X	

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

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

3. Location Triggers

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

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

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

4. Safety Triggers

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

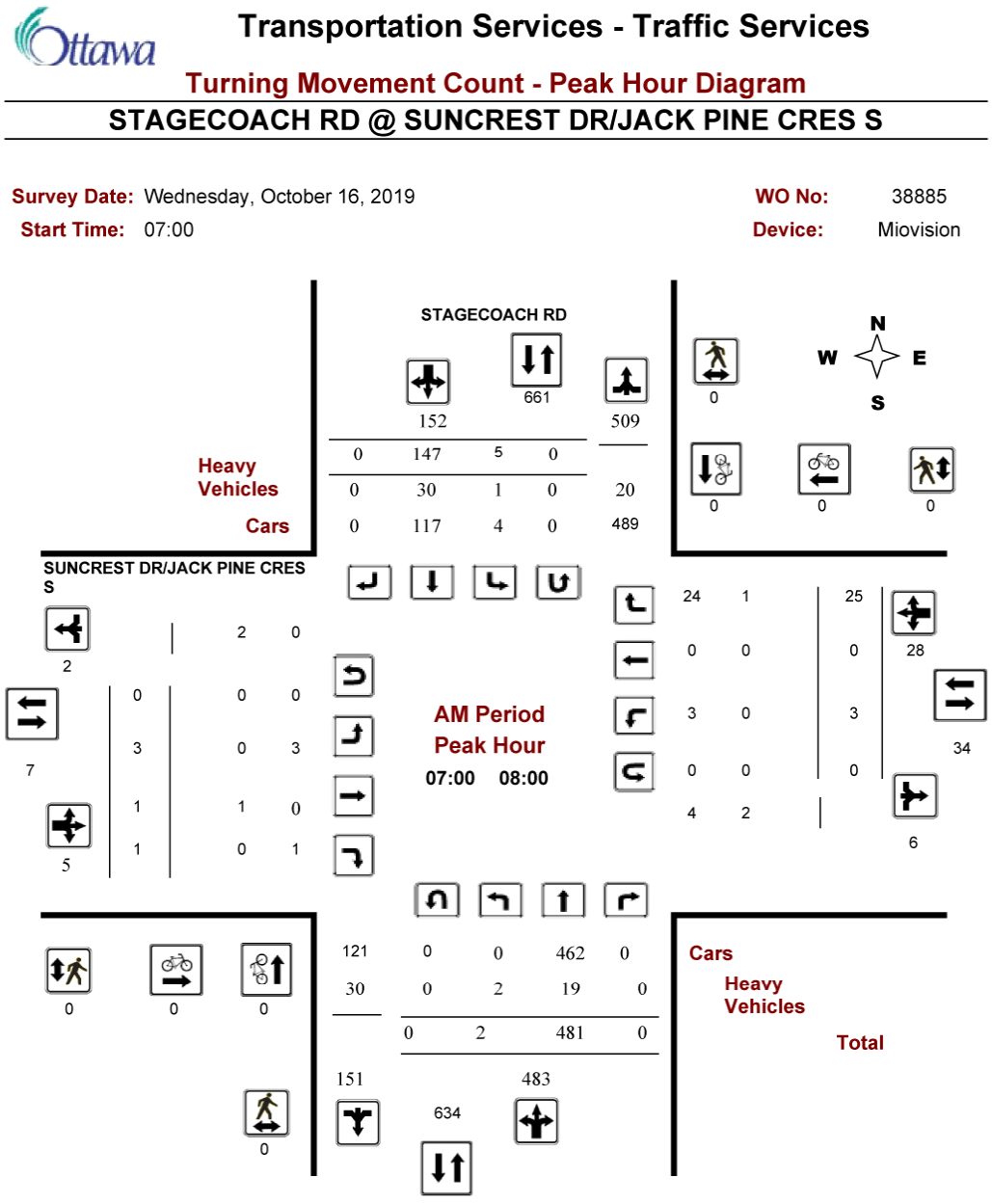
If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

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

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

EXHIBIT 2.1
2019 PEAK AM HOUR TRAFFIC COUNTS - STAGECOACH/JACK PINE



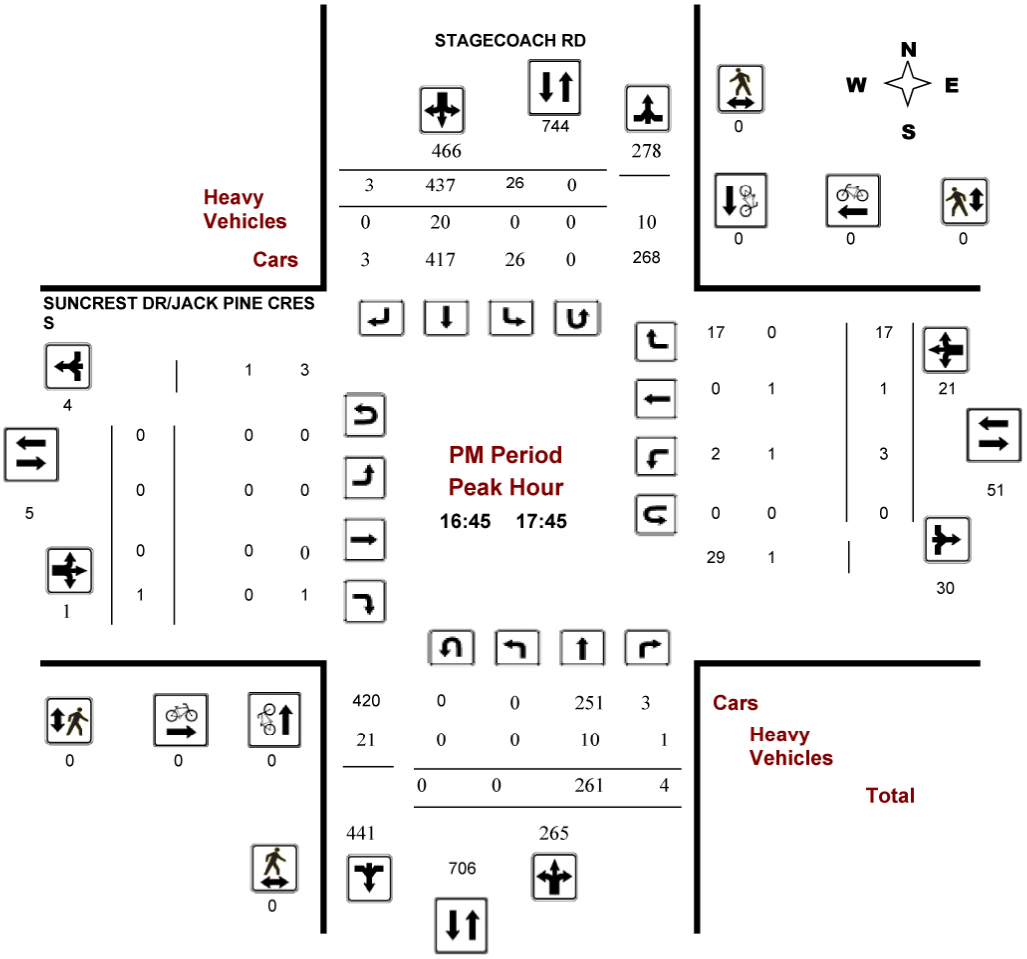
2019 PEAK PM HOUR TRAFFIC COUNTS - STAGECOACH/JACK PINE

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

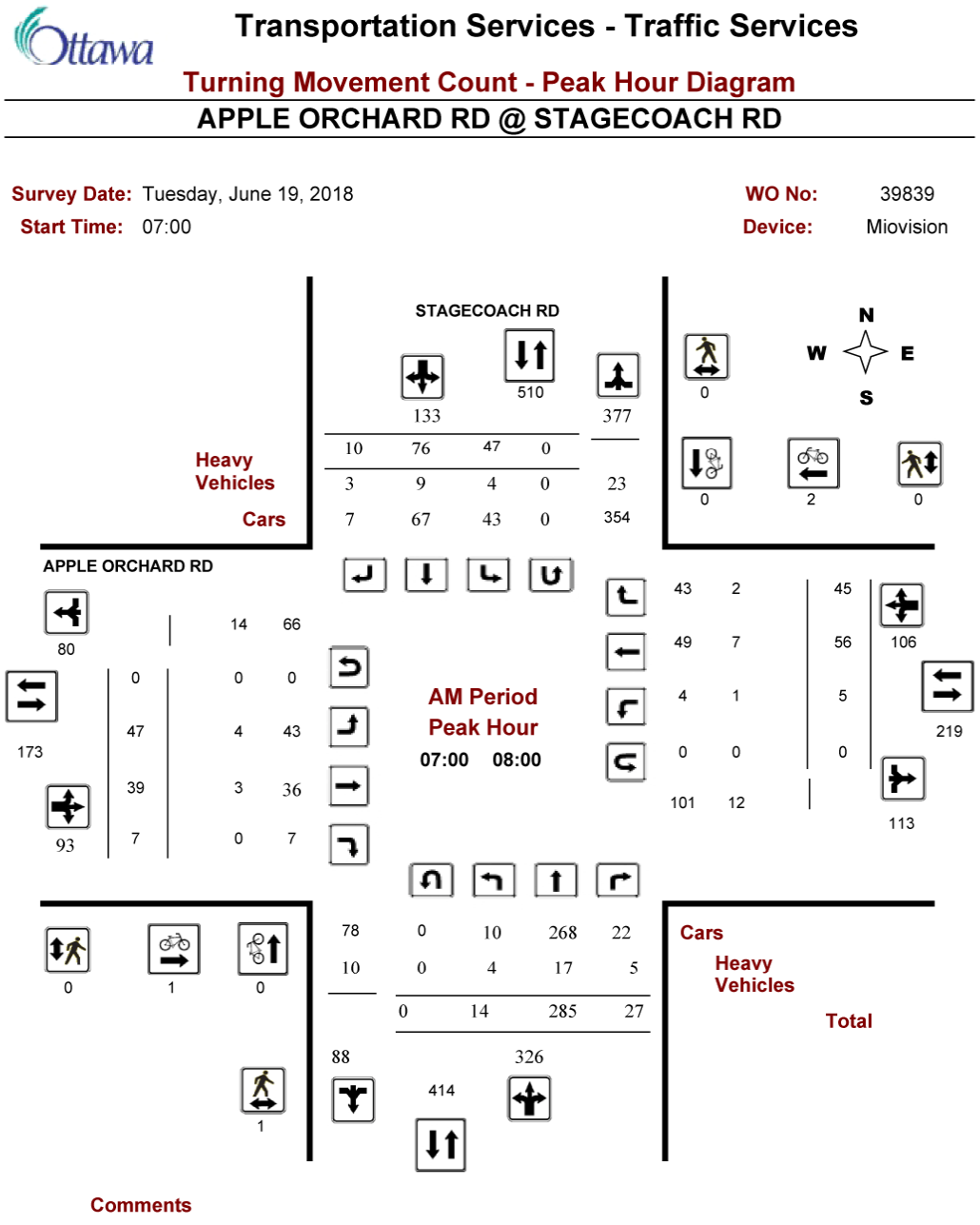
STAGECOACH RD @ SUNCREST DR/JACK PINE CRES S

Survey Date: Wednesday, October 16, 2019 **WO No:** 38885
Start Time: 07:00 **Device:** Miovision



Comments

EXHIBIT 2.2
2018 PEAK AM HOUR TRAFFIC COUNTS - APPLE ORCHARD/STAGECOACH



2018 PEAK PM HOUR TRAFFIC COUNTS - APPLE ORCHARD/STAGECOACH

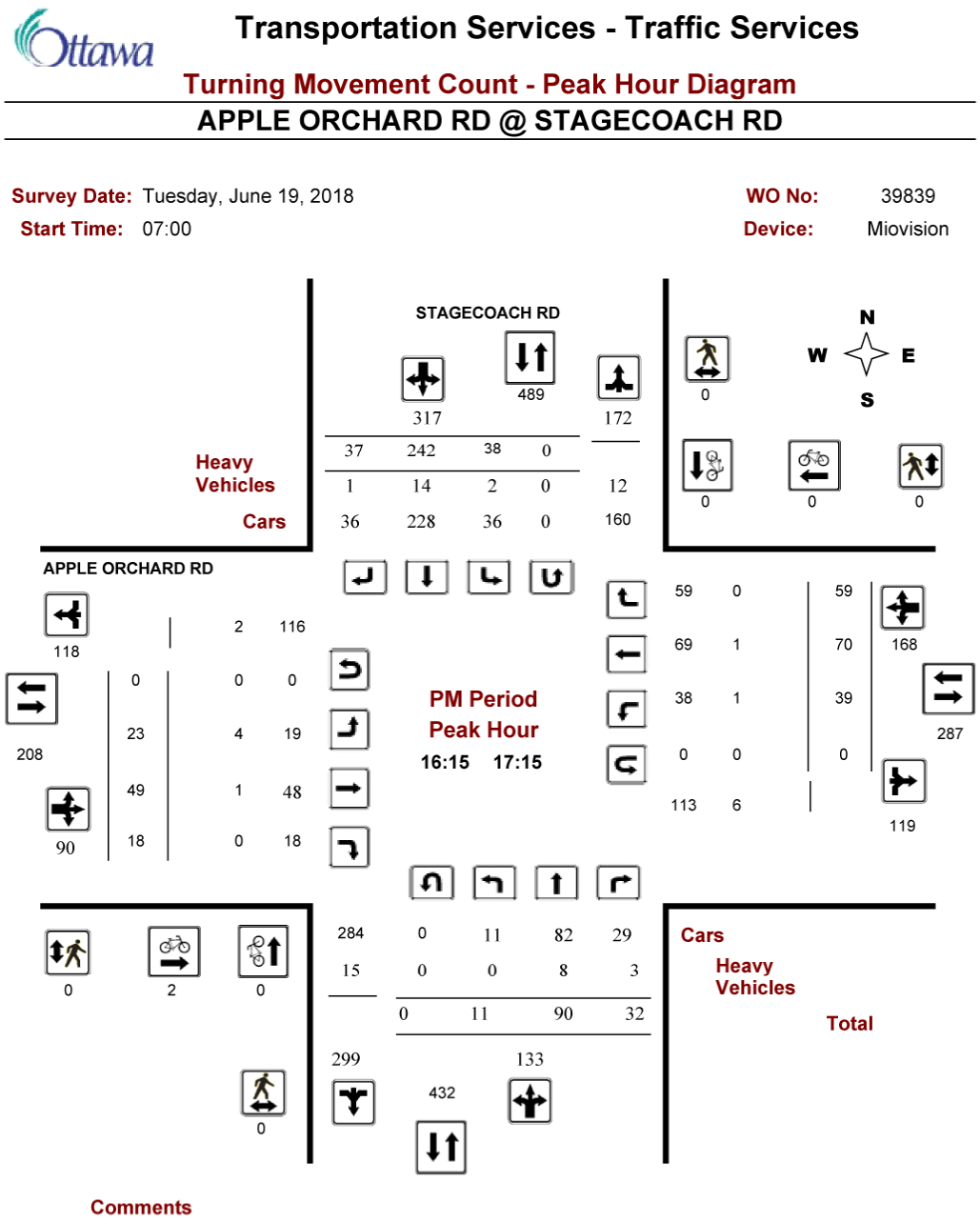


EXHIBIT 2.3
COLLISION SUMMARY

YEAR	COLLISION TYPE					TOTAL
	REAR END	ANGULAR	TURNING	SIDESWIPE	OTHER (SMV)	
Intersection of Jack Pine Crescent and Stagecoach Road						
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
Total	0	0	0	0	0	0
Intersection of Fox Valley Road and Apple Orchard Road						
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
Total	0	0	0	0	0	0
Intersection of Apple Orchard Road and Stagecoach Road						
2015	0	0	0	0	0	0
2016	0	0	1	0	0	1
2017	0	1	0	0	0	1
2018	0	1	0	0	0	1
2019	0	1	0	0	0	1
Total	0	3	1	0	0	4
Stagecoach Road Segment between Golden Ash Ln. and Apple Orchard Rd.						
2015	0	0	0	0	1	1
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	1	0	1	2
Total	0	0	1	0	2	3
Apple Orchard Road Segment between Stagecoach Rd. and Manotick Station Rd.						
2015	0	0	0	0	1	1
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	1	1
2019	0	0	0	0	0	0
Total	0	0	0	0	2	2

EXHIBIT 4.1
2032 MMLOS ROAD SEGMENT - STAGECOACH ROAD

Multi-Modal Level of Service - Segments Form

Consultant		Project	Emerald Subdivision
Scenario	Total 2032 Traffic	Date	Aug-21
Comments	Stagecoach Road		
	Golden Ash Ln. to Apple Orchard Rd.		

SEGMENTS		Apple Orchard	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width Boulevard Width	F	no sidewalk n/a		
	Avg Daily Curb Lane Traffic Volume		> 3000		
	Operating Speed On-Street Parking		> 60 km/h no		
	Exposure to Traffic PLoS		F	-	-
	Effective Sidewalk Width		1.2 m		
	Pedestrian Volume		250 ped/hr		
	Crowding PLoS		B	-	-
	Level of Service		F	-	-
Bicycle	Type of Cycling Facility	F	Mixed Traffic		
	Number of Travel Lanes		2-3 lanes total		
	Operating Speed		≥ 60 km/h		
	# of Lanes & Operating Speed LoS		F	-	-
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		>40 to 50 km/h		
	Unsignalized Crossing - Lowest LoS		B	-	-
	Level of Service		F	-	-
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		-	-	-
Truck	Truck Lane Width	C	≤ 3.5 m		
	Travel Lanes per Direction		1		
	Level of Service		C	-	-

EXHIBIT 4.2
2032 MMLOS ROAD SEGMENT - APPLE ORCHARD ROAD

Multi-Modal Level of Service - Segments Form

Consultant		Project	Emerald Subdivision
Scenario	Total 2032 Traffic	Date	Aug-21
Comments	Apple Orchard Road		
	Manotick Station Rd. to Stagecoach Rd.		

SEGMENTS		Apple Orchard	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width Boulevard Width	F	no sidewalk n/a		
	Avg Daily Curb Lane Traffic Volume		≤ 3000		
	Operating Speed On-Street Parking		> 60 km/h no		
	Exposure to Traffic PLoS		F	-	-
	Effective Sidewalk Width		1.2 m		
	Pedestrian Volume		250 ped/hr		
	Crowding PLoS		B	-	-
	Level of Service		F	-	-
Bicycle	Type of Cycling Facility	F	Mixed Traffic		
	Number of Travel Lanes		2-3 lanes total		
	Operating Speed		≥ 60 km/h		
	# of Lanes & Operating Speed LoS		F	-	-
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		>40 to 50 km/h		
	Unsignalized Crossing - Lowest LoS		B	-	-
	Level of Service		F	-	-
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		-	-	-
Truck	Truck Lane Width	C	≤ 3.5 m		
	Travel Lanes per Direction		1		
	Level of Service		C	-	-

EXHIBIT 4.3
2032 MMLOS ROAD SEGMENT - MANOTICK STATION ROAD

Multi-Modal Level of Service - Segments Form

Consultant		Project	Emerald Subdivision
Scenario	Total 2032 Traffic	Date	Aug-21
Comments	Manotick Station Road		
	Pebblewoods Dr. to Apple Orchard Rd.		

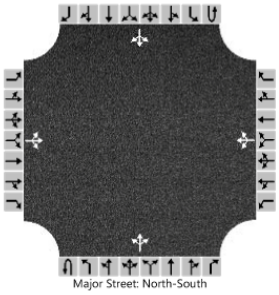
SEGMENTS		Apple Orchard	Section 1	Section 2	Section 3
Pedestrian	Sidewalk Width	F	no sidewalk		
	Boulevard Width		n/a		
	Avg Daily Curb Lane Traffic Volume		≤ 3000		
	Operating Speed		> 60 km/h		
	On-Street Parking		no		
	Exposure to Traffic PLoS		F	-	-
	Effective Sidewalk Width		1.2 m		
	Pedestrian Volume		250 ped/hr		
	Crowding PLoS		B	-	-
	Level of Service		F	-	-
Bicycle	Type of Cycling Facility	F	Mixed Traffic		
	Number of Travel Lanes		2-3 lanes total		
	Operating Speed		≥ 60 km/h		
	# of Lanes & Operating Speed LoS		F	-	-
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		>40 to 50 km/h		
	Unsignalized Crossing - Lowest LoS		B	-	-
	Level of Service		F	-	-
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		-	-	-
Truck	Truck Lane Width	C	≤ 3.5 m		
	Travel Lanes per Direction		1		
	Level of Service		C	-	-

EXHIBIT 4.4
2019 EXISTING PEAK AM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2019	North/South Street	Stagecoach Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	1	1		3	0	25		2	481	0		5	147	0
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			5				30			2				5		
Capacity, c (veh/h)			382				519			1426				1049		
v/c Ratio			0.01				0.06			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.0				0.2			0.0				0.0		
Control Delay (s/veh)			14.5				12.4			7.5				8.5		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	14.5				12.4				0.0				0.3			
Approach LOS	B				B											

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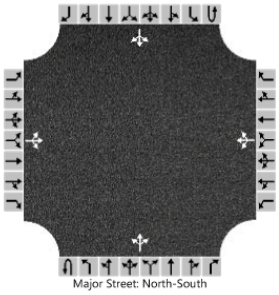
EXHIBIT 4.5
2019 EXISTING PEAK PM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2019	North/South Street	Stagecoach Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	0	1		3	1	17		0	261	4		26	437	3
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			1				23			0				28		
Capacity, c (veh/h)			589				576			1089				1280		
v/c Ratio			0.00				0.04			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			11.1				11.5			8.3				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)		11.1				11.5				0.0				0.7		
Approach LOS		B				B										

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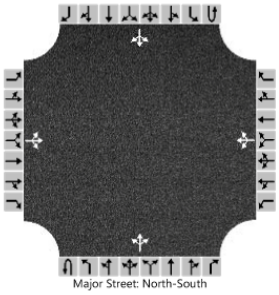
EXHIBIT 4.6
2027 BACKGROUND PEAK AM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2027	North/South Street	Stagecoach Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		11	1	1		3	0	27		2	521	0		5	159	3
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			14				33			2				5		
Capacity, c (veh/h)			314				490			1406				1011		
v/c Ratio			0.04				0.07			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.1				0.2			0.0				0.0		
Control Delay (s/veh)			17.0				12.9			7.6				8.6		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		17.0				12.9				0.0				0.3		
Approach LOS		C				B										

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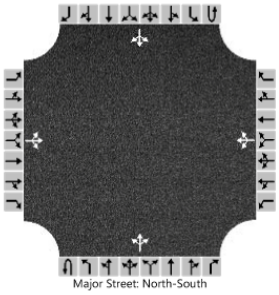
EXHIBIT 4.7
2027 BACKGROUND PEAK PM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2027	North/South Street	Stagecoach Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	0	1		3	1	18		0	283	4		26	473	11
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			5				24			0				28		
Capacity, c (veh/h)			276				549			1046				1254		
v/c Ratio			0.02				0.04			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.1		
Control Delay (s/veh)			18.3				11.9			8.4				7.9		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		18.3				11.9				0.0				0.6		
Approach LOS		C				B										

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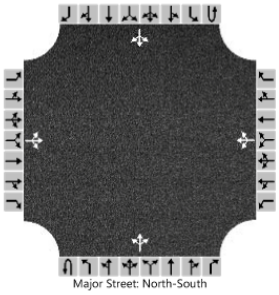
EXHIBIT 4.8
2032 BACKGROUND PEAK AM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2032	North/South Street	Stagecoach Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		11	1	1		3	0	28		2	547	0		6	167	3
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			14				34			2				7		
Capacity, c (veh/h)			295				471			1396				987		
v/c Ratio			0.05				0.07			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.2			0.0				0.0		
Control Delay (s/veh)			17.8				13.2			7.6				8.7		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		17.8				13.2				0.0				0.4		
Approach LOS		C				B										

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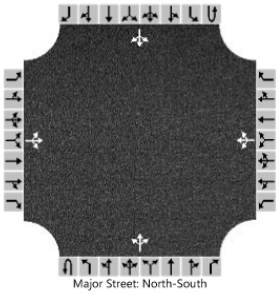
EXHIBIT 4.9
2032 BACKGROUND PEAK PM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2032	North/South Street	Stagecoach Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	0	1		3	1	19		0	297	5		30	497	11
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			7				25			0				33		
Capacity, c (veh/h)			249				531			1023				1237		
v/c Ratio			0.03				0.05			0.00				0.03		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.1		
Control Delay (s/veh)			19.8				12.1			8.5				8.0		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)	19.8				12.1				0.0				0.7			
Approach LOS	C				B											

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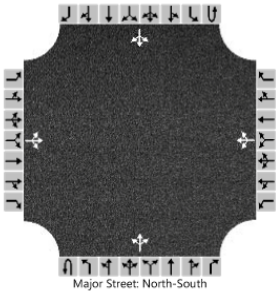
EXHIBIT 4.10
2027 TOTAL PEAK AM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2027	North/South Street	Stagecoach Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		27	1	5		3	0	27		4	521	0		5	159	10
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			36				33			4				5		
Capacity, c (veh/h)			325				488			1397				1011		
v/c Ratio			0.11				0.07			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.4				0.2			0.0				0.0		
Control Delay (s/veh)			17.4				12.9			7.6				8.6		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		17.4				12.9				0.1				0.3		
Approach LOS		C				B										

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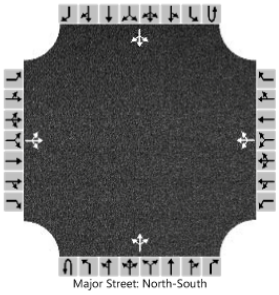
EXHIBIT 4.11
2027 TOTAL PEAK PM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2027	North/South Street	Stagecoach Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		14	0	3		3	1	18		4	283	4		28	473	28
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			18				24			4				30		
Capacity, c (veh/h)			262				539			1030				1254		
v/c Ratio			0.07				0.04			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.2				0.1			0.0				0.1		
Control Delay (s/veh)			19.8				12.0			8.5				7.9		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)	19.8				12.0				0.2				0.7			
Approach LOS	C				B											

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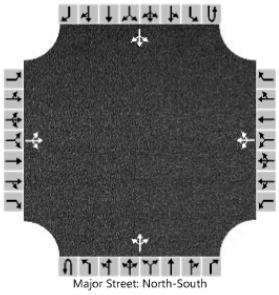
EXHIBIT 4.12
2032 TOTAL PEAK AM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2032	North/South Street	Stagecoach Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		27	1	5		3	0	28		4	547	0		6	167	10
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			36				34			4				7		
Capacity, c (veh/h)			305				470			1387				987		
v/c Ratio			0.12				0.07			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.4				0.2			0.0				0.0		
Control Delay (s/veh)			18.4				13.3			7.6				8.7		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		18.4				13.3				0.1				0.3		
Approach LOS		C				B										

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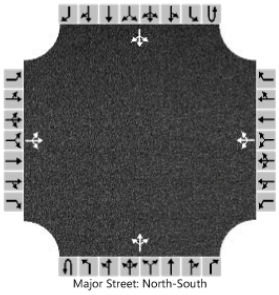
EXHIBIT 4.13
2032 TOTAL PEAK PM HOUR ANALYSIS - Jack Pine/Stagecoach

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Jack Pine/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Jack Pine Crescent
Analysis Year	2032	North/South Street	Stagecoach Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		15	0	3		3	1	19		4	297	5		30	497	28
Percent Heavy Vehicles (%)		1	1	1		1	1	1		1				1		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.11	6.51	6.21		7.11	6.51	6.21		4.11				4.11		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.51	4.01	3.31		3.51	4.01	3.31		2.21				2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			20				25			4				33		
Capacity, c (veh/h)			241				523			1007				1237		
v/c Ratio			0.08				0.05			0.00				0.03		
95% Queue Length, Q_{95} (veh)			0.3				0.2			0.0				0.1		
Control Delay (s/veh)			21.2				12.2			8.6				8.0		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)		21.2				12.2				0.2				0.7		
Approach LOS		C				B										

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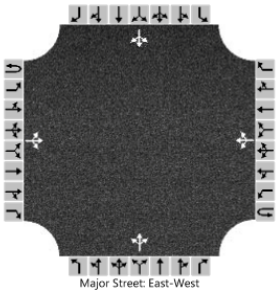
EXHIBIT 4.14
2021 EXISTING PEAK AM HOUR TRAFFIC ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2021	North/South Street	Fox Valley Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	44	0		2	68	5		3	0	8		6	0	9
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				2					12				16	
Capacity, c (veh/h)		1514				1563					958				907	
v/c Ratio		0.00				0.00					0.01				0.02	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.4				7.3					8.8				9.0	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)		0.3				0.2				8.8				9.0		
Approach LOS										A				A		

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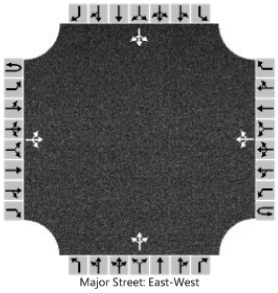
EXHIBIT 4.15
2021 EXISTING PEAK PM HOUR TRAFFIC ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2021	North/South Street	Fox Valley Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		9	88	4		5	85	6		2	0	7		6	1	7
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				5					10				15	
Capacity, c (veh/h)		1500				1491					887				817	
v/c Ratio		0.01				0.00					0.01				0.02	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.4				7.4					9.1				9.5	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)		0.7				0.4				9.1				9.5		
Approach LOS										A				A		

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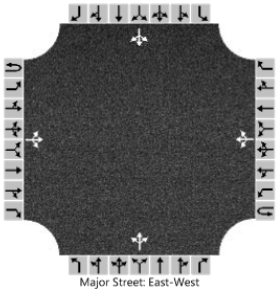
EXHIBIT 4.16
2027 BACKGROUND PEAK AM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Fox Valley Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	56	0		2	87	7		4	0	11		11	0	12
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				2					16				25	
Capacity, c (veh/h)		1485				1546					932				856	
v/c Ratio		0.00				0.00					0.02				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.4				7.3					8.9				9.3	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)	0.3				0.2				8.9				9.3			
Approach LOS									A				A			

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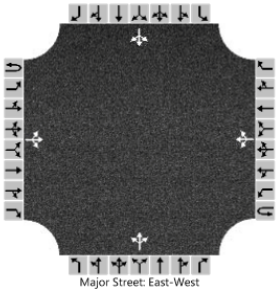
EXHIBIT 4.17
2027 BACKGROUND PEAK PM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Fox Valley Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		12	113	5		6	108	11		2	0	8		10	1	8
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				7					11				21	
Capacity, c (veh/h)		1462				1456					848				740	
v/c Ratio		0.01				0.00					0.01				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.5				7.5					9.3				10.0	
Level of Service (LOS)		A				A					A				B	
Approach Delay (s/veh)	0.8				0.4				9.3				10.0			
Approach LOS									A				B			

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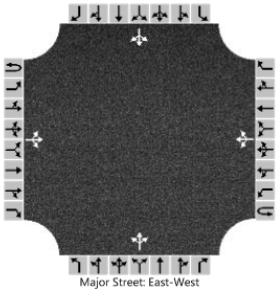
EXHIBIT 4.18
2032 BACKGROUND PEAK AM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Fox Valley Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	59	0		2	92	8		4	0	11		11	0	12
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				2					16				25	
Capacity, c (veh/h)		1477				1542					925				847	
v/c Ratio		0.00				0.00					0.02				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.4				7.3					9.0				9.4	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)		0.3				0.2				9.0				9.4		
Approach LOS										A				A		

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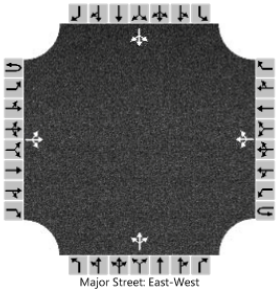
EXHIBIT 4.19
2032 BACKGROUND PEAK PM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Fox Valley Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		12	118	6		7	114	11		2	0	9		10	1	9
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				8					12				22	
Capacity, c (veh/h)		1455				1448					844				734	
v/c Ratio		0.01				0.01					0.01				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.5				7.5					9.3				10.1	
Level of Service (LOS)		A				A					A				B	
Approach Delay (s/veh)	0.7				0.4				9.3				10.1			
Approach LOS									A				B			

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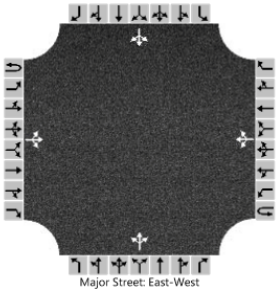
EXHIBIT 4.20
2027 TOTAL PEAK AM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Fox Valley Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	56	0		2	87	8		4	0	11		13	0	14
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				2					16				29	
Capacity, c (veh/h)		1484				1546					929				853	
v/c Ratio		0.00				0.00					0.02				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.4				7.3					8.9				9.4	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)		0.4				0.2				8.9				9.4		
Approach LOS										A				A		

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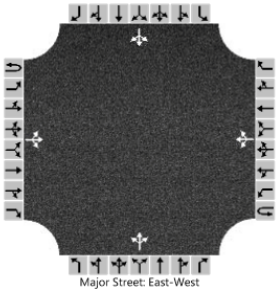
EXHIBIT 4.21
2027 TOTAL PEAK PM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Fox Valley Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		14	113	5		6	108	13		2	0	8		11	1	9
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		15				7					11				23	
Capacity, c (veh/h)		1460				1456					845				738	
v/c Ratio		0.01				0.00					0.01				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.5				7.5					9.3				10.0	
Level of Service (LOS)		A				A					A				B	
Approach Delay (s/veh)		0.9				0.4				9.3				10.0		
Approach LOS										A				B		

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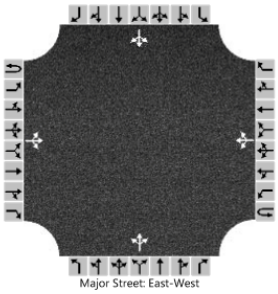
EXHIBIT 4.22
2032 TOTAL PEAK AM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information

Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Fox Valley Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	59	0		2	92	9		4	0	11		13	0	14
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				2					16				29	
Capacity, c (veh/h)		1476				1542					922				844	
v/c Ratio		0.00				0.00					0.02				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.4				7.3					9.0				9.4	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)		0.4				0.2				9.0				9.4		
Approach LOS										A				A		

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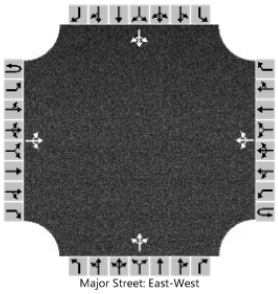
EXHIBIT 4.23
2032 TOTAL PEAK PM HOUR ANALYSIS - Fox Valley/Apple Orchard

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Fox Valley/Apple Orchard
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Fox Valley Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		14	118	6		7	114	13		2	0	9		11	1	10
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		15				8					12				24	
Capacity, c (veh/h)		1452				1448					841				731	
v/c Ratio		0.01				0.01					0.01				0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				0.1	
Control Delay (s/veh)		7.5				7.5					9.3				10.1	
Level of Service (LOS)		A				A					A				B	
Approach Delay (s/veh)		0.8				0.4				9.3				10.1		
Approach LOS										A				B		

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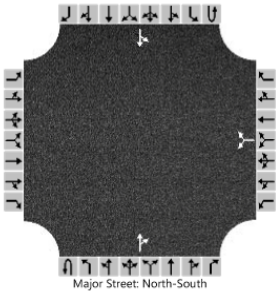
EXHIBIT 4.24
2021 EXISTING PEAK AM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2021	North/South Street	Manotick Station Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						5		4			147	2		10	59	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

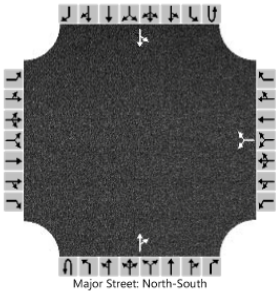
Flow Rate, v (veh/h)							10							11		
Capacity, c (veh/h)							797							1423		
v/c Ratio							0.01							0.01		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.6							7.5		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.6								1.1		
Approach LOS						A										

EXHIBIT 4.25
2021 EXISTING PEAK PM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2021	North/South Street	Manotick Station Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						3		5			139	1		3	209	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

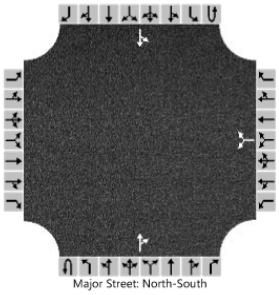
Flow Rate, v (veh/h)							9							3		
Capacity, c (veh/h)							767							1435		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.7							7.5		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.7								0.1		
Approach LOS						A										

EXHIBIT 4.26
2027 BACKGROUND PEAK AM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2027	North/South Street	Manotick Station Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		11			187	1		4	75	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

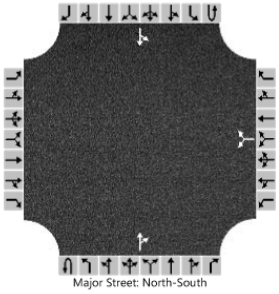
Flow Rate, v (veh/h)							13							4		
Capacity, c (veh/h)							825							1373		
v/c Ratio							0.02							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.4							7.6		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.4								0.4		
Approach LOS						A										

EXHIBIT 4.27
2027 BACKGROUND PEAK PM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2027	North/South Street	Manotick Station Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		6			177	1		11	267	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							8							12		
Capacity, c (veh/h)							781							1386		
v/c Ratio							0.01							0.01		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.7							7.6		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.7								0.4		
Approach LOS						A										

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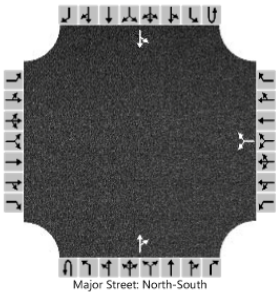
EXHIBIT 4.28
2032 BACKGROUND PEAK AM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2032	North/South Street	Manotick Station Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		11			196	1		4	79	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							13							4		
Capacity, c (veh/h)							815							1362		
v/c Ratio							0.02							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.5							7.7		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.5								0.4		
Approach LOS						A										

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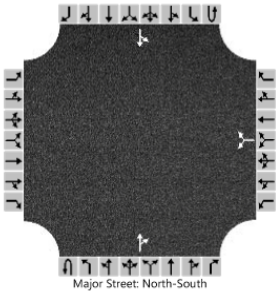
EXHIBIT 4.29
2032 BACKGROUND PEAK PM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2032	North/South Street	Manotick Station Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		6			186	1		11	280	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

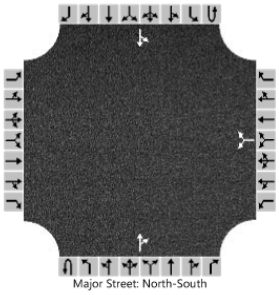
Flow Rate, v (veh/h)							8							12		
Capacity, c (veh/h)							768							1374		
v/c Ratio							0.01							0.01		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.7							7.6		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.7								0.4		
Approach LOS						A										

EXHIBIT 4.30
2027 TOTAL PEAK AM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2027	North/South Street	Manotick Station Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		23			187	1		9	75	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							26							10		
Capacity, c (veh/h)							832							1373		
v/c Ratio							0.03							0.01		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							9.5							7.6		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.5								0.9		
Approach LOS						A										

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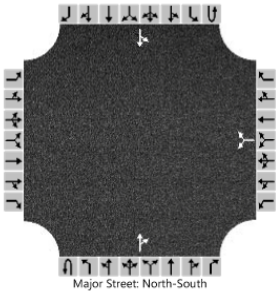
EXHIBIT 4.31
2027 TOTAL PEAK PM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2027	North/South Street	Manotick Station Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		14			177	1		23	267	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type | Storage							Undivided									

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							16							25		
Capacity, c (veh/h)							813							1386		
v/c Ratio							0.02							0.02		
95% Queue Length, Q_{95} (veh)							0.1							0.1		
Control Delay (s/veh)							9.5							7.6		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.5								0.8		
Approach LOS						A										

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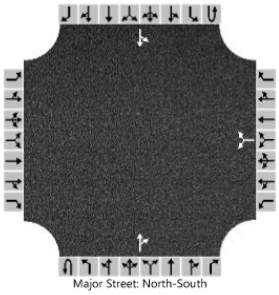
EXHIBIT 4.32
2032 TOTAL PEAK AM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2032	North/South Street	Manotick Station Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		23			196	1		9	79	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							26							10		
Capacity, c (veh/h)							821							1362		
v/c Ratio							0.03							0.01		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							9.5							7.7		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.5								0.8		
Approach LOS						A										

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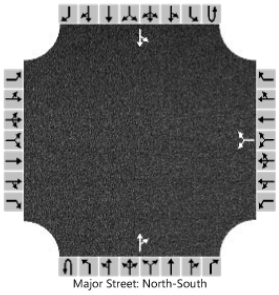
EXHIBIT 4.33
2032 TOTAL PEAK PM HOUR ANALYSIS - Green Links/Manotick Station

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Green Links/Manotick Stat
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/19/2021	East/West Street	Green Links Way
Analysis Year	2032	North/South Street	Manotick Station Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Emerald Subdivision		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		14			186	1		23	280	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							16							25		
Capacity, c (veh/h)							801							1374		
v/c Ratio							0.02							0.02		
95% Queue Length, Q_{95} (veh)							0.1							0.1		
Control Delay (s/veh)							9.6							7.7		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.6								0.7		
Approach LOS						A										

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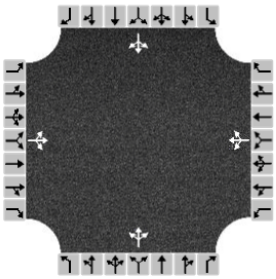
EXHIBIT 4.34
2018 EXISTING PEAK AM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2018	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak AM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	47	39	7	5	56	45	14	285	27	47	76	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	101			115			354			145		
Percent Heavy Vehicles	10			10			10			10		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.090			0.102			0.315			0.129		
Final Departure Headway, hd (s)	5.57			5.25			4.83			5.17		
Final Degree of Utilization, x	0.157			0.168			0.476			0.207		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.57			3.25			2.83			3.17		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	101			115			354			145		
Capacity	646			685			745			697		
95% Queue Length, Q_{95} (veh)	0.6			0.6			2.6			0.8		
Control Delay (s/veh)	9.6			9.3			12.1			9.5		
Level of Service, LOS	A			A			B			A		
Approach Delay (s/veh)	9.6			9.3			12.1			9.5		
Approach LOS	A			A			B			A		
Intersection Delay, s/veh | LOS	10.8						B					

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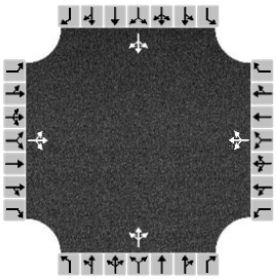
EXHIBIT 4.35
2018 EXISTING PEAK PM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2018	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak PM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	23	49	18	39	70	59	11	90	32	38	242	37
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	98			183			145			345		
Percent Heavy Vehicles	10			3			3			5		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.087			0.162			0.129			0.306		
Final Departure Headway, hd (s)	5.54			5.19			5.07			4.91		
Final Degree of Utilization, x	0.150			0.263			0.203			0.470		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.54			3.19			3.07			2.91		
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	98			183			145			345		
Capacity	650			694			710			733		
95% Queue Length, Q_{95} (veh)	0.5			1.1			0.8			2.5		
Control Delay (s/veh)	9.5			10.0			9.4			12.2		
Level of Service, LOS	A			B			A			B		
Approach Delay (s/veh)	9.5			10.0			9.4			12.2		
Approach LOS	A			B			A			B		
Intersection Delay, s/veh | LOS	10.8						B					

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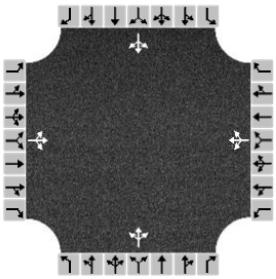
EXHIBIT 4.36
2027 BACKGROUND PEAK AM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak AM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	51	46	8	5	62	49	15	312	30	51	83	11
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	114			126			388			158		
Percent Heavy Vehicles	10			10			10			10		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.101			0.112			0.345			0.140		
Final Departure Headway, hd (s)	5.76			5.45			4.97			5.33		
Final Degree of Utilization, x	0.183			0.191			0.535			0.234		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.76			3.45			2.97			3.33		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	114			126			388			158		
Capacity	625			661			725			675		
95% Queue Length, Q_{95} (veh)	0.7			0.7			3.2			0.9		
Control Delay (s/veh)	10.0			9.7			13.5			10.0		
Level of Service, LOS	B			A			B			A		
Approach Delay (s/veh)	10.0			9.7			13.5			10.0		
Approach LOS	B			A			B			A		
Intersection Delay, s/veh | LOS	11.7						B					

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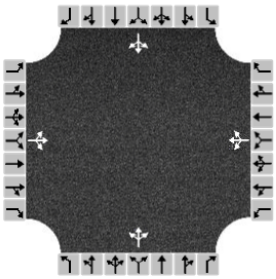
EXHIBIT 4.37
2027 BACKGROUND PEAK PM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak PM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	25	56	20	43	80	65	12	98	35	42	265	40
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	110			204			158			377		
Percent Heavy Vehicles	10			3			3			5		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.098			0.182			0.140			0.335		
Final Departure Headway, hd (s)	5.79			5.41			5.30			5.09		
Final Degree of Utilization, x	0.177			0.307			0.232			0.533		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.79			3.41			3.30			3.09		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	110			204			158			377		
Capacity	621			665			679			708		
95% Queue Length, Q_{95} (veh)	0.6			1.3			0.9			3.2		
Control Delay (s/veh)	10.0			10.8			9.9			13.7		
Level of Service, LOS	B			B			A			B		
Approach Delay (s/veh)	10.0			10.8			9.9			13.7		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh | LOS	11.8						B					

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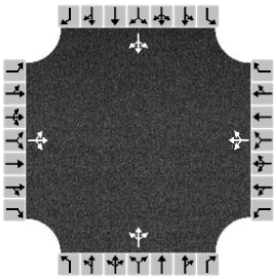
EXHIBIT 4.38
2032 BACKGROUND PEAK AM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak AM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

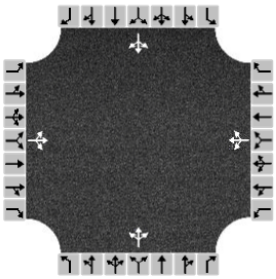
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	54	48	8	6	65	52	16	327	31	54	87	11
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	120			134			407			165		
Percent Heavy Vehicles	10			10			10			10		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.106			0.119			0.361			0.147		
Final Departure Headway, hd (s)	5.89			5.57			5.04			5.44		
Final Degree of Utilization, x	0.196			0.207			0.569			0.250		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.89			3.57			3.04			3.44		
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	120			134			407			165		
Capacity	611			646			715			661		
95% Queue Length, Q_{95} (veh)	0.7			0.8			3.6			1.0		
Control Delay (s/veh)	10.3			10.0			14.5			10.2		
Level of Service, LOS	B			B			B			B		
Approach Delay (s/veh)	10.3			10.0			14.5			10.2		
Approach LOS	B			B			B			B		
Intersection Delay, s/veh | LOS	12.3						B					

EXHIBIT 4.39
2032 BACKGROUND PEAK PM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak PM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	26	59	21	45	84	68	13	103	37	44	278	43
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	115			214			166			397		
Percent Heavy Vehicles	10			3			3			5		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.102			0.190			0.148			0.353		
Final Departure Headway, hd (s)	5.92			5.52			5.41			5.17		
Final Degree of Utilization, x	0.189			0.328			0.250			0.570		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.92			3.52			3.41			3.17		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	115			214			166			397		
Capacity	608			652			665			696		
95% Queue Length, Q_{95} (veh)	0.7			1.4			1.0			3.6		
Control Delay (s/veh)	10.3			11.2			10.2			14.8		
Level of Service, LOS	B			B			B			B		
Approach Delay (s/veh)	10.3			11.2			10.2			14.8		
Approach LOS	B			B			B			B		
Intersection Delay, s/veh | LOS	12.5						B					

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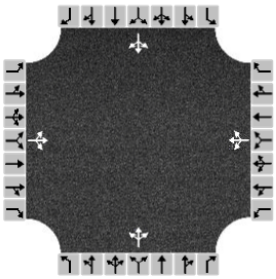
EXHIBIT 4.40
2027 TOTAL PEAK AM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak AM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	51	48	8	5	63	50	15	313	30	53	85	11
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	116			128			389			162		
Percent Heavy Vehicles	10			10			10			10		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.103			0.114			0.346			0.144		
Final Departure Headway, hd (s)	5.78			5.47			4.99			5.36		
Final Degree of Utilization, x	0.187			0.195			0.540			0.241		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.78			3.47			2.99			3.36		
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	116			128			389			162		
Capacity	623			658			721			672		
95% Queue Length, Q_{95} (veh)	0.7			0.7			3.3			0.9		
Control Delay (s/veh)	10.1			9.8			13.7			10.1		
Level of Service, LOS	B			A			B			B		
Approach Delay (s/veh)	10.1			9.8			13.7			10.1		
Approach LOS	B			A			B			B		
Intersection Delay, s/veh | LOS	11.8						B					

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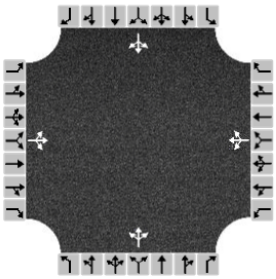
EXHIBIT 4.41
2027 TOTAL PEAK PM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2027	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak PM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	25	57	20	43	82	67	12	100	35	43	266	40
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	111			209			160			379		
Percent Heavy Vehicles	10			3			3			5		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.099			0.186			0.142			0.337		
Final Departure Headway, hd (s)	5.82			5.43			5.33			5.11		
Final Degree of Utilization, x	0.179			0.315			0.237			0.539		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.82			3.43			3.33			3.11		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	111			209			160			379		
Capacity	618			663			675			704		
95% Queue Length, Q_{95} (veh)	0.6			1.3			0.9			3.2		
Control Delay (s/veh)	10.1			10.9			10.0			13.9		
Level of Service, LOS	B			B			A			B		
Approach Delay (s/veh)	10.1			10.9			10.0			13.9		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh | LOS	12.0						B					

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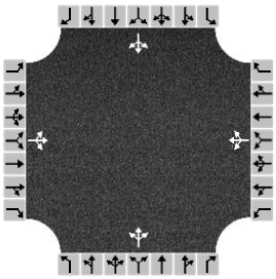
EXHIBIT 4.42
2032 TOTAL PEAK AM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak AM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	54	50	8	6	66	53	16	328	31	56	89	11
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	122			136			408			170		
Percent Heavy Vehicles	10			10			10			10		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.108			0.121			0.362			0.151		
Final Departure Headway, hd (s)	5.92			5.60			5.06			5.47		
Final Degree of Utilization, x	0.200			0.211			0.573			0.258		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.92			3.60			3.06			3.47		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	122			136			408			170		
Capacity	608			643			711			658		
95% Queue Length, Q_{95} (veh)	0.7			0.8			3.7			1.0		
Control Delay (s/veh)	10.4			10.1			14.6			10.4		
Level of Service, LOS	B			B			B			B		
Approach Delay (s/veh)	10.4			10.1			14.6			10.4		
Approach LOS	B			B			B			B		
Intersection Delay, s/veh | LOS	12.4						B					

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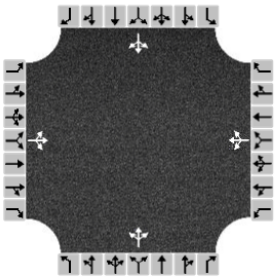
EXHIBIT 4.43
2032 TOTAL PEAK PM HOUR ANALYSIS - Apple Orchard/Stagecoach

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst		Intersection	Apple Orchard/Stagecoach
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	8/20/2021	East/West Street	Apple Orchard Road
Analysis Year	2032	North/South Street	Stagecoach Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Peak PM Hour		
Project Description	Emerald Subdivision		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	26	60	21	45	86	70	13	105	37	45	279	43
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	116			218			168			399		
Percent Heavy Vehicles	10			3			3			5		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.103			0.194			0.150			0.355		
Final Departure Headway, hd (s)	5.95			5.54			5.44			5.20		
Final Degree of Utilization, x	0.192			0.336			0.255			0.576		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.95			3.54			3.44			3.20		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	116			218			168			399		
Capacity	605			650			662			693		
95% Queue Length, Q_{95} (veh)	0.7			1.5			1.0			3.7		
Control Delay (s/veh)	10.4			11.3			10.3			15.0		
Level of Service, LOS	B			B			B			C		
Approach Delay (s/veh)	10.4			11.3			10.3			15.0		
Approach LOS	B			B			B			C		
Intersection Delay, s/veh | LOS	12.6						B					

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