MacEWEN SERVICE CENTRE
5546 ALBION ROAD
OTTAWA, ONTARIO

TIA STRATEGY REPORT

March 20, 2023

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

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Prepared for:

MacEwen Petroleum Inc.
18 Adelaide Street
Maxville ON K0C 1T0

759 TIA Strategy.doc

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

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INTRODUCTION

The MacEwen gasoline service station is an existing service station located at the northwest corner of the intersection of Albion Road and Mitch Owens Road. The property has a net area of 10,843.7 m^2 and currently contains a fuelling station with 12 gasoline and 2 diesel fuelling positions, and a convenience store with a coffee shop. The service station counter and convenience store/coffee shop are contained in a single building with a gross floor area of 189 m^2. The site has two existing access points with one onto Mitch Owens Road located 75 m west of the Albion/Mitch Owens intersection, and a second access onto Albion Road located 90 m north of the intersection. The location of the MacEwen service station is provided in Figure 1.1.

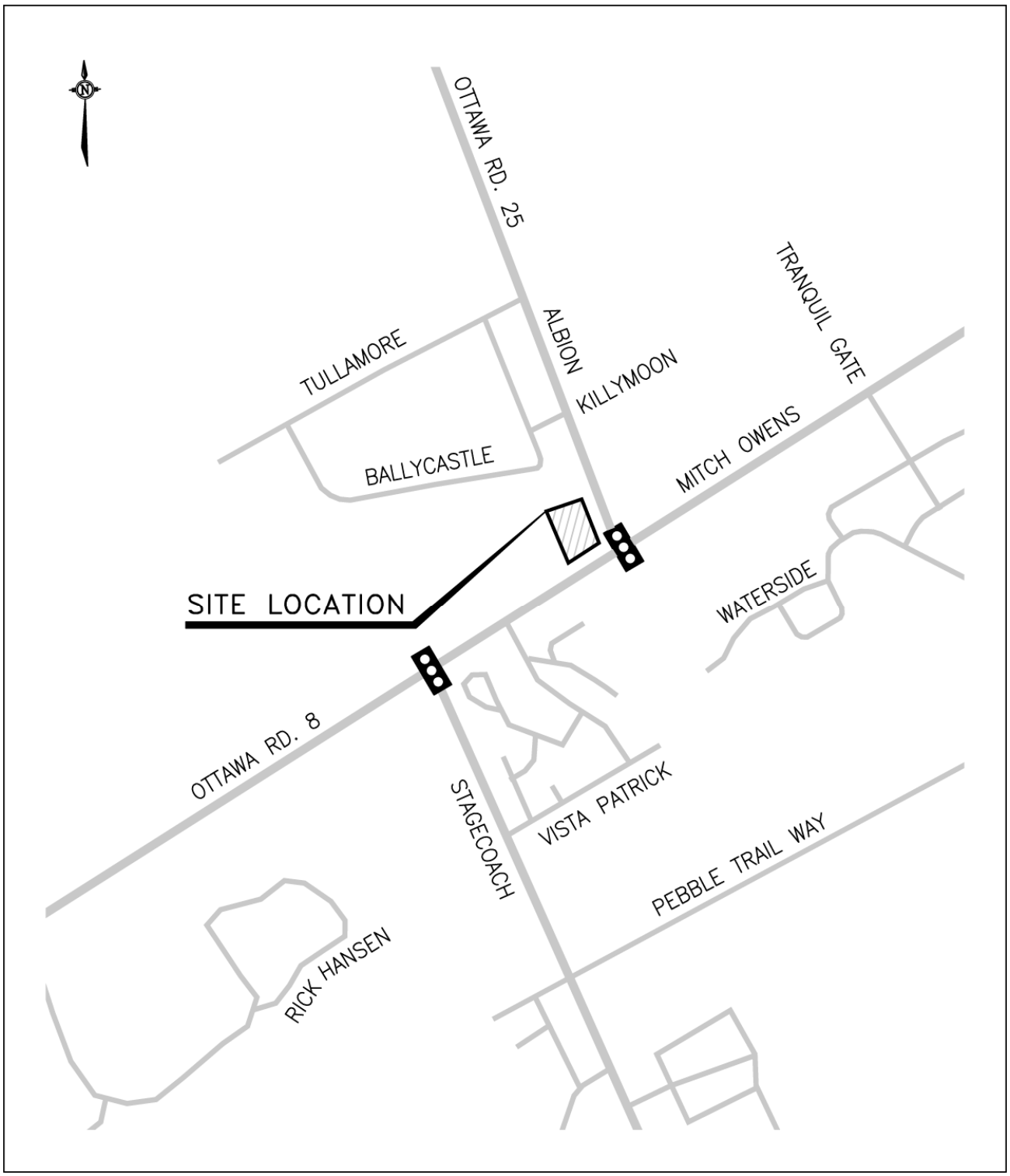
A Site Plan has been prepared to modify the site by increasing the size of the convenience store from 189 m^2 to 400 m^2. There will be no changes to the number of gasoline and diesel fuelling positions. The site will also provide 2 new electric vehicle quick charging stations. The modified site will retain the existing two accesses onto Albion Road and Mitch Owens Road. The site modifications are expected to be completed and the service station operational by the year 2024.

The firm of D. J. Halpenny & Associates Ltd. has been retained to prepare a Transportation Impact Assessment report in support of the Site Plan Application. The following documents the steps which conform to the City of Ottawa *Transportation Impact Assessment Guidelines (2017)*. Exhibit A.1 in the Appendix presents the consultant Certification Form.

STEP 1 - SCREENING

A Screening Form has been prepared for the project and is provided as Exhibit 1.1 in the Appendix. The Screening Form was submitted to the City of Ottawa which determined that the Trip Generation and Safety Triggers were met and a Transportation Impact Assessment (TIA) study must continue onto the next stage. The following will address the requirements of the Scoping Document.

FIGURE 1.1
SITE LOCATION PLAN



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STEP 2 - SCOPING

MODULE 2.1 – Existing and Planned Conditions

Element 2.1.1 – Proposed Development

The MacEwen service station at 5546 Albion Road is located at the northwest corner of the intersection of Albion Road and Mitch Owens Road. The existing station contains 12 regular fuelling positions and 2 diesel fuelling positions. There is a single free standing building on site with a gross floor area of 189 m^2 which contains the gas bar service counter, a C-Store (convenience store) and a Java Post coffee shop.

MacEwen Petroleum Inc. is proposing to redevelop the property to provide better amenities by replacing the existing building with a new 400 m^2 building which will contain the gas bar service counter and a convenience store (a building expansion of 211 m^2). There will be no changes in the number of petroleum fuelling positions. The Site Plan does provide space for 2 new electric vehicle charging stations. The EV charging stations will be the quick charge Level 3 charging station. The site will provide 31 parking spaces including 1 barrier free space. Although the building and fuelling area will be redeveloped, the site will retain the existing two site access points onto Albion Road and Mitch Owens Road.

The service centre property has a net lot area of 10,844 m^2 fronting on both Albion Road and Mitch Owens Road. The land is zoned RC2 - Rural Commercial Zone which will support the proposed redevelopment. Lands surrounding the site comprise of residential properties north of the site, vacant land immediately south of Mitch Owens Road, some commercial and vacant lands to the east, and vacant lands to the west.

The gasoline service centre will be redeveloped in a single phase with completion expected by the year 2024. Figure 2.1 shows a conceptual site plan of the development.

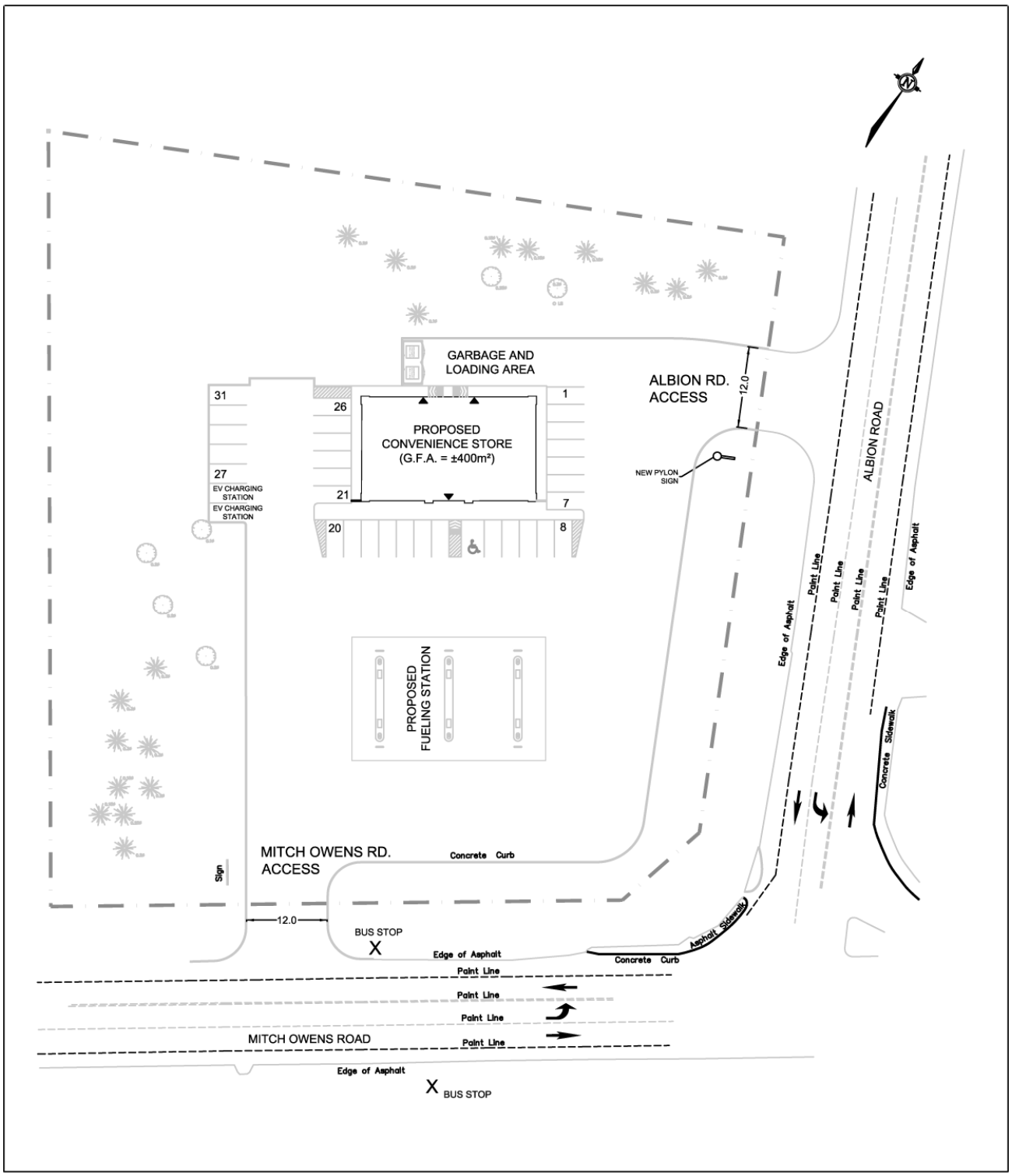
Element 2.1.2 – Existing Conditions

ROADS

The MacEwen Service Centre is located on the west side of Albion Road. Albion Road is a two lane rural road which is designated in the *Ottawa 20/20 – Transportation Master Plan* (TMP) as an arterial road. There are no pedestrian sidewalks along either side of the road. There are paved shoulders along the road which is designated in the City of Ottawa TMP as a Spine Route in the Cycling Network - Primary Rural. The posted speed limit along the road in the vicinity of the site is 80 km./h.

Mitch Owens Road borders the south end of the site. The road has paved shoulders and is designated in the TMP as an arterial road and Spine Route. The road is a two lane rural road with no sidewalks or cycling facilities. The posted speed limit along the road in the vicinity of the site is 80 km./h.

FIGURE 2.1
CONCEPTUAL SITE PLAN



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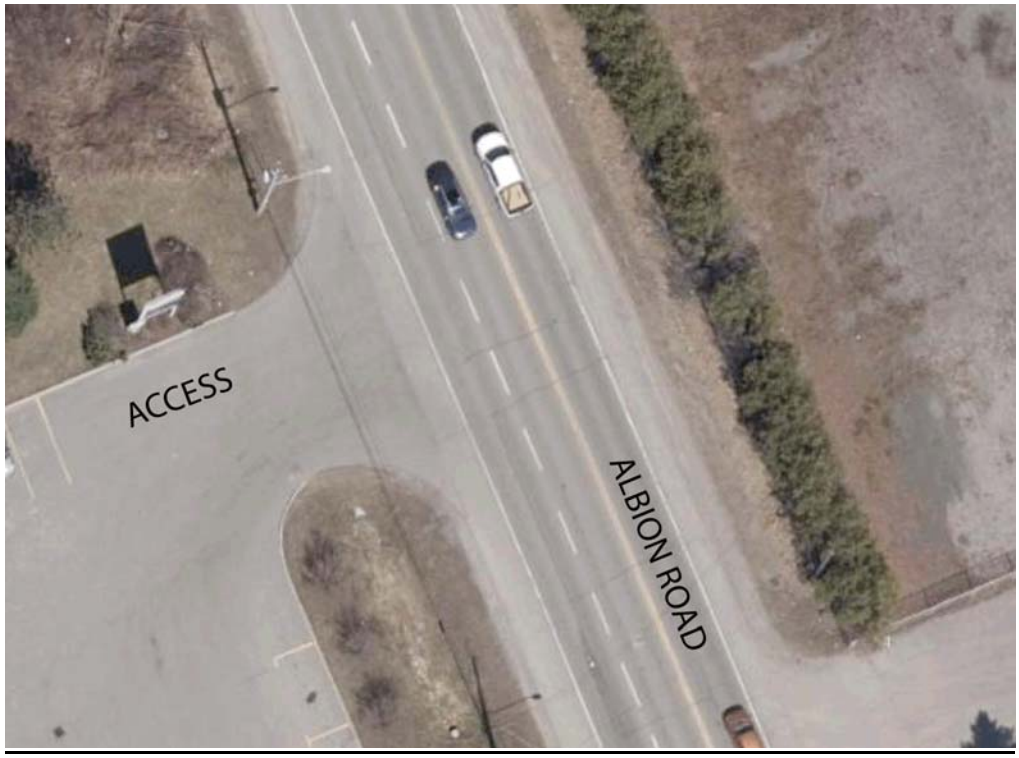
Stagecoach Road is located 600 m west of Albion Road. Stagecoach Road is a rural arterial road and Spine Route with paved shoulders and no sidewalks or cycling facilities. The posted speed limit in the vicinity of Mitch Owens Road is 70 km./h.

INTERSECTIONS

Site Access/Albion Intersection - The intersection is one of two accesses to the site. The Albion Road access is located approximately 90 m north of the Albion/Mitch Owens intersection (centreline to centreline). The intersection is a "T" intersection with Albion Road forming the northbound and southbound approaches, and the site access the eastbound approach. There are no pavement markings or stop sign at the eastbound site approach, but the 12 m width of the access provides sufficient space for a shared left/right turn lane with a flared approach providing storage for 1 left and right turning vehicle at the implied stop. Traffic in the southbound left turn lane to the Albion/Mitch Owens intersection does queue during peak hours which periodically extends north past the eastbound site access approach. Below is the existing lane configuration of the Site Access/Albion intersection with an aerial photograph of the intersection from geoOttawa:

Northbound Albion Rd.	One shared left/through lane
Southbound Albion Rd.	One through lane
	One shared through/right lane
Eastbound Site Access	One shared left/right turn lane (Implied Stop)

INTERSECTION OF SITE ACCESS/ALBION - Aerial



Site Access/Mitch Owens Intersection - The intersection is a two-way stop controlled "T" intersection with an implied stop at the southbound site access approach. The intersection is located approximately 75 m west of the Albion/Mitch Owens intersection. Mitch Owens Road forms the eastbound and westbound approaches, and the site the 12 m wide southbound approach. There are no lane markings or stop sign at the southbound approach, but the 12 m width of the access provides sufficient space for a shared left/right turn lane with a flared approach providing storage for 2 left and right turning vehicles at the implied stop. Mitch Owens Road currently contains no auxiliary turn lanes into the site, however the queuing of the left turn lane at the eastbound approach to the Albion/Mitch Owens intersection does extend across the site access during peak periods. Below is the existing lane configuration of the Site Access/Mitch Owens intersection with an aerial photograph of the intersection from geoOttawa:

Eastbound Mitch Owens Rd.	One left turn lane (Extending from Albion/Mitch Owens) One through lane
Westbound Mitch Owens Rd.	One shared through/right lane
Southbound Site Access	One shared left/right turn lane (Implied Stop)

INTERSECTION OF SITE ACCESS/MITCH OWENS - Aerial

Albion/Mitch Owens Intersection - The Albion/Mitch Owens intersection is a "T" intersection controlled by traffic signals which contain a protected eastbound left turn phase. Mitch Owens Road forms the eastbound and westbound approaches and Albion Road the southbound approach. There is a short section of sidewalk at the northeast corner providing access to the island at the westbound channelized right turn lane. The

following is the lane configuration with an aerial photograph of the intersection from geoOttawa:

Eastbound Mitch Owens Rd.	One left turn lane (255 m storage/parallel)
	One through lane
Westbound Mitch Owens Rd.	One through lane
	One channelized right turn lane (160 m storage)
Southbound Albion Rd.	One left turn lane (140 m storage/parallel)
	One right turn lane

INTERSECTION OF ALBION/MITCH OWENS - Aerial

Stagecoach/Mitch Owens Intersection - The intersection of Stagecoach Road and Mitch Owens Road is located 600 m west of the Albion/Mitch Owens intersection. The intersection is a “T” intersection with Mitch Owens Road forming the eastbound and westbound approaches, and Stagecoach Road the northbound approach. The intersection is controlled by traffic signals containing a protected westbound left turn phase. There are no sidewalks at any of the intersection approaches, with only a paved standing area at each cross walk approach. The following is the lane configuration with an aerial photograph of the intersection from geoOttawa:

Eastbound Mitch Owens Rd.	One shared through/right lane
Westbound Mitch Owens Rd.	One through lane
	One left turn lane (220 m storage/parallel)
Northbound Stagecoach Rd.	One left turn lane (150 m storage/parallel)
	One right turn lane

INTERSECTION OF STAGECOACH/MITCH OWENS - Aerial

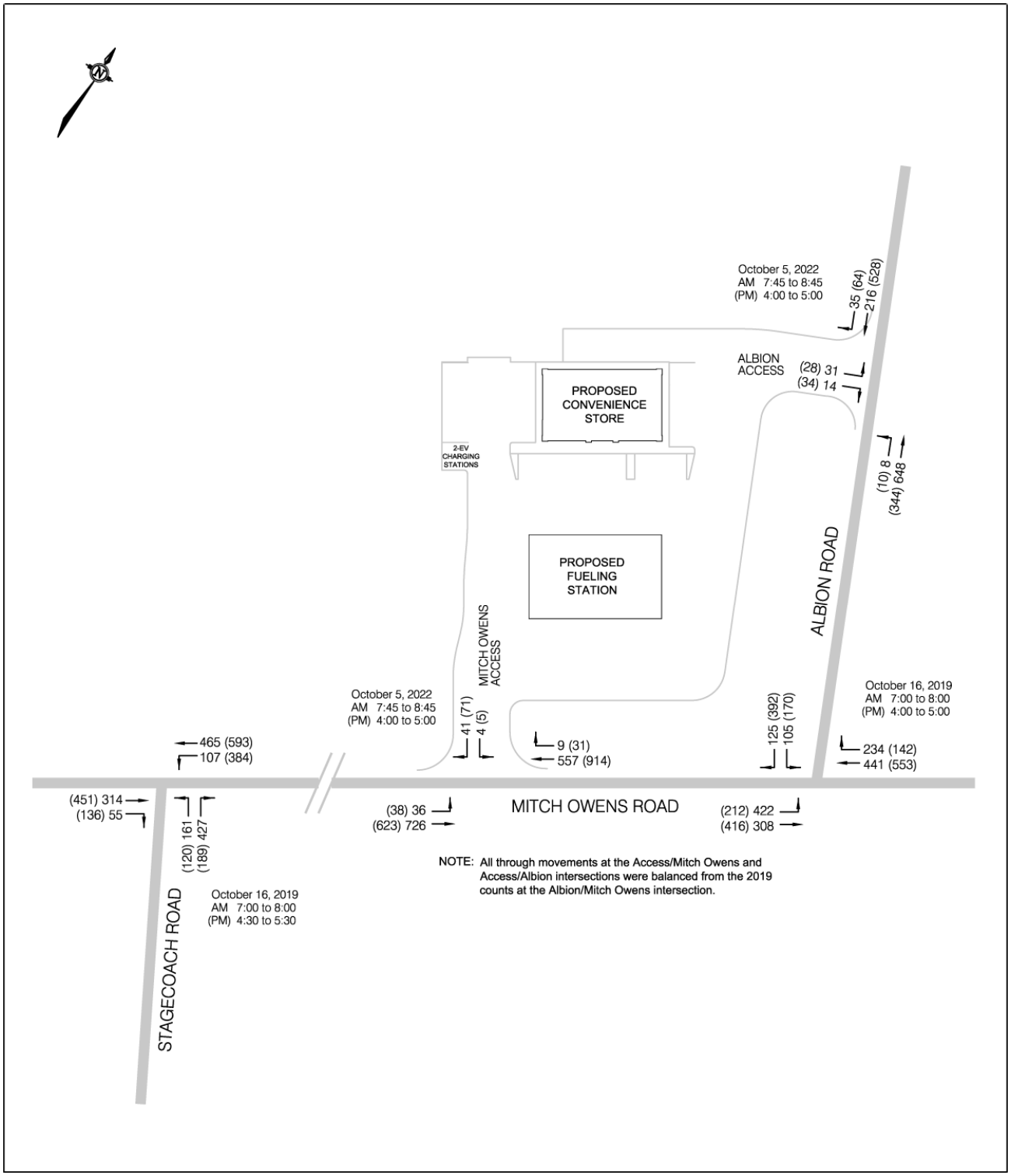
Figure 2.2 shows the weekday traffic counts at the Albion/Mitch Owens and Stagecoach/Mitch Owens intersections taken on October 16, 2019 by the City of Ottawa, and the traffic counts taken at the two MacEwen accesses on October 5, 2022 by the consultant. Exhibit 2.1, 2.2, 2.3 and 2.4 in the Appendix presents the traffic counts at the Albion/Mitch Owens and Stagecoach/Mitch Owens intersections and two site access points.

TRANSIT

The section of Albion Road and Mitch Owens Road in the vicinity of the site is currently not served by regular or peak hour OC Transpo routes. There is no transit service within a 4.5 km walk of the site. As developments in the area are completed and occupied, regular transit service and routes would be evaluated and determined.

There is a transit route providing one bus past the site in the morning (9:30 AM) travelling to the Billings Bridge transit station, and one bus returning (3:00 PM). The route is Route 304 which provides no charge service with one bus travelling on Thursdays past the site outside the peak hour of traffic along the adjacent roads. The bus stops are located on the north and south sides of Mitch Owens Road at the site's Mitch Owens Access as shown in the conceptual site plan in Figure 2.1.

FIGURE 2.2
EXISTING PEAK AM AND PM HOUR TRAFFIC COUNTS



NOT TO SCALE

COLLISION HISTORY

Collision reports were obtained through Open Data Ottawa for the following intersections and road segments:

Intersections	Albion Road and Mitch Owens Road Stagecoach Road and Mitch Owens Road MacEwen Access at Albion Road MacEwen Access and Mitch Owens Road
Road Segments	Albion Rd. between Mitch Owens Rd. and Killymoon Way Mitch Owens Rd. between Albion Rd. and Stagecoach Rd. Mitch Owens Rd. between Albion Rd. and Tranquil Gate

The collision data was for the five year time period between January 1, 2016 and December 31, 2020. Over the five year period, 62 collisions were reported at the Albion/Mitch Owens intersection and 27 collisions at the Stagecoach/Mitch Owens intersection. The pattern of the majority of collisions was related to turning movements at the Albion/Mitch Owens intersection, and rear end collisions at the Stagecoach/Mitch Owens intersection. The site access points reported 5 collisions at the Site Access/Albion intersection, and 0 collisions at the Site Access/Mitch Owens intersection. Table 2.1 summarizes the collisions by year and type.

SURROUNDING AREA

The area surrounding the site is predominantly rural, with a residential subdivision north of the site (Zoned Rural Residential), vacant commercial land east of the site (Zoned Rural Heavy Industrial), vacant forested land west of the site (Zoned Rural Residential), and vacant land south of the site on the south side of Mitch Owens Road (Zoned Rural Commercial).

There is a driveway accessing the vacant commercial property on the east side of Albion Road located approximately 35 m south of MacEwen's Albion Road access. The closest municipal intersections are the Killymoon/Albion intersection located 250 m north of the site, the Stagecoach/Mitch Owens intersection located 600 m west, and the Tranquil Gate/Mitch Owens intersection located 860 m east of the site.

Traffic counts taken on October 16, 2019 at the Albion/Mitch Owens and Stagecoach/Mitch Owens intersections were obtained from the City of Ottawa. The traffic counts are provided as Figure 2.2 and Exhibit 2.1 and Exhibit 2.2. The Albion/Mitch Owens counts determined that there were 0 bike trips and 0 pedestrian trips during the peak AM hour, and 0 bike trips and 1 pedestrian trip (crossing Mitch Owens Road) during the peak PM hour. The counts at the Stagecoach/Mitch Owens intersection determined that 0 bike and 0 pedestrians crossed the intersection during the peak AM and PM hours. With no regular transit service provided in the vicinity of the site, there were no peak hour travel demands recorded in the area for modes other than vehicular travel.

TABLE 2.1
COLLISION SUMMARY

YEAR	COLLISION TYPE					TOTAL
	REAR END	ANGULAR	TURNING	SIDESWIPE	OTHER	
INTERSECTION - Albion Road at Mitch Owens Road Intersection						
2016	2	0	4	0	2	8
2017	8	0	10	1	1	20
2018	4	4	6	1	0	15
2019	2	0	9	1	0	12
2020	0	1	5	1	0	7
INTERSECTION - Stagecoach Road at Mitch Owens Road Intersection						
2016	6	2	0	0	1	9
2017	2	1	2	0	0	5
2018	2	0	2	0	1	5
2019	5	0	1	0	0	6
2020	2	0	0	0	0	2
INTERSECTION - MacEwen Access at Albion Road Intersection						
2016	0	0	0	0	0	0
2017	1	0	1	0	0	2
2018	0	0	1	0	0	1
2019	0	2	0	0	0	2
2020	0	0	0	0	0	0
INTERSECTION - MacEwen Access at Mitch Owens Road Intersection						
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
2020	0	0	0	0	0	0
SEGMENT - Albion Road Segment - Between Mitch Owens Road and Killymoon Way						
2016	0	0	0	0	1	1
2017	0	0	0	0	0	0
2018	0	0	0	0	1	1
2019	1	0	0	0	0	1
2020	0	0	0	0	0	0
SEGMENT - Mitch Owens Road Segment - Between Albion Road and Stagecoach Road						
2016	1	0	0	0	0	1
2017	0	0	0	0	0	0
2018	1	0	1	0	0	2
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
SEGMENT - Mitch Owens Road Segment - Between Albion Road and Tranquil Gate						
2016	1	0	0	0	0	1
2017	0	0	0	0	0	0
2018	0	0	0	0	1	1
2019	1	0	0	0	0	1
2020	0	0	0	0	0	0

Element 2.1.3 – Planned Conditions

The *Transportation Master Plan 2013* (TMP) was examined to determine if there were any roadway or intersection modifications to the municipal road network. The TMP did not identify any roadway infrastructure projects in both the 2031 Network Concept list and Affordable Network list. City staff did identify some planned intersection modifications to protect the eastbound Mitch Owens Road left turn movement.

A development application search was conducted on the City of Ottawa website. There were no Site Plan Applications for development in the proximity of the site.

MODULE 2.2 – Study Area and Time Periods

Element 2.2.1 – Study Area

The study area for the MacEwen Service Centre will be confined to the site's two access points onto Albion Road and Mitch Owens Road, and the signalized intersections of Albion/Mitch Owens and Stagecoach/Mitch Owens. The road sections examined would be along Albion Road between Mitch Owens Road and Killymoon Way, along Mitch Owens Road between Albion Road and Stagecoach Road to the west, and along Mitch Owens Road between Albion Road and Tranquil Gate to the east. The study will examine the intersection geometry and roadway segments in accordance with the City of Ottawa *Transportation Impact Assessment Guidelines (2017).*

Element 2.2.2 – Time Periods

The time period for the analysis would be the weekday peak AM and PM time period of the background roadway traffic. This would be the peak period of traffic along Albion Road and Mitch Owens Road as presented in existing traffic counts in Figure 2.2.

Element 2.2.3 – Horizon Years

The TIA will address the impact of the site generated trips from the proposed redevelopment of the MacEwen Service Centre. The horizon year of the study will be the completion of the proposed modifications at the year 2024. The analysis will further examine the impact at the year 2029 which represents five years beyond completion.

MODULE 2.3 – Exemptions Review

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

MODULE	ELEMENT	EXEMPTION CONSIDERATIONS
Design Review Component		
4.1 Development Design	4.1.2 Circulation and Access	No – The circulation of vehicles throughout the site and queuing at the Albion Rd. and Mitch Owens Rd. accesses will be examined.
	4.1.3 New Street Networks	Yes - Not Applicable. Only required for subdivisions.
4.2 Parking	4.2.1 Parking Supply	No – The parking supply will be compared to that required as determined from City By-laws.
	4.2.2 Spillover Parking	Yes - Parking will meet the City of Ottawa By-laws. The Site Plan will provide sufficient parking for the convenience store.
Network Impact Component		
4.5 Transportation Demand Management	All Elements	Yes – The convenience store and gas bar would have few employees.
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Yes – The site will have access only onto arterial roads.
4.8 Network Concept		Yes - The site would not generate more than 200 person-trips per peak hour in excess of the volume permitted by established zoning.

STEP 3 - FORECASTING

MODULE 3.1 - Development-generated Travel Demand

Element 3.1.1 – Trip Generation and Mode Shares

The additional site generated trips resulting from the redevelopment of the MacEwen Service Centre would comprise of trips from the expansion of the convenience store and the provision of 2 electric vehicle (EV) charging stations. There would be no additions to the petroleum fuelling stations.

The peak AM and PM hour trip generation rates for the convenience store were determined from transaction data obtained from MacEwen Petroleum Inc. The data showed the number of peak hour transactions at the convenience store which were not related to fuel transactions paid either outside or inside the building, or transactions relating to fuel and merchandise purchases. The data for peak hour inside merchandise transactions on October 5, 2022 for the 189 m^2 building was 0.233 trips/m^2 GFA during

the peak AM hour and 0.265 trips/m^2 during the peak PM hour. For the building addition of 211 m^2, the redevelopment would result in an additional 49 trips entering and 49 trips exiting totaling 98 trips during the peak AM hour, and 56 trips entering and 56 trips exiting totaling 112 trips during the peak PM hour.

The site redevelopment will also include the addition of 2 electric vehicle (EV) Level 3 charging stations. With no statistical trip data available for an EV charging station which is proposed at the west side of the proposed convenience store, the study has assumed that both EV Level 3 charging stations are in use. With a turnover of 30 minutes each, which is the approximate length of time it takes to charge a vehicle from 0 to 80%, the trips were calculated as shown below:

EV Trips Generated = [# Charging Stations / Length of Charge (Minutes)] x 2 (enter/exit)
= [2 / (30/60)] x 2
= 8 Trips or 4 Trips entering and 4 Trips exiting

The number of future person-trips was determined by the number of auto-trips calculated above, and multiplied by 1.28 (from the TIA Guidelines) to convert auto-trips to person-trips. Table 3.1 shows the future peak hour auto-trips and person-trips generated by the building addition and EV charging stations.

TABLE 3.1
PEAK HOUR SITE GENERATED TRIPS

TRIPS	Peak AM Hr. Auto-Trips	Peak PM Hr. Auto-Trips	Peak AM Hr. Person-Trips	Peak PM Hr. Person-Trips
Convenience Store	98 veh.	112 Veh.	125 Per.	143 Per.
EV Charging Sta.	8 Veh.	8 Veh.	10 Per.	10 Per.
Total Trips	106 veh.	120 veh.	135 Per.	153 Per.

The Trip Reduction Factors which were provided in the TIA Guidelines were applied to the land uses as discussed below:

1) *Deduction of Existing Development Trips* - The site has an existing convenience store with 12 regular and 2 diesel fuelling positions. There would be no trip deduction applied for an existing on-site use since the study will be adding new trips to the existing land use.

2) *Pass-by Vehicle Trips* - Pass-by trips are trips that are already on the road and are passing by the site on their way to their primary destination. They are not considered new trips generated by the site. The surveys provided in the ITE *Trip Generation Handbook 3rd Edition* for a Land Use Code 853 - Convenience Market with Gasoline Pumps, which has a convenience store as the primary use

and not the fuelling of vehicles. This land use would best represent the additional trips from the expanded convenience store which does not propose changes to the petroleum fuel stations. The ITE Handbook states the average peak AM hour pass-by trip percentage to be 63 percent, with 37 percent of the trips as primary trips. The pass-by trip percentage is considered reasonable due to the site location and high volume of commuter traffic travelling past the site and was applied to both the peak AM and PM hour trips.

3) *Synergy or Internalization* - The site will consist only of a gasoline service centre. There would be no trip reduction due to shared trips between multiple uses.

The expected number of primary and pass-by person-trips following the application of the three Trip Reduction Factors is shown in Table 3.2.

TABLE 3.2
TOTAL PEAK HOUR SITE GENERATED PERSON-TRIPS

TRIPS	FUTURE PERSON-TRIPS	
	AM Peak Hr.	PM Peak Hr.
Primary Trips	50 per.	57 per.
Pass-by Trips (Reduction 63%)	85 per.	96 per.
Total Person Trips	135 per.	153 per.

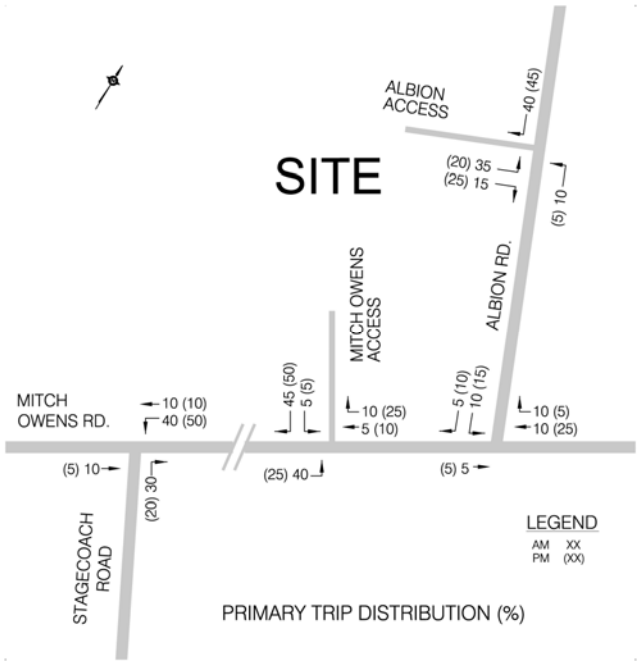
The MacEwen Service Centre is located at the northwest corner of the intersection of Albion Road and Mitch Owens Road. The location of the centre is in a rural area with no regular transit service or sidewalks and little residential development in the immediate area. Traffic counts taken by the City of Ottawa on October 16, 2019 counted no bicycles and only one pedestrian crossing the intersection during both the peak AM and PM hours. With the land use of the service centre being a fuelling station for cars and trucks, the modal share would comprise mainly of auto driver and auto passenger trips. The mode share for peak AM and PM hour trips was determined for a Commercial Generator from Table 13 in the *TRANS Trip Generation Manual - Summary Report* 2020. The City of Ottawa designates the area to be “South Gloucester / Leitrim”, with the mode share of all trips being a combination of Auto Driver and Auto Passenger trips. The analysis has proportioned the transit, cycling and walking mode shares from Table 13 of the TRANS document to only the auto driver and auto passenger shares. Table 3.3 presents the peak hour mode share, and the peak AM and PM hour primary and pass-by person-trips.

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

FUTURE MODE SHARE TARGETS FOR THE MacEWEN SERVICE CENTRE						
Travel Mode	**AM % Peak Hr.**	**Primary Trips**	**Pass-By Trips**	**PM % Peak Hr.**	**Primary Trips**	**Pass-By Trips**
Auto Driver	85%	42	72	76%	44	82
Auto Passenger	15%	8	13	24%	13	14
Transit	0%	0	0	0%	0	0
Cycling	0%	0	0	0%	0	0
Walking	0%	0	0	0%	0	0
Total	100%	50 Trips	85 Trips	100%	57 Trips	96 Trips

Element 3.1.2 – Trip Distribution

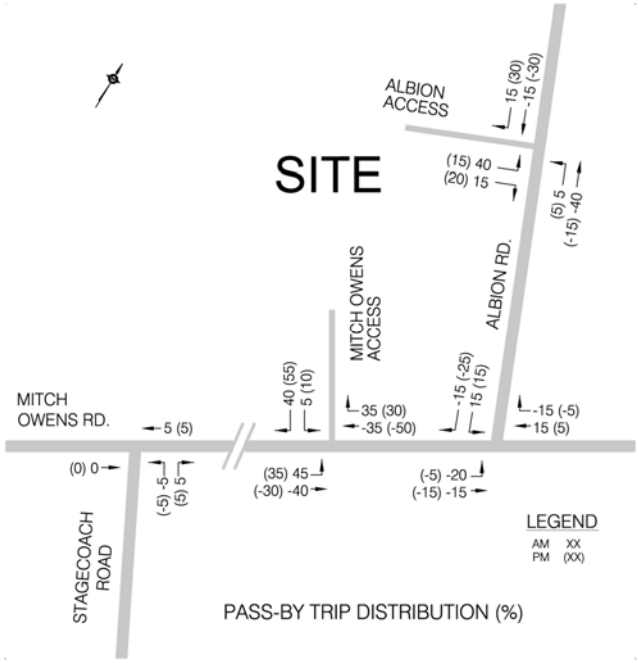
Primary Trips - The distribution of site generated primary trips was determined from the examination of the background traffic pattern at the adjacent intersections along with the size and location of the surrounding residential and employment areas which would represent the origin and destination of trips. The adjacent sketch shows the percentage distribution of primary trips to the site for the purposes of purchasing items at the convenience store or refuelling at the EV charging station.



The primary trip distribution was determined assuming full development of the site in 2024, and represents only the site trips associated with the additional development to the site. The proportioning of trips was calculated for the weekday peak AM and PM hours. The trips would be for the auto driver travel mode presented in Table 3.3.

Pass-By Trips - The pass-by and diverted site generated trips are trips already on the road and passing by or in the vicinity of the site. The distribution of pass-by trips was determined from the traffic counts of existing traffic at adjacent intersections to the site, and the convenience of routes entering and exiting the site from the mainstream traffic.

The percentage distribution of pass-by and diverted trips is shown on the adjacent sketch for the site access points and intersections within the study area. The pass-by trips shown in Table 3.3 under the auto driver travel mode were distributed onto the surrounding roads assuming the completion of the redevelopment in 2024. The trips were calculated for the weekday peak AM and PM hours.



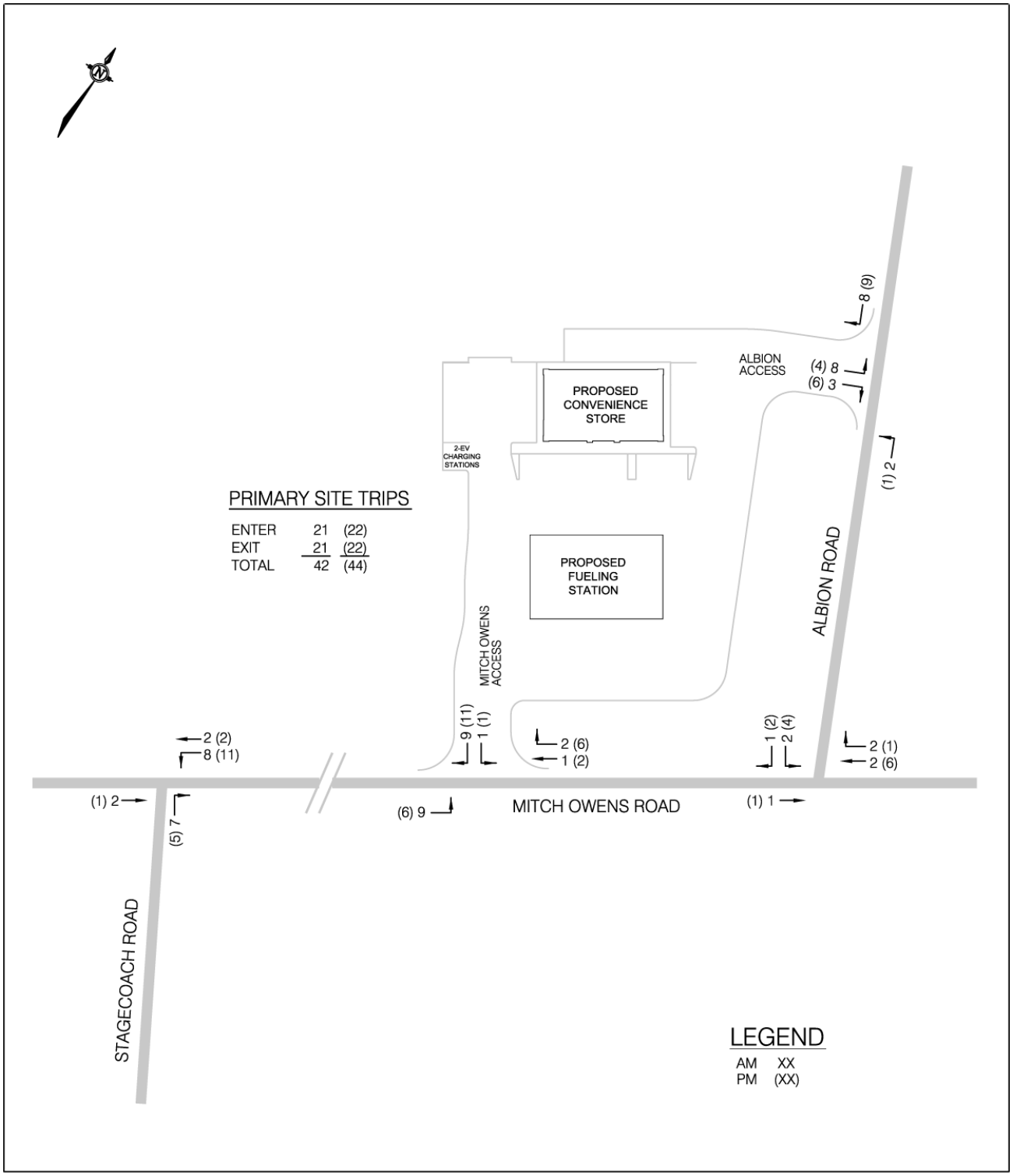
Element 3.1.3 – Trip Assignment

The distribution of site generated primary and pass-by vehicle-trips entering and exiting was determined by applying the directional distribution shown in the ITE trip generation graphs for convenience stores with gasoline pumps. The ITE Land Use distributes the site trips to 50 percent entering and 50 percent exiting for both the primary and pass-by peak AM and PM hour trips. This distribution was substantiated by the October 5, 2022 traffic counts at the site's Albion Road and Mitch Owens Road accesses. The peak hour vehicle-trips (auto driver) are shown in Table 3.4, and were proportioned onto the surrounding roads at the primary and pass-by distribution. Figure 3.1 shows the peak AM and PM hour site generated primary vehicle-trips, and Figure 3.2 the peak hour site generated pass-by/diverted vehicle-trips.

TABLE 3.4
PEAK HOUR ASSIGNMENT OF VEHICLE-TRIPS

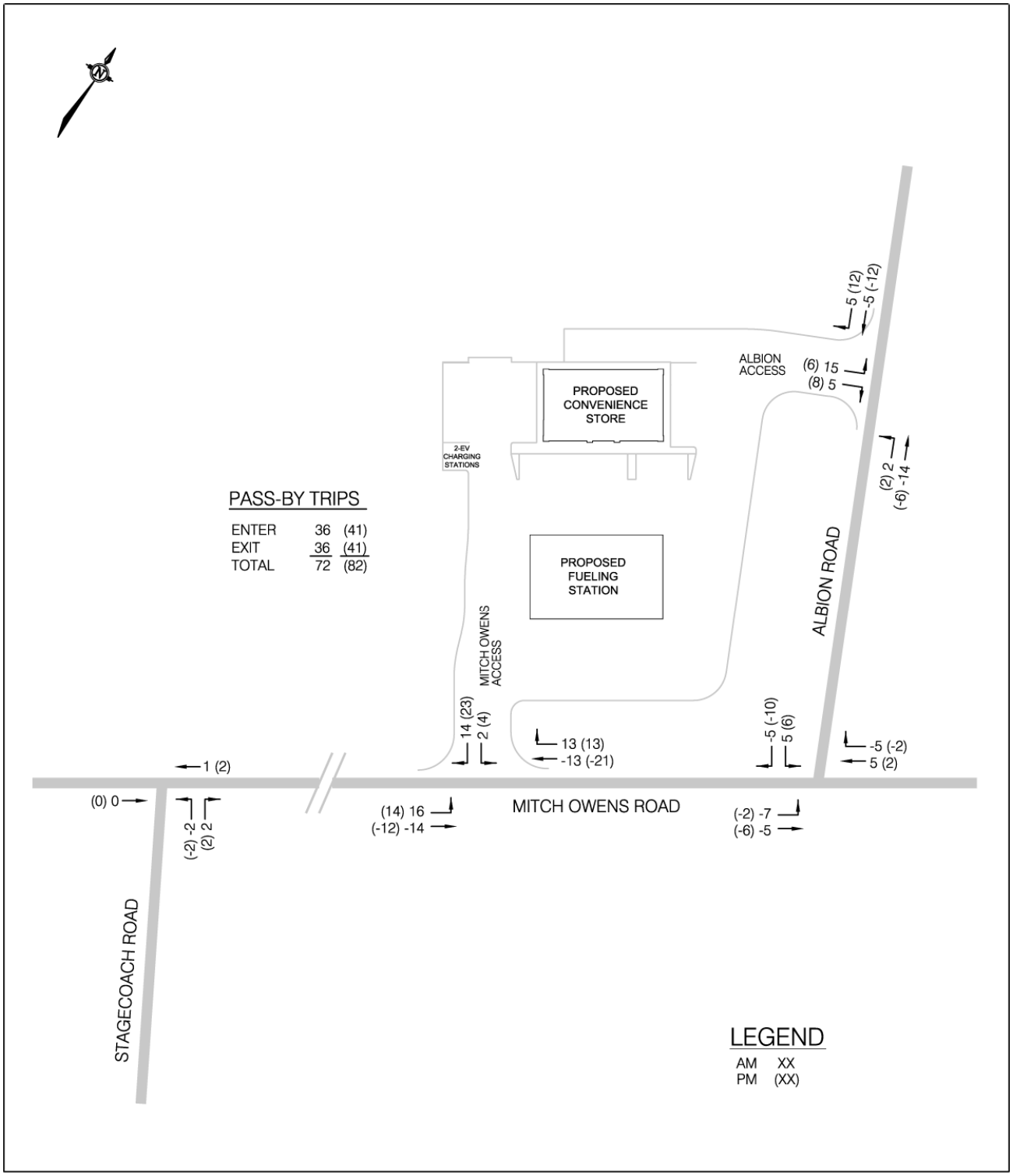
PEAK HOUR TRIPS / TRIP TYPE	WEEKDAY PEAK AM HR.			WEEKDAY PEAK PM HR.		
	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Primary Trips	42	21 (50%)	21 (50%)	44	22 (50%)	22 (50%)
Pass-by Trips	72	36 (50%)	36 (50%)	82	41 (50%)	41 (50%)
Total Vehicle-Trips	114	57	57	126	63	63

FIGURE 3.1
PEAK AM AND PM HOUR SITE GENERATED PRIMARY TRIPS



NOT TO SCALE

FIGURE 3.2
PEAK AM AND PM HOUR SITE GENERATED PASS-BY TRIPS



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 along with other traffic studies. The TMP did not identify any new roadway or transit projects within the study area. Although there is no regular transit service in the area, future development outside the horizon year of the study may trigger the need for transit service along Albion Road and Mitch Owens Road.

A development application search was conducted on the City of Ottawa website. There were no Site Plan Applications for development in the proximity of the site and within the time frame of the TIA study.

Element 3.2.2 – Background Growth

The background traffic would consist of the expected future volume of traffic which would not include trips from the redevelopment of the site. The background traffic was determined for the year 2024 when the modifications to the MacEwen Service Centre are expected to be completed, and for the year 2029 which represents five years beyond completion.

The 2024 and 2029 background traffic was determined for the existing intersections of Albion/Mitch Owens, Stagecoach/Mitch Owens, Albion Site Access and Mitch Owens Site Access. The background traffic comprised of two adjustment factors. The first would be to adjust the traffic counts taken at the two site accesses on October 5, 2022 to the expected 2022 pre-COVID-19 traffic. The second factor would be to increase the pre-COVID-19 typical traffic to account for future development outside the immediate area. The following discusses in detail the two background traffic adjustment factors:

1) Typical Peak Hour Traffic (pre-COVID-19)

The traffic counts taken at the site accesses on October 5, 2022 would need to be increased to account for the decreased traffic due to the COVID-19 outbreak, which resulted from both the temporary job loss of some of the work force and allowing some workers to work remotely from home. To convert the 2022 counts to the expected pre-COVID-19 traffic volumes, a conversion factor was applied to the counts. Traffic counts were obtained from the City of Ottawa Open Data website for the Annual Average Daily Traffic (AADT) at the intersection of Bank Street and Mitch Owens Road. The counts are shown below:

Count Date	**AADT**
June 13, 2019	21,282
May 28, 2021	18,200
	-14.5% decrease in traffic or 15%

For the first factor, the October 5, 2022 counts (Figure 2.1) at the approaches entering and exiting the Albion Site Access and Mitch Owens Site Access were increased by 15.0 percent.

2) Future 2024 and 2029 Background Traffic From Outside the Immediate Area

The second factor represents the increase in traffic due to future development outside the study area. The growth in background traffic was determined by examining the growth in peak AM hour traffic along Albion Road, Mitch Owens Road and Stagecoach Road. The traffic volumes from the *TRANS Regional Model* were obtained from the City of Ottawa for the peak AM hour at the years 2011 and 2031. The model showed the average annual compounded increase in peak AM hour traffic to be:

	2011	2031	Annual Increase
Albion Rd.	643 NB	592 NB	-0.41%
	134 SB	179 SB	1.46%
Mitch Owens Rd.	867 EB	925 EB	0.32%
	246 WB	284 WB	0.72%
Stagecoach Rd.	1,006 NB	1,069 NB	0.30%
	225 SB	308 SB	1.58%

The study has assumed a peak AM and PM hour annual compounded growth of 2.0 percent which was applied to all approaches following the COVID-19 adjustment. The growth rate translates to the following growth factors which represent the growth in traffic from outside the study area:

2.0% Annual Increase

2019 → 2024 1.104 Completion of the MacEwen modifications
2022 → 2024 1.040

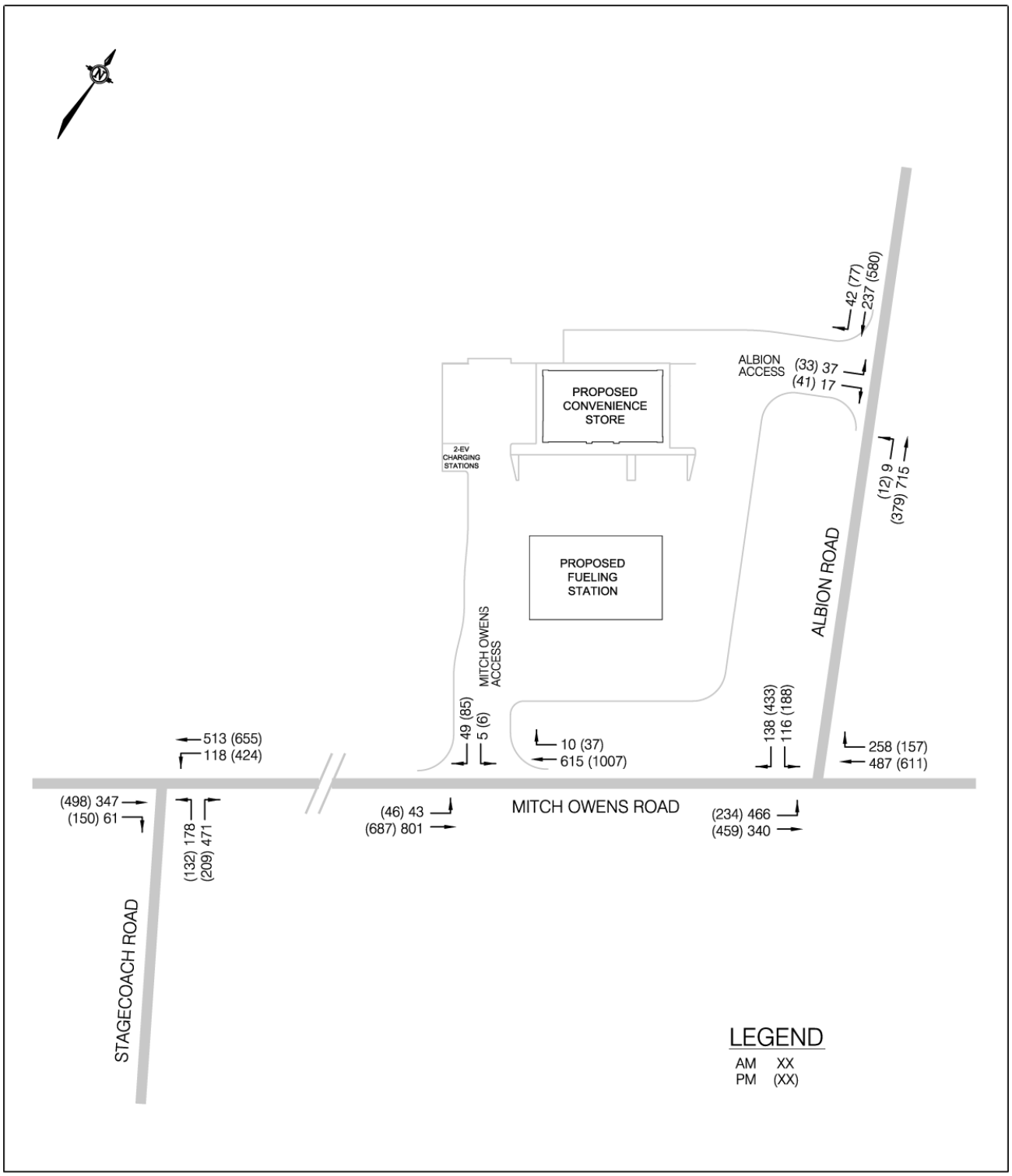
2024 → 2029 1.104 5 years beyond completion

Element 3.2.3 – Other Developments

A Development Application search was conducted at the City of Ottawa Open Data website for the surrounding area. The examination determined that there was no new development in close proximity to the site. The Albion Woods - Phase 2 subdivision is proposed on lands on the south side of Mitch Owens Road, but it is not expected to be completed and occupied by the horizon year of the TIA study and was therefore not included in the study.

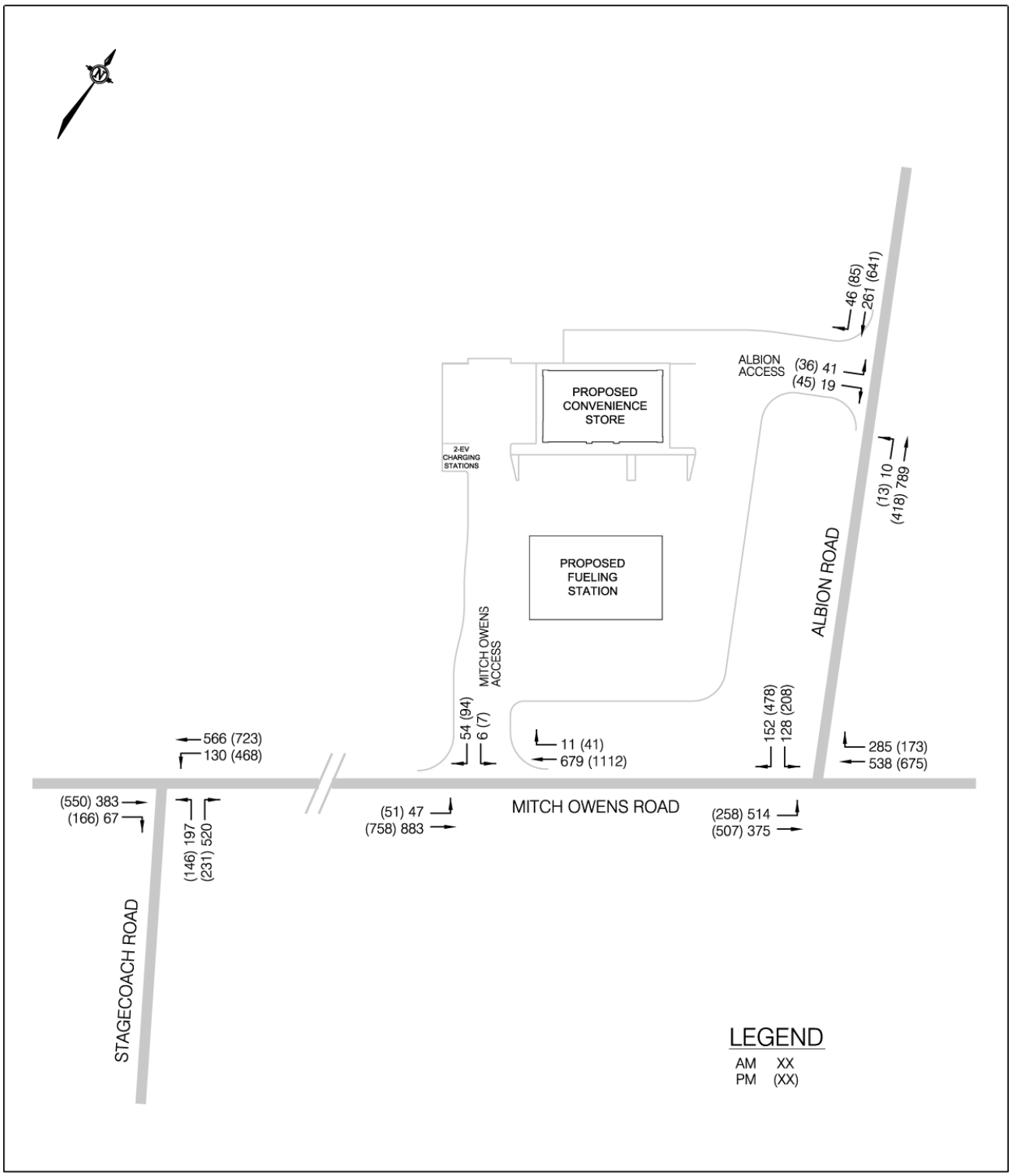
Figure 3.3 shows the expected 2024 peak AM and PM hour background traffic incorporating the two growth factors (excluding site generated trips) with no proposed new development in the area, and Figure 3.4 the 2029 peak hour background traffic.

FIGURE 3.3
2024 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

FIGURE 3.4
2029 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

The total traffic volumes are the addition of the future background traffic and the expected site generated primary trips (Figure 3.1) and pass-by trips (Figure 3.2). The 2024 total volume of traffic is provided in Figure 3.5, and 2029 total traffic in Figure 3.6.

MODULE 3.3 - Demand Rationalization

The MacEwen Service Centre project will consist of the redevelopment of the site by providing a larger and more modern convenience store with two EV charging stations. There will be no additions to the number of petroleum fuelling stations. The additional development at the service centre will generate a relatively low volume of peak hour trips during the AM and PM period of the adjacent roads with a large proportion of the trips as by-pass trips generated from the traffic already travelling along the adjacent roads. The expected new trip demand would have a minor impact on the surrounding roadway network. The trip demand would not result in an issue with capacity of the intersections within the study area.

STEP 4 – ANALYSIS

MODULE 4.1 – Development Design

Element 4.1.1 – Design for Sustainable Modes

The centre provides fuel for both cars and trucks, and a convenience store with a coffee shop. Not including spaces used by vehicles for fuelling, the site will provide 31 vehicle parking spaces including 1 barrier free space. The City of Ottawa By-laws require 14 vehicle parking spaces with 1 barrier free space.

The site will provide a bicycle rack for 1 bicycle located at the side of the building in close proximity to the main door to the building. The city By-law requires 1 bike storage space per 500 m^2 of retail area which would require 1 space for the centre.

The service centre is located in a rural area with traffic counts recording only 1 pedestrian crossing the Albion/Mitch Owens intersection during both the peak AM and PM hours. Traffic counts taken at the site accesses recorded no pedestrian activity entering/exiting the site with no pedestrian sidewalks along adjacent roads.

There are currently no regular OC Transpo bus routes in the immediate area, but as the surrounding residential area is completed regular bus service will be reexamined.

The location of the site and land use would support few alternative modes of travel with the majority of trips made up of auto drivers and auto passengers.

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

FIGURE 3.5
2024 PEAK AM AND PM HOUR TOTAL TRAFFIC

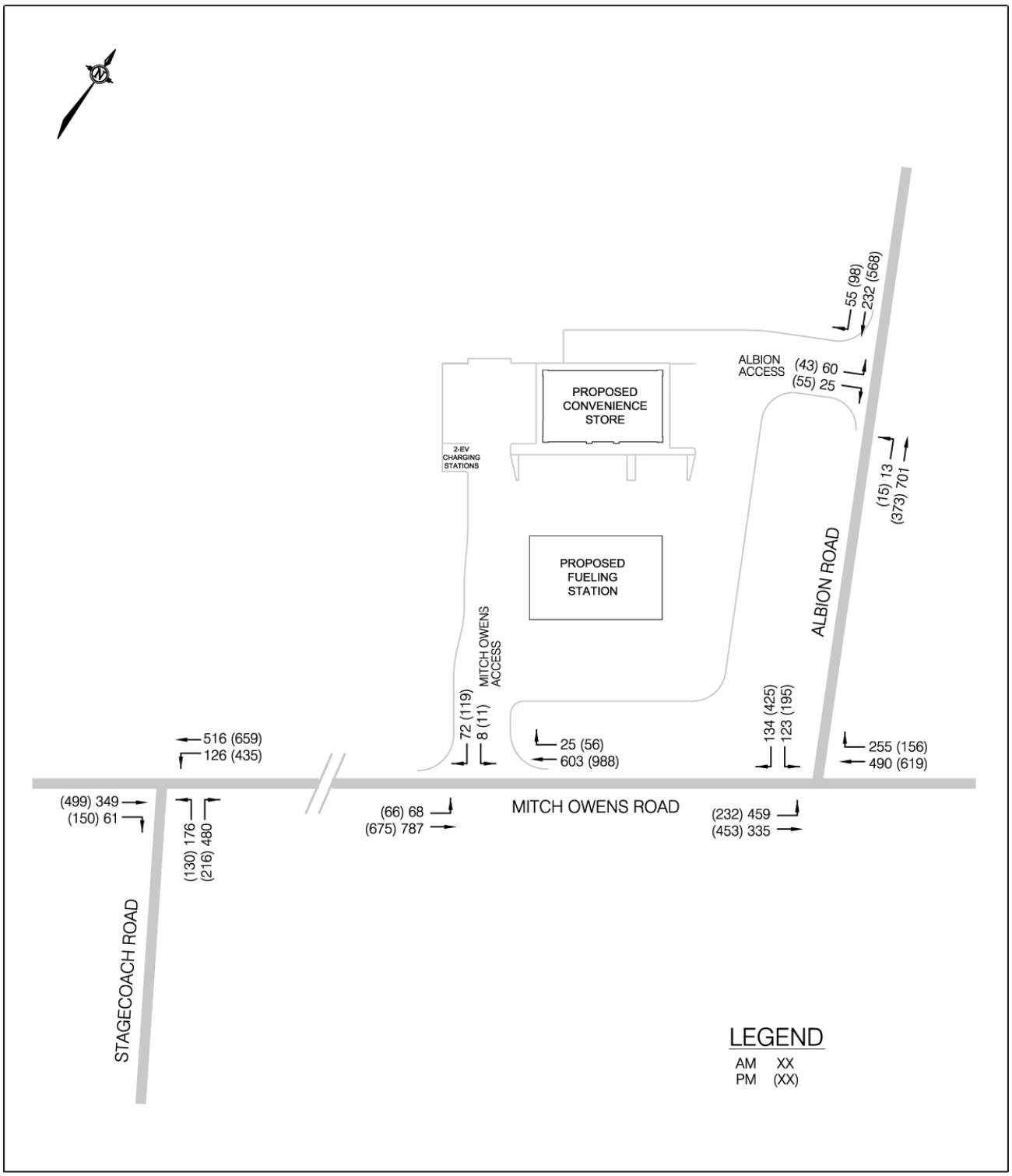
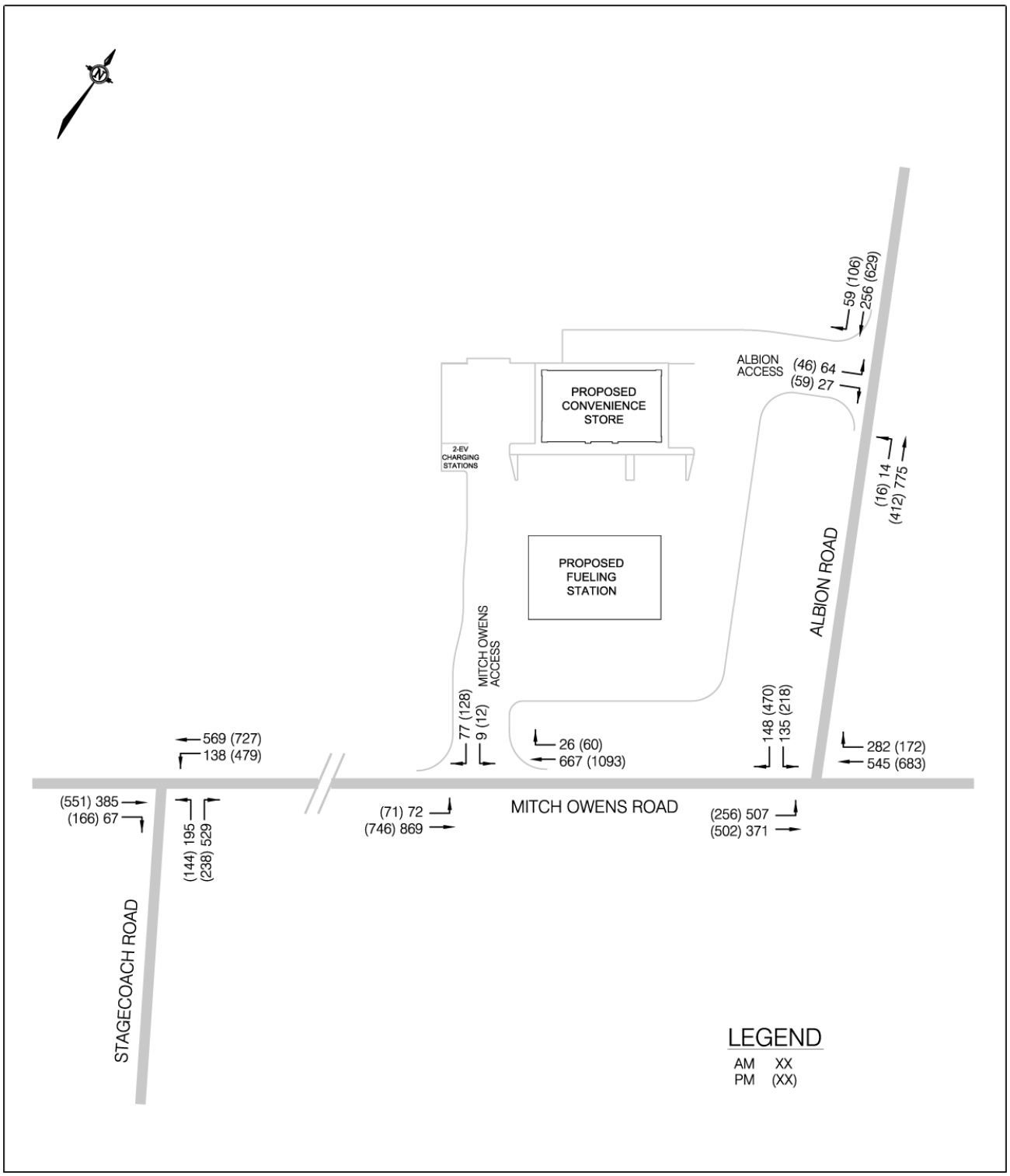


FIGURE 3.6
2029 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

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

Legend

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

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐ The development will utilize the existing entrances
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☒ Parking will be located next to the building with good visibility of pedestrian movements
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☒ There is no regular transit provided in close proximity to the site. There is a route travelling along Albion Road and Mitch Owens Road provided one bus to Billings Bridge and one returning on Thursdays only
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☐ There are no municipal sidewalks along Albion Road and Mitch Owens Road in the vicinity of the site.

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

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☒ A bicycle rack is located close to the building entrance
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☒ The number of bicycle parking spaces will meet the required spaces under the zoning by-laws
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☒ The bike rack and bicycle storage spaces are horizontal
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☒ The provided parking meets City of Ottawa By-Laws
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

Element 4.1.2 – Circulation and Access

The fuelling portion of the site has been designed to accommodate both cars and diesel fuelling of tractor-semitrailers. The site has also been designed to accommodate fuel trucks and the maneuvering throughout the site for the discharge of fuel into the holding tanks.

Both the existing Albion Road and Mitch Owens Road accesses are 12 m wide and have sufficient width to accommodate the turning movements of a tractor-semitrailer.

Element 4.1.3 – New Street Networks

Exempt as determined in the Scoping Document.

MODULE 4.2 – Parking

Element 4.2.1 – Parking Supply

The MacEwen Service Centre will provide 31 vehicle parking spaces including 1 barrier free space. The parking spaces would be located adjacent to the building with 5 spaces and 2 EV charging stations at the west side of the building.

The site meets City of Ottawa parking By-laws which require 14 parking spaces including 1 barrier free space.

The site will provide a storage rack for the storage of 1 bicycle close to the main entrance to the building. The Zoning By-law requires storage for a minimum of 1 bicycle determined as follows:

1 space / 500 m^2 of GFA = 476 m^2 = 1 TOTAL Required storage spaces

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 MacEwen Service Centre are Albion Road adjacent to the east limit of the site, Mitch Owens Road adjacent to the south limit of the site, and Stagecoach Road located 600 m west of the site.

Collision reports over the 5 year period of January 1, 2016 to December 31, 2020 have determined that the Albion/Mitch Owens intersection experienced 34 turning movement collisions. City staff is currently planning modifications to the intersection which would protect the eastbound left turn movements and reduce turning movement conflicts.

The Stagecoach/Mitch Owens intersection has experienced 17 rear end collisions during the 5 year reporting period. There are no plans for intersection improvements to reduce the number of rear end collisions.

The multi-modal level of service for the Albion Road segment between Mitch Owens Road and Killymoon Way, Mitch Owens Road between Albion Road and Tranquil Gate to the east, and Mitch Owens Road between Albion Road and Stagecoach Road to the west Street, were determined utilizing the City of Ottawa publication, *Multi-Modal Level of Service (MMLOS) Guidelines*. The following examined the MMLOS for the various modes of travel along the street segments of Albion Road as shown in Exhibit 4.1 in the Appendix, and Mitch Owens Road in Exhibit 4.2.

Albion Road - Mitch Owens Road to Killymoon Way

Pedestrian Level of Service (PLOS)

Albion Road has a rural roadway cross section which provides paved shoulders with no sidewalks. The posted speed limit is 80 km./h.

The pedestrian Level of Service (PLOS) for the Albion Road street segment as determined in the City of Ottawa *Multi-Modal Level of Service (MMLOS) Worksheet* was a PLOS "F" as shown in Exhibit 4.1 in the Appendix. The major factor in the lower level of service was the lack of a sidewalk and boulevard along Albion Road.

Bicycle Level of Service (BLOS)

Albion Road is a two lane arterial road with no designated cycling lanes. The road is designated as a Spine Route in the TMP. The bicycle level of service was determined as a BLOS "F" as shown in Exhibit 4.1 with the lack of cycling lanes as the major factor contributing to a low level of service.

Transit Level of Service (TLOS)

There currently is no regular transit service in the area. Service routes will be examined as residential development is completed in the area.

Truck Level of Service (TkLOS)

The truck level of service was determined to be a TkLOS "A" as shown in Exhibit 4.1.

Mitch Owens Road - Stagecoach Road to Tranquil Gate

Pedestrian Level of Service (PLOS)

Mitch Owens Road between Stagecoach Road and Tranquil Gate has a rural roadway cross section which provides paved shoulders with no sidewalks. The posted speed limit is 80 km./h.

The pedestrian Level of Service (PLOS) for the Mitch Owens Road street segment was a PLOS "F" as shown in Exhibit 4.2. The major factor in the lower level of service was the lack of a sidewalk and boulevard along Mitch Owens Road.

Bicycle Level of Service (BLOS)

Mitch Owens Road is a two lane collector road with no designated cycling lanes. The road is designated as a Spine Route in the TMP. The bicycle level of service was determined as a BLOS "F" as shown in Exhibit 4.2 with the lack of cycling lanes as the major factor contributing to a low level of service.

Transit Level of Service (TLOS)

There currently is no regular transit service along Mitch Owens Road. OC Transpo does provide on Thursdays only one bus traveling past the site at 9:30 AM to the Billings Bridge Transit Station, and one bus returning at 3:00 PM. With only two buses per week and service outside the peak hours of the adjacent roads, transit service was not examined in the MMLOS analysis. Service routes will be examined as residential development is completed in the area.

Truck Level of Service (TkLOS)

The truck level of service was determined to be a TkLOS "A".

Traffic collisions along the road segments are shown in Table 2.1 in Element 2.1.2. Over the five year period between January 1, 2016 and December 31, 2020, 3 collisions were recorded along the Albion Road segment between Mitch Owens Road and Killymoon Way, 3 collisions along Mitch Owens Road between Albion Road and Stagecoach Road and 3 collisions between Albion Road and Tranquil Gate. The pattern of collisions did not identify any measures which could be taken to reduce the number of collisions.

The calculated Level of Service (LOS) was determined using the Multi-Modal Level of Service Worksheet provided in the Appendix as Exhibits 4.1 for Albion Road and Exhibit 4.2 for Mitch Owens Road. The LOS targets were obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines* for a "General Rural Area" as designated in the 2021 Official Plan - Rural Transect as Rural Countryside. Table 4.1 summarizes the MMLOS results for the road segments and targets using the 2029 traffic and road configuration.

TABLE 4.1
MULTI-MODAL (MMLOS) SEGMENT SUMMARY TABLE

STREET SEGMENT	Level of Service (LOS) – 2029				
	Pedestrian	Bicycle	Transit	Auto	Truck
Albion Road					
Calculated	F	F	N/A	N/A	A
Target	No Target	D	N/A	N/A	C
Mitch Owens Road					
Calculated	F	F	N/A	N/A	A
Target	No Target	D	N/A	N/A	C

The pedestrian level of service (PLOS) was low on Albion Road and Mitch Owens Road due to the lack of pedestrian sidewalks and boulevards along the rural roads.

The bicycle level of service (BLOS) did not meet the target due to the lack of a cycling lane on Albion Road and Mitch Owens Road. Paved shoulders are provided along both roads.

The truck level of service (TkLOS) meets the target value.

MODULE 4.4 – Access Intersection Design

Element 4.4.1 – Location and Design of Access

The MacEwen Service Centre is located at the northwest corner of the intersection of Albion Road and Mitch Owens Road. The proposed Site Plan will utilize the existing two accesses with one onto Albion Road located 90 m north of Mitch Owens Road and one onto Mitch Owens Road located 75 m west of Albion Road. Both accesses are 12.0 m in width with one lane entering and one lane exiting as shown in Figure 2.1.

The Albion Road Access has a shared eastbound left/right turn movement exiting the site (flared approach). The clear throat distance is approximately 35 m. The Mitch Owens Access has a shared southbound left/right turn movement exiting the site (flared approach). The clear throat distance is approximately 30 m. The minimum clear throat length onto an arterial road as suggested in the *Geometric Design Guide for Canadian Roads* published by the Transportation Association of Canada (TAC) is 15 m for a light industrial land use. The site accesses provide a clear throat length which exceeds the TAC guidelines.

The geometry and width of the accesses will be sufficient to allow fuel delivery vehicles to enter and exit the site. The garbage containers and loading area are located at the rear of the proposed convenience store. The location is easily accessible for garbage and delivery trucks.

There is an existing entrance to a vacant commercial site on the east side of Albion Road approximately 35 m south of the Albion Access.

Element 4.4.2 – Intersection Control

The two existing site accesses onto Albion Road and Mitch Owens Road are two-way stop controlled intersections with a stop at the eastbound approach to Albion Road and a stop at the southbound approach to Mitch Owens Road. The volume of traffic entering and exiting the site along with the proximity of the accesses to the signalized intersection of Albion/Mitch Owens determined that the existing two-way stop controlled access intersections would remain as the best form of intersection control.

Element 4.4.3 – Intersection Design

The operational analyses of the two site accesses, Albion/Mitch Owens and Stagecoach/Mitch Owens intersections were completed for the number of peak AM and PM hour vehicle trips using the existing traffic counts and the expected 2024 and 2029 traffic. 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.

VEHICLE LEVEL OF SERVICE (LOS) – Intersection Capacity Analysis

The analysis will utilize the *Highway Capacity Software (HCS), HCS2022 Version 2023,* which uses the capacity analysis procedure as documented in the *Highway Capacity Manual (HCM) 7th Edition*.

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

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

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

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

The expected length of queue at the critical lane movements for an unsignalized intersection was determined by the calculation of the 95th percentile queue at the lane approach as shown on the analysis work sheets provided in the Appendix. The 95th percentile queue length is the calculated 95th greatest queue length out of 100 occurrences at a movement during a 15-minute peak period. The 95th percentile queue length is a function of the capacity of a movement and the total expected traffic, with the

calculated value determining the magnitude of the queue by representing the queue length as fractions of vehicles.

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

Site Access and Albion Road Intersection

The Site Access/Albion intersection is an existing "T" intersection with the Albion Access forming the eastbound approach and Albion Road the northbound and southbound approaches. The Site Access will be a 12.0 m wide private driveway controlled by an implied stop at the eastbound approach. The intersection will have the following lane configuration:

Northbound Albion Rd.	One shared left/through lane
Southbound Albion Rd.	One through lane
	One shared through/right lane
Eastbound Site Access	One shared left/right turn lane (Implied Stop)

The proposed redevelopment of the site would utilize the existing site accesses and intersection configuration. The operational analysis for the expected 2029 total traffic determined the northbound Albion Road approach would function at a Level of Service (LOS) "A" during the peak AM and PM hours, and the eastbound Site Access approach at a LOS "D" during the peak AM hour and LOS "C" during the peak PM hour. The 95th percentile queue was 2.0 vehicles at the eastbound access approach during the peak AM hour and 0.1 vehicles at the northbound Albion Road approach during the peak PM hour. The operation of the intersection is summarized in Table 4.2, with the existing traffic analysis, 2024 and 2029 analysis sheets provided in the Appendix as Exhibit 4.4 to Exhibit 4.13.

TABLE 4.2
SITE ACCESS/ALBION INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR **Existing -** 2022 **Background - 2024** *2029* **Total -** ***2024*** (2029)		WEEKDAY PEAK PM HOUR **Existing -** 2022 **Background - 2024** *2029* **Total -** ***2024*** (2029)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left/Right	C **C** *D* ***C*** (D)	0.15 **0.21** *0.27* ***0.34*** (0.43)	B **C** *C* ***C*** (C)	0.15 **0.20** *0.26* ***0.26*** (0.33)
NB Left/Through	A **A** *A* ***A*** (A)	0.01 **0.01** *0.01* ***0.01*** (0.01)	A **A** *A* ***A*** (A)	0.01 **0.02** *0.02* ***0.02*** (0.02)

The Albion Access intersection would operate at an acceptable level of service following the completion of the redevelopment of the site. There would be no requirement for any additional intersection modifications to the access.

Site Access and Mitch Owens Road Intersection

The Mitch Owens Access intersection is located along the south limit of the site, 75 m west of the Albion/Mitch Owens intersection. The intersection is a "T" intersection with the site access forming the southbound approach. The access is 12 m wide and contains one lane entering and one lane exiting (flared approach). Below is the lane configuration of the Site Access/Mitch Owens intersection:

Eastbound Mitch Owens Rd.	One left turn lane (Extending from Albion/Mitch Owens) One through lane
Westbound Mitch Owens Rd.	One shared through/right lane
Southbound Site Access	One shared left/right turn lane (Implied Stop)

The operational analysis determined that the intersection functioned at an acceptable level of service. Due to the increasing volume of traffic along Mitch Owens Road, the southbound site access approach for the 2029 total peak PM hour traffic experienced delays (47.2 sec.) at the left turn movement onto Mitch Owens Road which resulted in a LOS "E" (v/c Ratio 0.66). The 2029 peak PM hour background traffic (without the expected redevelopment trips) would also experience a LOS "E" at the southbound approach. The 95th percentile queue for the total traffic during the peak PM hour was 4.1 vehicles at the southbound approach and 0.5 vehicles at the eastbound Mitch Owens Road left turn movement. The operation of the intersection is summarized in Table 4.3, with the existing traffic analysis, 2024 and 2029 analysis sheets provided in the Appendix as Exhibit 4.14 to Exhibit 4.23.

TABLE 4.3
SITE ACCESS/MITCH OWENS INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR **Existing -** 2022 **Background - 2024** *2029* **Total -** ***2024*** (2029)		WEEKDAY PEAK PM HOUR **Existing -** 2022 **Background - 2024** *2029* **Total -** ***2024*** (2029)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left/Through	A **A** *A* ***A*** (A)	0.04 **0.05** *0.06* ***0.08*** (0.09)	A **A** *A* ***A*** (A)	0.07 **0.09** *0.11* ***0.13*** (0.15)
SB Left/Right	B **B** *B* ***B*** (C)	0.10 **0.12** *0.15* ***0.18*** (0.22)	C **D** *E* ***D*** (E)	0.27 **0.38** *0.49* ***0.52*** (0.66)

The Mitch Owens Access intersection would operate at an acceptable level of service following the completion of the redevelopment of the site. There would be no requirement for any additional intersection modifications to the access.

Albion Road and Mitch Owens Road Intersection

The Albion/Mitch Owens intersection is a signalized intersection at the southeast corner of the MacEwen Service Centre site. The intersection is a "T" intersection with Albion Road forming the southbound approach and Mitch Owens Road the eastbound and westbound approaches. The following is the lane configuration of the intersection:

Eastbound Mitch Owens Rd.	One left turn lane (255 m storage/parallel) One through lane
Westbound Mitch Owens Rd.	One through lane One channelized right turn lane (160 m storage)
Southbound Albion Rd.	One left turn lane (140 m storage/parallel) One right turn lane

The overall intersection level of service functions at an acceptable level to the year 2029. Due to the increasing traffic along Albion Road and Mitch Owens Road, the eastbound peak AM hour left turning movement, and peak PM hour westbound through and southbound right turn movements functioned at low levels of service which were determined during the 2024 and 2029 background traffic analysis. The level of service could be improved by the construction of additional turning lanes. The operation of the intersection is summarized in Table 4.4, with the existing traffic analysis, 2024 and 2029 analysis sheets provided in the Appendix as Exhibit 4.24 to Exhibit 4.33.

TABLE 4.4
ALBION/MITCH OWENS INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR **Existing -** 2019 **Background - 2024** *2029* **Total -** ***2024*** (2029)		WEEKDAY PEAK PM HOUR **Existing -** 2019 **Background - 2024** *2029* **Total -** ***2024*** (2029)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Left	B **C** *E* ***C*** (E)	0.671 **0.790** *0.922* ***0.780*** (0.919)	B **D** *D* ***D*** (D)	0.630 **0.859** *0.873* ***0.857*** (0.872)
EB Through	A **A** *A* ***A*** (A)	0.230 **0.257** *0.287* ***0.253*** (0.283)	A **A** *A* ***A*** (A)	0.394 **0.453** *0.524* ***0.444*** (0.514)
WB Through	A **A** *C* ***A*** (C)	0.489 **0.570** *0.722* ***0.567*** (0.715)	C **E** *F* ***E*** (F)	0.759 **0.938** *1.223* ***0.931*** (1.216)
WB Right	A **A** *A* ***A*** (A)	0.219 **0.254** *0.323* ***0.249*** (0.313)	A **A** *A* ***A*** (A)	0.166 **0.204** *0.266* ***0.195*** (0.262)
SB Left	B **B** *B* ***C*** (C)	0.671 **0.681** *0.691* ***0.735*** (0.745)	A **A** *A* ***A*** (A)	0.438 **0.441** *0.445* ***0.465*** (0.474)
SB Right	C **C** *C* ***C*** (C)	0.718 **0.742** *0.763* ***0.730*** (0.756)	D **E** *E* ***D*** (E)	0.900 **0.910** *0.920* ***0.908*** (0.918)
Total	A **A** *A* ***A*** (A)	0.389 **0.444** *0.522* ***0.440*** (0.517)	A **A** *B* ***A*** (B)	0.509 **0.592** *0.680* ***0.588*** (0.679)

The Albion/Mitch Owens intersection would operate at an acceptable overall level of service following the completion of the redevelopment of the site. Several movements

functioned at a low level of service during peak hours due to the increasing volume of background traffic. City staff are currently examining the intersection for some planned modifications to protect the eastbound Mitch Owens Road left turn movement.

Stagecoach Road and Mitch Owens Road Intersection

The intersection of Stagecoach Road and Mitch Owens Road is a signalized intersection located 600 m west of the site. The intersection is a "T" intersection with Stagecoach Road forming the northbound approach and Mitch Owens Road the eastbound and westbound approaches. The intersection would have the following lane configuration.

Eastbound Mitch Owens Rd.	One shared through/right lane
Westbound Mitch Owens Rd.	One through lane
	One left turn lane (220 m storage/parallel)
Northbound Stagecoach Rd.	One left turn lane (150 m storage/parallel)
	One right turn lane

The operational analysis has determined that the intersection would function at an overall acceptable level of service. With the increasing background traffic, the northbound right turn movement experienced a low level of service during the peak AM and PM hours along with the eastbound through/right and westbound left turn movements during the peak PM hour. The existing 2019 analysis utilized the traffic signal timing plan obtained from the City of Ottawa, with timing adjustment to the northbound movement for the 2024 and 2029 analysis years. The operation of the intersection is summarized in Table 4.5, with the existing traffic analysis, 2024 and 2029 analysis sheets provided in the Appendix as Exhibit 4.34 to Exhibit 4.43.

TABLE 4.5
STAGECOACH/MITCH OWENS INTERSECTION – LOS & v/c Ratio

APPROACH	WEEKDAY PEAK AM HOUR **Existing -** 2019 **Background - 2024** *2029* **Total - *2024*** (2029)		WEEKDAY PEAK PM HOUR **Existing -** 2019 **Background - 2024** *2029* **Total - *2024*** (2029)	
	LOS	**v/c Ratio**	**LOS**	**v/c Ratio**
EB Through/Right	A **A** *C* ***A*** (C)	0.492 **0.560** *0.759* ***0.561*** (0.786)	B **D** *F* ***E*** (F)	0.692 **0.902** *1.014* ***0.917*** (1.018)
WB Left	A **A** *A* ***A*** (A)	0.276 **0.348** *0.481* ***0.372*** (0.520)	D **E** *F* ***E*** (F)	0.813 **0.933** *1.141* ***0.953*** (1.168)
WB Through	A **A** *B* ***A*** (B)	0.505 **0.575** *0.692* ***0.578*** (0.704)	A **A** *A* ***A*** (A)	0.461 **0.509** *0.562* ***0.512*** (0.565)
NB Left	A **A** *A* ***A*** (A)	0.328 **0.342** *0.330* ***0.338*** (0.322)	A **A** *B* ***A*** (A)	0.505 **0.557** *0.617* ***0.549*** (0.608)
NB Right	E **E** *E* ***E*** (E)	0.925 **0.966** *0.934* ***0.985*** (0.937)	D **E** *F* ***E*** (F)	0.834 **0.937** *1.048* ***0.972*** (1.083)
Total	A **A** *B* ***A*** (B)	0.504 **0.566** *0.652* ***0.572*** (0.663)	A **B** *C* ***C*** (C)	0.607 **0.705** *0.795* ***0.714*** (0.803)

The Stagecoach/Mitch Owens intersection would operate at an acceptable overall level of service following the completion of the redevelopment of the site. Several movements functioned at a low level of service during peak hours due to the increasing volume of background traffic.

INTERSECTION MMLOS SUMMARY

The Albion/Mitch Owens and Stagecoach/Mitch Owens intersections were analyzed to determine the level of service which was compared to the MMLOS targets for pedestrians, bicycles, trucks, transit and autos. The calculated Level of Service (LOS) was determined using the *Multi-Modal Level of Service Worksheet* provided in the Appendix as Exhibit 4.3, and the *Highway Capacity Software, HCS2022 Version 2023,* for the vehicle LOS. The LOS targets were obtained from Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines* for a General Rural Area as designated in the Official Plan Schedule B9 - Rural Transect as Rural Countryside. Table 4.6 summarizes the MMLOS results for the intersections and targets.

TABLE 4.6
MULTI-MODAL (MMLOS) INTERSECTION SUMMARY TABLE

INTERSECTION	Level of Service (LOS) – 2029				
	Pedestrian	Bicycle	Transit	Truck	Auto
Albion/Mitch Owens					
Calculated	C	F	-	C	A-B
Target	No Target	D	-	C	D
Stagecoach/Mitch Owens					
Calculated	C	F	-	C	B-C
Target	No Target	D	-	C	D

The pedestrian level of service (PLOS) at the intersection was a LOS “C”. Due to the rural nature of the location of the development there were no PLOS targets.

The lower bicycle level of service (BLOS) was due to the lack of cycling lanes and the number of lanes crossed in making a left turn movement at intersections.

The truck level of service (TkLOS) meets the target.

The vehicle level of service (LOS) exceeded the MMLOS target.

MODULE 4.5 – Transportation Demand Management

Element 4.5.1 – Context for TDM

Exempt as determined in the Scoping Document.

Element 4.5.2 – Need and Opportunity

Exempt as determined in the Scoping Document.

Element 4.5.3 – TDM Program

Exempt as determined in the Scoping Document.

MODULE 4.6 – Neighbourhood Traffic Management

Element 4.6.1 – Adjacent Neighbourhoods

Exempt as determined in the Scoping Document.

MODULE 4.7 - Transit

Element 4.7.1 – Route Capacity

There currently is no regular transit service in the area. There is Route 304 which is a transit route providing service only on Thursdays with one bus travelling past the site at 9:30 AM to Billings Bridge, and one bus returning at 3:30 PM. As development progresses in the area and transit demand increases, the level of transit service and routes will be determined to service the area. Site generated trips to/from the gasoline service centre is expected to have little if any transit share.

Element 4.7.2 – Transit Priority

The MacEwen Service Centre is located at the intersection of two arterial roads. The site proposes to utilize the existing site accesses with little if any transit demands generated by the site. When regular transit service is provided, the benefit of providing transit priority measures will be examined.

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 intersections examined in the study were the Albion/Mitch Owens and the Stagecoach/Mitch Owens intersections. Both intersections are controlled by traffic signals with protected left turn phasing.

The existing two site accesses are controlled by implied two-way stops. The volume of traffic at the site approach and the proximity of the access intersection to the

Albion/Mitch Owens intersection would prohibit the installation of other traffic control measures than the existing two-way stop controls.

Element 4.9.2 – Intersection Design

The Site Access/Albion, Site Access/Mitch Owens, Albion/Mitch Owens and Stagecoach/Mitch Owens intersections were all examined utilizing the *Highway Capacity Software (HCS), HCS2022 Version 2023,* which uses the capacity analysis procedure as documented in the *Highway Capacity Manual (HCM) 7th Edition*. With the *Multi-Modal Level of Service (MMLOS) Guidelines* stating that only signalized intersections are considered for the multi-modal analysis, only the signalized intersections of Albion/Mitch Owens and Stagecoach/Mitch Owens were examined for the MMLOS.

The intersections were analyzed in Element 4.4.3 - Intersection Design to determine the level of service at all four intersections. The calculated level of service was compared to the level of service targets listed in Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*. The results are provided in Table 4.6.

The MMLOS for each intersection determined the vehicle target for arterial roads in a General Rural Area to be a LOS "D". The operational analysis was completed for the existing, 2024 & 2029 background and 2024 & 2029 total traffic for the existing Albion/Mitch Owens and Stagecoach/Mitch Owens intersections. The level of service analysis is based on the total v/c Ratio of the intersection. The level of service of the intersection and LOS targets are shown in Table 4.7.

TABLE 4.7
WEEKDAY PEAK AM AND PM HOUR INTERSECTION ANALYSIS – LOS

INTERSECTION	Existing - 2019 **Background - 2024** *2029* **Total - *2024*** (2029)			
	LOS Analysis		**LOS Target**	
	AM	**PM**	**AM**	**PM**
Albion/Mitch Owens	A **A** *A* ***A*** (A)	A **A** *B* ***A*** (B)	D **D** *D* ***D*** (D)	D **D** *D* ***D*** (D)
Stagecoach/Mitch Owens	A **A** *B* ***A*** (B)	A **B** *C* ***C*** (C)	D **D** *D* ***D*** (D)	D **D** *D* ***D*** (D)

SUMMARY

MacEwen Petroleum Inc. has prepared a Site Plan for the redevelopment of their gasoline service centre at 5546 Albion Road. The service centre site has a net area of 10,843.7 m^2 and is located at the northwest corner of the intersection of Albion Road and Mitch Owens Road. The existing site contains a fuelling station with 12 gasoline

and 2 diesel fuelling positions. The site has one free standing building which contains a convenience store with a coffee shop. The site has two existing access points with one onto Mitch Owens Road located 75 m west of the Albion/Mitch Owens intersection, and a second access onto Albion Road located 90 m north of the intersection.

The Site Plan proposes the replacement of the existing building with a new larger building which will contain a convenience store. The new facility will have a building with gross floor area of 400 m^2, an increase of 211 m^2 over the existing building. The number of petroleum fuelling positions will remain the same as existing, with the addition of 2 new Level 3 electric vehicle (EV) charging stations. The site will provide 31 parking spaces including 1 barrier free space for patrons, and will retain the existing two site access points onto Albion Road and Mitch Owens Road.

The Transportation Impact Assessment report has established a study area which would include the Albion Access, Mitch Owens Access, Albion/Mitch Owens intersection, and Stagecoach/Mitch Owens intersection. The operational analysis will be conducted for the weekday peak AM and PM hours for the existing traffic counts, at the completion of the Service Centre in 2024, and at five years beyond completion at the year 2029. The TIA analysis has examined all modes of transportation along the road segments and the intersections within the study area. The transportation analysis has determined the following:

1. The existing MacEwen Service Centre at 5546 Albion Road is open weekdays from 5:30 AM to 12:00 AM, Saturday from 5:30 AM to 11:00 PM, and Sunday from 7:00 AM to 10:00 PM.

2. The Site Plan proposes to expand the gross floor area of the existing building and retain the same number of petroleum fuelling positions and site access points. Two new EV charging stations will be added. Both the Albion Access and Mitch Owens Access have a 12 m width.

3. The 2022 traffic counts at the site accesses determined the MacEwen Service Centre to generate 178 vehicle trips entering and exiting during the peak AM hour and 281 vehicle trips during the peak PM hour.

4. Following the completion of the site redevelopment and an adjustment of the traffic to reflect lower trips due to COVID-19 (15% increase), the expected 2024 site generated trips would be 326 vehicle trips entering and exiting during the peak AM hour and 463 vehicle trips during the peak PM hour. During the year 2029, the expected site generated trips would be 348 vehicle trips entering and exiting during the peak AM hour and 498 vehicle trips during the peak PM hour.

5. The MMLOS analysis of the street segment determined that for the Albion Road segment between Mitch Owens Road and Killymoon Way, and the Mitch Owens Road segment between Stagecoach Road and Tranquil Gate, the pedestrian level of service (PLOS) was low with no MMLOS targets due to the rural location and cross section of the road and lack of sidewalks. The cycling level of service

(BLOS) was low and did not meet the target along both road segments due to the lack of cycling facilities. The truck level of service (TkLOS) exceeded the MMLOS target along both roads.

6. The MMLOS analysis for the Albion/Mitch Owens and Stagecoach/Mitch Owens intersections determined that both intersections functioned well when compared to the MMLOS targets. The 2029 analysis of the Albion/Mitch Owens intersection determined the intersection to function at a LOS “A-B” with the target of LOS “A”, and the Stagecoach/Mitch Owens intersection at a “B-C” with the target of “C”.

7. The intersection analysis using the level of service calculated from the HCS and HCM determined that the overall Albion/Mitch Owens intersection level of service was acceptable during the peak AM and PM hour for the existing, 2024 and 2029 traffic. The 2029 background and total AM traffic analysis determined the eastbound Mitch Owens Road left turn movement to function at a LOS “E”. During the peak PM hour the 2024 and 2029 background and total traffic scenarios determined the southbound Albion Road right turn movement and westbound Mitch Owens Road through movement to function at a LOS “E” and LOS “F”. The lower level of service was due to the high volume of background traffic at the lane movements. The level of service could be increased by the addition of dual turn lanes and an adjustment to the signal timing. The redevelopment of the MacEwen site would have a minor impact of the operation of the Albion/Mitch Owens and Stagecoach/Mitch Owens intersections.

8. The existing Site Access/Albion intersection would operate at an acceptable level of service during the existing, 2024 and 2029 peak hours. The Site Access/Mitch Owens intersection operated at an acceptable level of service during the peak AM hour, but during the 2029 peak PM hour the background and total scenarios at the southbound site access approach would function at a LOS “E” due to the high volume of westbound Mitch Owens Road through movement traffic past the access.

9. The redevelopment of the MacEwen Service Centre would result in a minor impact on the adjacent roads but would not be triggering roadway improvements. Additions to the site would consist of a larger convenience store building and 2 EV charging stations.

Prepared by:

David J. Halpenny

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

APPENDIX

CERTIFICATION FORM

SCREENING FORM

TRAFFIC COUNTS

EXHIBIT A.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 1.1
SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	5546 Albion Road, Ottawa
Description of Location	Northwest corner of Albion Rd. and Mitch Owens Rd.
Land Use Classification	"RC2" - Rural Commercial Zone
Development Size (units)	Gasoline Service Centre - ±400 m^2 GFA
Development Size (m^2)	10,843.7 m^2 Lot Area
Number of Accesses and Locations	One access onto Albion Rd., 90 m north of Mitch Owens Rd. One access onto Mitch Owens Rd., 75 m west of Albion Rd.
Phase of Development	Single Phase of development
Buildout Year	2024

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

2. Trip Generation Trigger

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

Land Use Type	Minimum Development Size
Gasoline station or convenience market	75 m^2

	Yes	No
400 m^2 Gasoline Station > 75 m^2 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 is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

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

5. Summary

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

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

EXHIBIT 2.1
2019 TRAFFIC COUNT SUMMARY - Albion/Mitch Owens

Transportation Services - Traffic Services

Turning Movement Count - Study Results

ALBION RD @ MITCH OWENS RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38921

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

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, October 16, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 1 Westbound: 0

AADT Factor

.90

	ALBION RD									MITCH OWENS RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	0	0	0	**0**	105	0	125	**230**	**230**	422	308	0	**730**	0	441	234	**675**	**1405**	**1635**
08:00 09:00	0	0	0	**0**	85	0	105	**190**	**190**	348	355	0	**703**	0	338	186	**524**	**1227**	**1417**
09:00 10:00	0	0	0	**0**	84	0	117	**201**	**201**	255	232	0	**487**	0	282	158	**440**	**927**	**1128**
11:30 12:30	0	0	0	**0**	91	0	153	**244**	**244**	157	234	0	**391**	0	239	100	**339**	**730**	**974**
12:30 13:30	0	0	0	**0**	122	0	159	**281**	**281**	152	233	0	**385**	0	246	105	**351**	**736**	**1017**
15:00 16:00	0	0	0	**0**	214	0	373	**587**	**587**	169	375	0	**544**	0	356	121	**477**	**1021**	**1608**
16:00 17:00	0	0	0	**0**	170	0	392	**562**	**562**	211	416	0	**627**	0	553	142	**695**	**1322**	**1884**
17:00 18:00	0	0	0	**0**	162	0	392	**554**	**554**	209	353	0	**562**	0	538	117	**655**	**1217**	**1771**
Sub Total	0	0	0	**0**	1033	0	1816	**2849**	**2849**	1923	2506	0	**4429**	0	2993	1163	**4156**	**8585**	**11434**
U Turns				**0**				**0**	**0**				**1**				**0**	**1**	**1**
Total	0	0	0	**0**	1033	0	1816	**2849**	**2849**	1923	2506	0	**4430**	0	2993	1163	**4156**	**8586**	**11435**
EQ 12Hr	0	0	0	**0**	1436	0	2524	**3960**	**3960**	2673	3483	0	**6158**	0	4160	1617	**5777**	**11935**	**15895**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	0	0	0	**0**	1292	0	2976	**3564**	**3564**	2406	3135	0	**5542**	0	3744	1455	**5199**	**10742**	**14306**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	0	0	0	**0**	1693	0	3899	**4669**	**4669**	3152	4107	0	**7260**	0	4905	1906	**6811**	**14072**	**18741**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

2019 PEAK AM HOUR TRAFFIC COUNTS - Albion/Mitch Owens

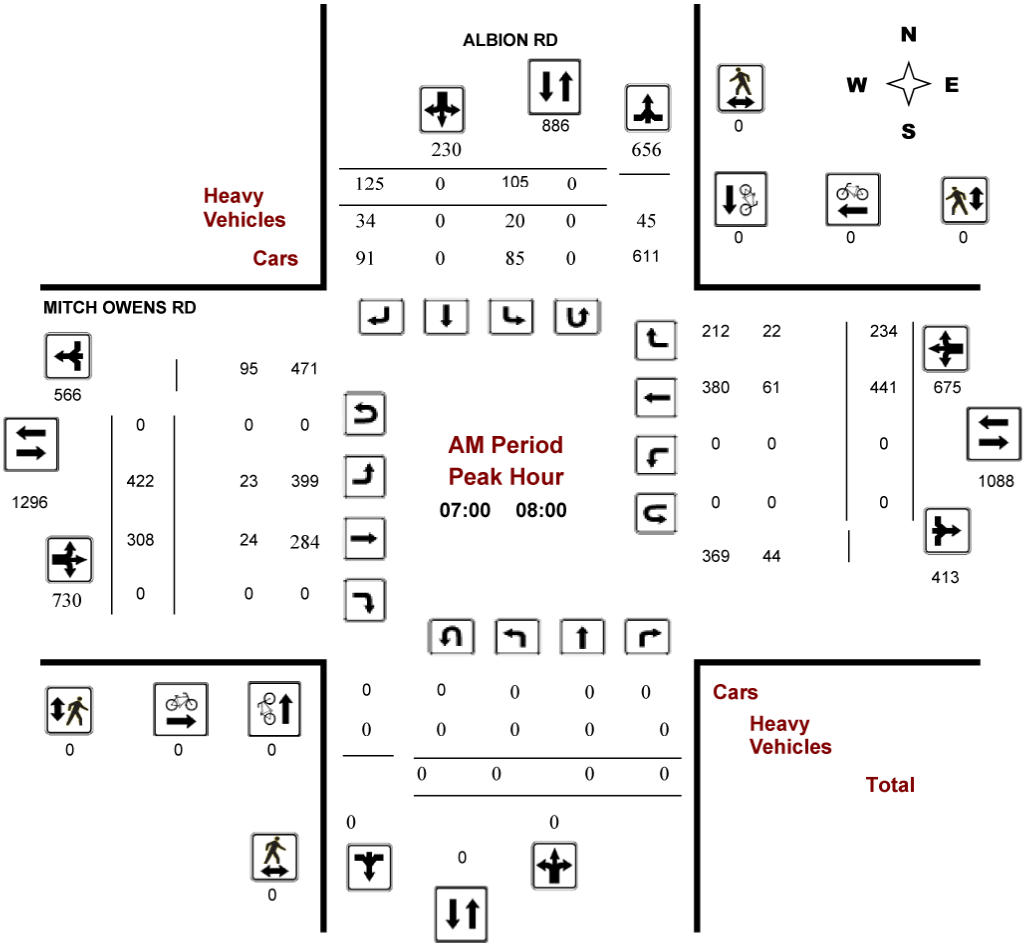
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ALBION RD @ MITCH OWENS RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38921

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



Comments

2019 PEAK PM HOUR TRAFFIC COUNTS - Albion/Mitch Owens

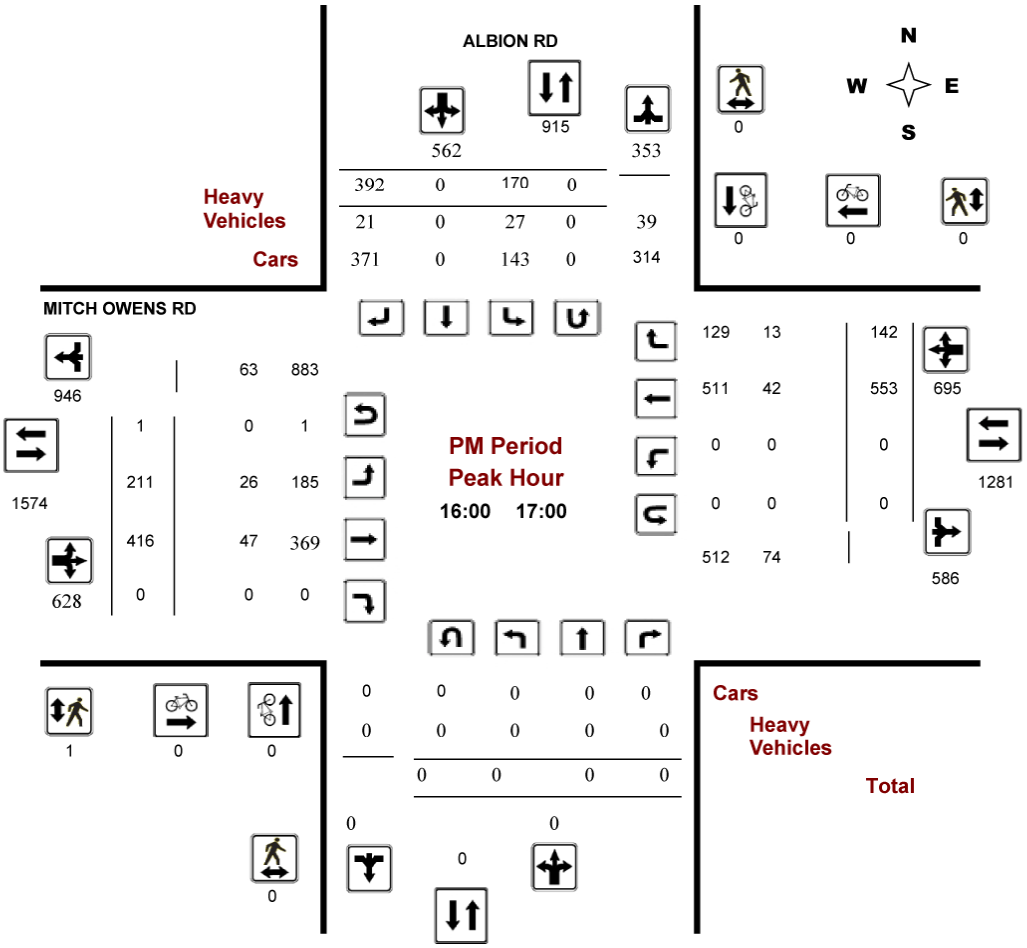
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ALBION RD @ MITCH OWENS RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38921

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



Comments

EXHIBIT 2.2
2019 TRAFFIC COUNT SUMMARY - Stagecoach/Mitch Owens

Transportation Services - Traffic Services

Turning Movement Count - Study Results

MITCH OWENS RD @ STAGECOACH RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38920

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

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, October 16, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

.90

	STAGECOACH RD								MITCH OWENS RD									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	161	0	427	**588**	0	0	0	**0**	**588**	0	314	55	**369**	107	465	0	**572**	**941**	**1529**
08:00 09:00	102	0	325	**427**	0	0	0	**0**	**427**	0	419	44	**463**	94	376	0	**470**	**933**	**1360**
09:00 10:00	103	0	227	**330**	0	0	0	**0**	**330**	0	272	64	**336**	107	309	0	**416**	**752**	**1082**
11:30 12:30	72	0	131	**203**	0	0	0	**0**	**203**	0	285	55	**340**	133	284	0	**417**	**757**	**960**
12:30 13:30	72	0	144	**216**	0	0	0	**0**	**216**	0	287	63	**350**	146	277	0	**423**	**773**	**989**
15:00 16:00	57	0	149	**206**	0	0	0	**0**	**206**	0	428	116	**544**	356	416	0	**772**	**1316**	**1522**
16:00 17:00	86	0	158	**244**	0	0	0	**0**	**244**	0	490	127	**617**	386	606	0	**992**	**1609**	**1853**
17:00 18:00	109	0	191	**300**	0	0	0	**0**	**300**	0	416	108	**524**	408	564	0	**972**	**1496**	**1796**
Sub Total	762	0	1752	**2514**	0	0	0	**0**	**2514**	0	2911	632	**3543**	1737	3297	0	**5034**	**8577**	**11091**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	762	0	1752	**2514**	0	0	0	**0**	**2514**	0	2911	632	**3543**	1737	3297	0	**5034**	**8577**	**11091**
EQ 12Hr	1059	0	2435	**3494**	0	0	0	**0**	**3494**	0	4046	878	**4925**	2414	4583	0	**6997**	**11922**	**15416**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	953	0	2192	**3145**	0	0	0	**0**	**3145**	0	3641	790	**4432**	2173	4125	0	**6297**	**10730**	**13874**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	1248	0	2872	**4120**	0	0	0	**0**	**4120**	0	4770	1035	**5806**	2847	5404	0	**8249**	**14056**	**18175**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

2019 PEAK AM HOUR TRAFFIC COUNTS - Stagecoach/Mitch Owens

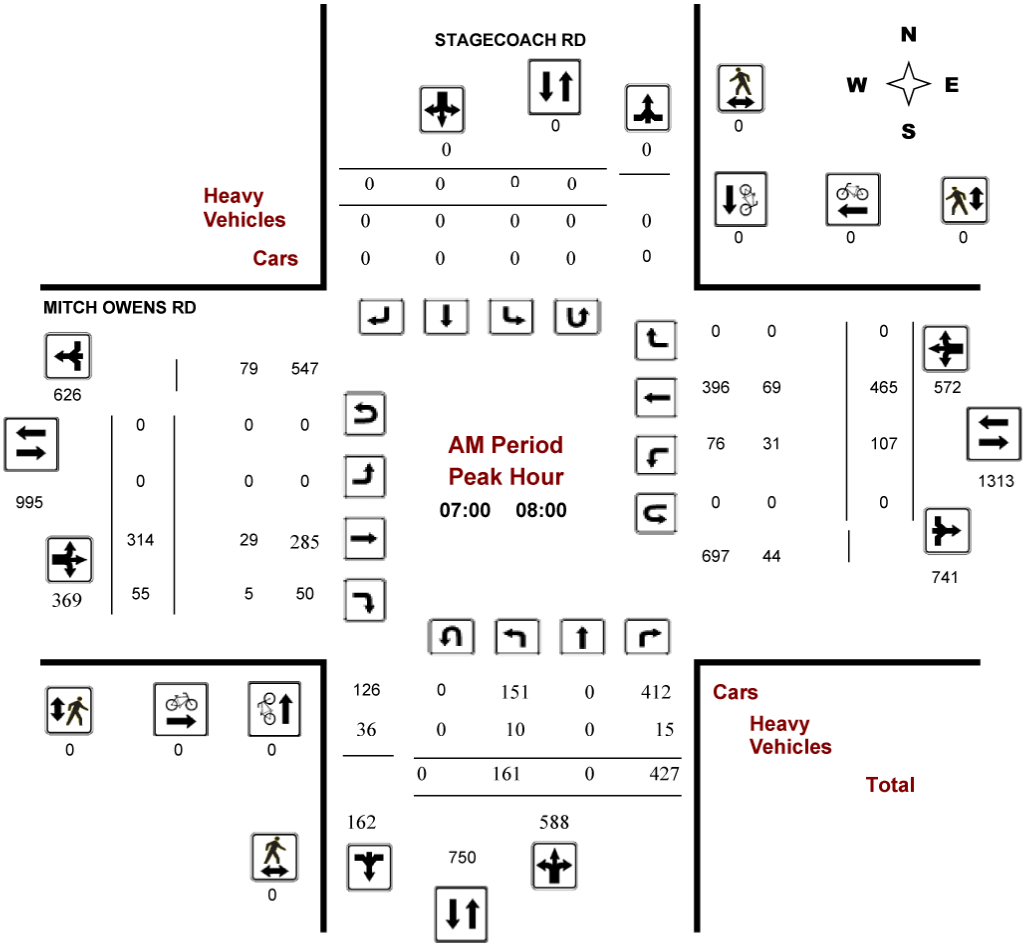
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

MITCH OWENS RD @ STAGECOACH RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38920

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



Comments

2019 PEAK PM HOUR TRAFFIC COUNTS - Stagecoach/Mitch Owens

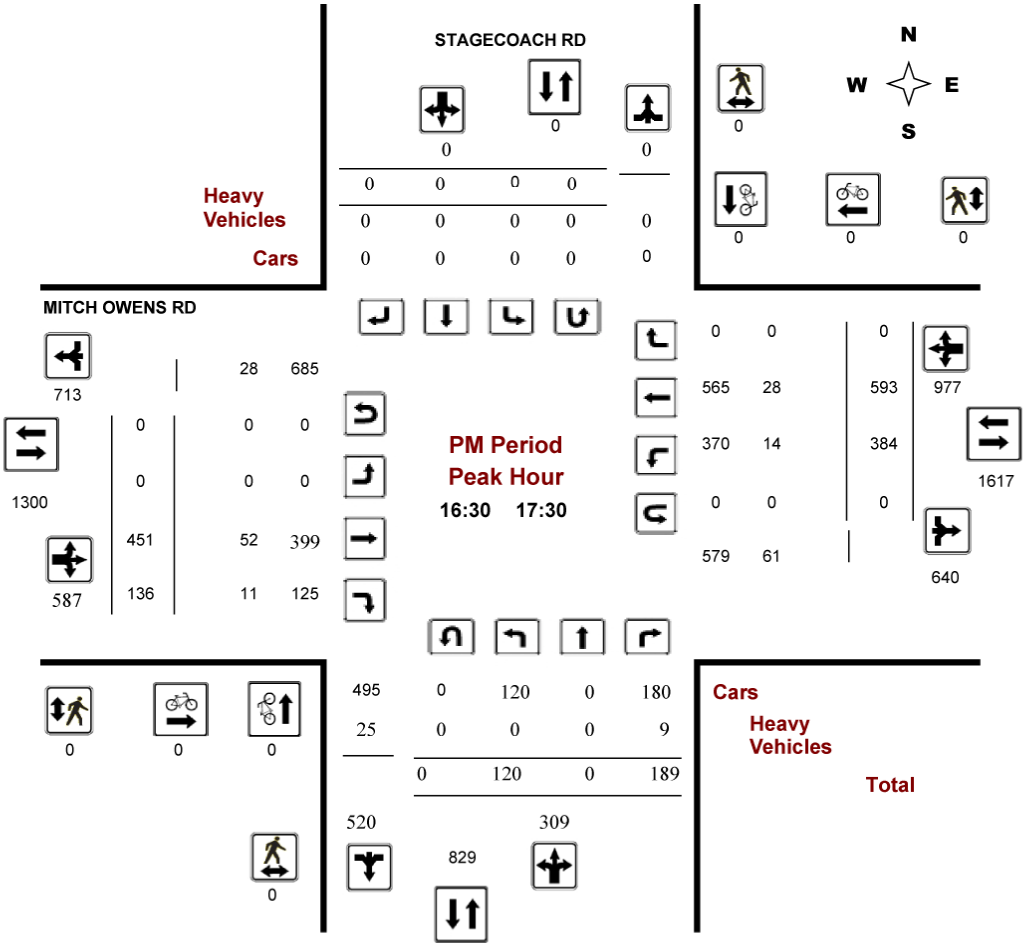
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

MITCH OWENS RD @ STAGECOACH RD

Survey Date: Wednesday, October 16, 2019 **WO No:** 38920

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



Comments

EXHIBIT 2.3
2022 AM AND PM HOUR TRAFFIC COUNTS – Site Access/Albion

All Vehicles

Time Period	Northbound			Southbound			Eastbound			Westbound			
AM	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**Total**
07:00 – 07:15	1	-	-	-	-	6	6	-	3	-	-	-	**16**
07:15 – 07:30	0	-	-	-	-	12	9	-	4	-	-	-	**25**
07:30 – 07:45	0	-	-	-	-	12	9	-	4	-	-	-	**25**
07:45 – 08:00	1	-	-	-	-	10	7	-	2	-	-	-	**20**
08:00 – 08:15	3	-	-	-	-	5	7	-	2	-	-	-	**17**
08:15 – 08:30	2	-	-	-	-	11	6	-	7	-	-	-	**26**
08:30 – 08:45	2	-	-	-	-	9	11	-	3	-	-	-	**25**
08:45 – 09:00	0	-	-	-	-	7	5	-	2	-	-	-	**14**
PM													
04:00 – 04:15	2	-	-	-	-	17	7	-	11	-	-	-	**37**
04:15 – 04:30	3	-	-	-	-	13	4	-	7	-	-	-	**27**
04:30 – 04:45	2	-	-	-	-	15	10	-	9	-	-	-	**36**
04:45 – 05:00	3	-	-	-	-	19	7	-	7	-	-	-	**36**
05:00 – 05:15	2	-	-	-	-	21	9	-	10	-	-	-	**42**
05:15 – 05:30	3	-	-	-	-	12	3	-	8	-	-	-	**26**
05:30 – 05:45	4	-	-	-	-	17	6	-	9	-	-	-	**36**
05:45 – 06:00	2	-	-	-	-	15	7	-	5	-	-	-	**29**

Truck & Bus Traffic

Time Period	Northbound			Southbound			Eastbound			Westbound			
AM	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**Total**
07:00 – 07:15	0	-	-	-	-	0	1	-	0	-	-	-	**1**
07:15 – 07:30	0	-	-	-	-	3	2	-	0	-	-	-	**5**
07:30 – 07:45	0	-	-	-	-	1	2	-	0	-	-	-	**3**
07:45 – 08:00	0	-	-	-	-	2	0	-	0	-	-	-	**2**
08:00 – 08:15	0	-	-	-	-	0	0	-	0	-	-	-	**0**
08:15 – 08:30	0	-	-	-	-	2	1	-	1	-	-	-	**4**
08:30 – 08:45	0	-	-	-	-	1	3	-	0	-	-	-	**4**
08:45 – 09:00	0	-	-	-	-	1	1	-	0	-	-	-	**2**
PM													
04:00 – 04:15	0	-	-	-	-	0	0	-	1	-	-	-	**1**
04:15 – 04:30	0	-	-	-	-	0	0	-	1	-	-	-	**1**
04:30 – 04:45	0	-	-	-	-	0	0	-	0	-	-	-	**0**
04:45 – 05:00	1	-	-	-	-	0	1	-	1	-	-	-	**3**
05:00 – 05:15	0	-	-	-	-	0	1	-	1	-	-	-	**2**
05:15 – 05:30	1	-	-	-	-	0	0	-	0	-	-	-	**1**
05:30 – 05:45	0	-	-	-	-	1	0	-	1	-	-	-	**2**
05:45 – 06:00	0	-	-	-	-	1	0	-	0	-	-	-	**1**

EXHIBIT 2.4
2022 AM AND PM HOUR TRAFFIC COUNTS – Site Access/Mitch Owens

All Vehicles

Time Period	Northbound			Southbound			Eastbound			Westbound			
AM	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**Total**
07:00 – 07:15	-	-	-	1	0	9	16	0	0	0	0	4	**30**
07:15 – 07:30	-	-	-	1	0	8	5	0	0	0	0	5	**19**
07:30 – 07:45	-	-	-	1	0	9	10	0	0	0	0	1	**21**
07:45 – 08:00	-	-	-	1	0	11	7	0	0	0	0	1	**20**
08:00 – 08:15	-	-	-	1	0	6	7	0	0	0	0	3	**17**
08:15 – 08:30	-	-	-	0	0	13	11	0	0	0	0	3	**27**
08:30 – 08:45	-	-	-	2	0	11	11	0	0	0	0	2	**26**
08:45 – 09:00	-	-	-	2	0	7	7	0	0	0	0	4	**20**
PM								0	0	0	0		
04:00 – 04:15	-	-	-	2	0	25	14	0	0	0	0	9	**50**
04:15 – 04:30	-	-	-	1	0	14	6	0	0	0	0	7	**28**
04:30 – 04:45	-	-	-	0	0	13	10	0	0	0	0	9	**32**
04:45 – 05:00	-	-	-	2	0	19	8	0	0	0	0	6	**35**
05:00 – 05:15	-	-	-	2	0	20	7	0	0	0	0	8	**37**
05:15 – 05:30	-	-	-	2	0	18	9	0	0	0	0	7	**36**
05:30 – 05:45	-	-	-	2	0	14	4	0	0	0	0	3	**23**
05:45 – 06:00	-	-	-	0	0	18	8	0	0	0	0	6	**32**

Truck & Bus Traffic

Time Period	Northbound			Southbound			Eastbound			Westbound			
AM	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**LT**	**ST**	**RT**	**Total**
07:00 – 07:15	-	-	-	0	-	0	1	-	-	-	-	0	**1**
07:15 – 07:30	-	-	-	0	-	1	0	-	-	-	-	2	**3**
07:30 – 07:45	-	-	-	0	-	2	2	-	-	-	-	0	**4**
07:45 – 08:00	-	-	-	0	-	1	0	-	-	-	-	0	**1**
08:00 – 08:15	-	-	-	1	-	1	0	-	-	-	-	0	**2**
08:15 – 08:30	-	-	-	0	-	1	2	-	-	-	-	0	**3**
08:30 – 08:45	-	-	-	0	-	1	0	-	-	-	-	0	**1**
08:45 – 09:00	-	-	-	1	-	1	1	-	-	-	-	1	**4**
PM													
04:00 – 04:15	-	-	-	0	-	0	3	-	-	-	-	0	**3**
04:15 – 04:30	-	-	-	0	-	0	0	-	-	-	-	0	**0**
04:30 – 04:45	-	-	-	0	-	0	2	-	-	-	--	0	**2**
04:45 – 05:00	-	-	-	0	-	0	0		-	-	-	0	**0**
05:00 – 05:15	-	-	-	0	-	1	0	-	-	-	-	0	**1**
05:15 – 05:30	-	-	-	0	-	1	0	-	-	-	-	0	**1**
05:30 – 05:45	-	-	-	1	-	1	1	-	-	-	-	0	**3**
05:45 – 06:00	-	-	-	0	-	2	0	-	-	-	-	0	**2**

EXHIBIT 4.1
2029 MMLOS ROAD SEGMENT - Albion Road

Multi-Modal Level of Service - Segments Form

Consultant		Project	MacEwen
Scenario	Total 2029 Traffic	Date	Feb-23
Comments	Albion Rd.		
	Mitch Owens Rd. to Killymoon Way		

SEGMENTS		Albion	Killymoon Way / Mitch Owens		
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		~~≥ 1.8 m~~		
	Bike Lane Width LoS		~~A~~	-	-
	Bike Lane Blockages		~~Rare~~		
	Blockage LoS		~~A~~	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		>50 to 60 km/h		
	Unsignalized Crossing - Lowest LoS		C	-	-
	Level of Service		F	-	-
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		-	-	-
Truck	Truck Lane Width	A	> 3.7 m		
	Travel Lanes per Direction		> 1		
	Level of Service		A	-	-

EXHIBIT 4.2
2029 MMLOS ROAD SEGMENT - Mitch Owens Road

Multi-Modal Level of Service - Segments Form

Consultant		Project	MacEwen
Scenario	Total 2029 Traffic	Date	Feb-23
Comments	Mitch Owens Rd.		
	Stagecoach Rd. to Tranquil Gate		

SEGMENTS		Mitch Owens	Stagecoach Albion	Albion Tranquil Gate	
Pedestrian	Sidewalk Width Boulevard Width	F	no sidewalk n/a	no sidewalk n/a	
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	
	Exposure to Traffic PLoS		F	F	-
	Effective Sidewalk Width		1.2 m	1.2 m	
	Pedestrian Volume		250 ped/hr	250 ped/hr	
	Crowding PLoS		B	B	-
	Level of Service		F	F	-
Bicycle	Type of Cycling Facility	F	Mixed Traffic	Mixed Traffic	
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	
	Operating Speed		≥ 60 km/h	≥ 60 km/h	
	# of Lanes & Operating Speed LoS		F	F	-
	Bike Lane (+ Parking Lane) Width		~~≥ 1.8 m~~	~~≥ 1.8 m~~	
	Bike Lane Width LoS		~~A~~	~~A~~	-
	Bike Lane Blockages		~~Rare~~	~~Rare~~	
	Blockage LoS		~~A~~	~~A~~	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	
	Sidestreet Operating Speed		>50 to 60 km/h	>50 to 60 km/h	
	Unsignalized Crossing - Lowest LoS		C	C	-
	Level of Service		F	F	-
Transit	Facility Type	-			
	Friction or Ratio Transit:Posted Speed				
	Level of Service		-	-	-
Truck	Truck Lane Width	A	> 3.7 m	> 3.7 m	
	Travel Lanes per Direction		> 1	> 1	
	Level of Service		A	A	-

EXHIBIT 4.3
2029 MMLOS INTERSECTIONS - Albion/Mitch Owens and Stagecoach/Mitch Owens

Multi-Modal Level of Service - Intersections Form

Consultant		Project	MacEwen
Scenario	Total 2029 Traffic	Date	Feb-23
Comments	Mitch Owens Intersections		

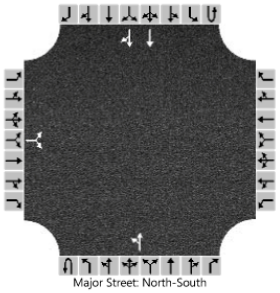
INTERSECTIONS		Albion Road and Mitch Owens Road				Stagecoach Road and Mitch Owens Road			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3		3	3		3	3	3
	Median	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive		Permissive	No left turn / Prohib.		Permissive	Protected/ Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control		Permissive or yield control	No right turn		Permissive or yield control	No right turn	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No		No	No		No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane		Conv'tl without Receiving Lane	No Channel		No Channel	Conv'tl without Receiving Lane	No Channel
	Corner Radius	15-25m		15-25m	15-25m		15-25m	15-25m	15-25m
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**72**		**72**	**81**		**68**	**77**	**76**
	Ped. Exposure to Traffic LoS	**C**	-	**C**	**B**	-	**C**	**B**	**B**
	Cycle Length	75		75	75		75	75	75
	Effective Walk Time	10		10	10		10	10	10
	Average Pedestrian Delay	**28**		**28**	**28**		**28**	**28**	**28**
	Pedestrian Delay LoS	**C**	-	**C**	**C**	-	**C**	**C**	**C**
	Level of Service	**C**	-	**C**	**C**	-	**C**	**C**	**C**
		C				**C**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic		Mixed Traffic	Mixed Traffic		Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m		> 50 m	≤ 50 m		> 50 m	≤ 50 m	≤ 50 m
	Right Turning Speed	>25 km/h		>25 km/h	≤ 25 km/h		>25 km/h	>25 km/h	>25 km/h
	Cyclist relative to RT motorists	**F**	-	**F**	**D**	-	**F**	**E**	**E**
	Separated or Mixed Traffic	**Mixed Traffic**	-	**Mixed Traffic**	**Mixed Traffic**	-	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	One lane crossed		No lane crossed	One lane crossed		One lane crossed	One lane crossed	No lane crossed
	Operating Speed	≥ 60 km/h		≥ 60 km/h	≥ 60 km/h		≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	-	**C**	**F**	-	**F**	**F**	**C**
	Level of Service	**F**	-	**F**	**F**	-	**F**	**F**	**E**
		F				**F**			
Transit	Average Signal Delay								
	Level of Service	-	-	-	-	-	-	-	-
		-				-			
Truck	Effective Corner Radius	> 15 m		> 15 m	> 15 m		> 15 m	> 15 m	> 15 m
	Number of Receiving Lanes on Departure from Intersection	1		1	1		1	1	1
	Level of Service	**C**	-	**C**	**C**	-	**C**	**C**	**C**
		C				**C**			
Auto	Volume to Capacity Ratio	0.0 - 0.60				0.71 - 0.80			
	Level of Service	**A**				**C**			

EXHIBIT 4.4
2022 EXISTING PEAK AM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2022	North/South Street	Albion Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Existing AM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		31		14						8	648				216	35
Percent Heavy Vehicles (%)		13		7						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		7.06		7.04						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.63		3.37						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			49							9						
Capacity, c (veh/h)			328							1302						
v/c Ratio			0.15							0.01						
95% Queue Length, Q_{95} (veh)			0.5							0.0						
Control Delay (s/veh)			17.9							7.8	0.1					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		17.9								0.2						
Approach LOS		C								A						

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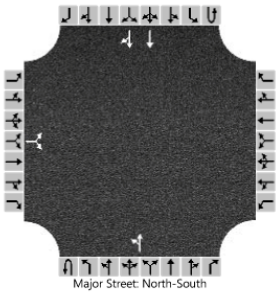
EXHIBIT 4.5
2022 EXISTING PEAK PM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2022	North/South Street	Albion Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Existing PM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		28		34						10	344				528	64
Percent Heavy Vehicles (%)		7		8						10						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		6.94		7.06						4.30						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.57		3.38						2.30						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			67							11						
Capacity, c (veh/h)			462							885						
v/c Ratio			0.15							0.01						
95% Queue Length, Q_{95} (veh)			0.5							0.0						
Control Delay (s/veh)			14.1							9.1	0.1					
Level of Service (LOS)			B							A	A					
Approach Delay (s/veh)		14.1								0.4						
Approach LOS		B								A						

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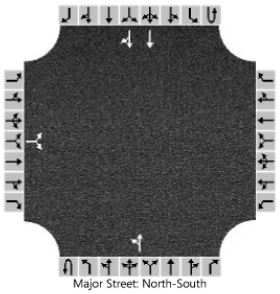
EXHIBIT 4.6
2024 BACKGROUND PEAK AM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2024	North/South Street	Albion Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background AM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		37		17						9	715				237	42
Percent Heavy Vehicles (%)		13		7						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		7.06		7.04						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.63		3.37						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			59							10						
Capacity, c (veh/h)			282							1269						
v/c Ratio			0.21							0.01						
95% Queue Length, Q_{95} (veh)			0.8							0.0						
Control Delay (s/veh)			21.1							7.9	0.1					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		21.1								0.2						
Approach LOS		C								A						

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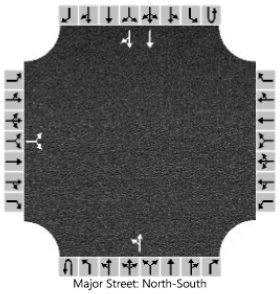
EXHIBIT 4.7
2024 BACKGROUND PEAK PM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2024	North/South Street	Albion Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background PM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		33		41						12	379				580	77
Percent Heavy Vehicles (%)		7		8						10						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		6.94		7.06						4.30						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.57		3.38						2.30						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			80							13						
Capacity, c (veh/h)			401							831						
v/c Ratio			0.20							0.02						
95% Queue Length, Q_{95} (veh)			0.7							0.0						
Control Delay (s/veh)			16.2							9.4	0.2					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		16.2								0.5						
Approach LOS		C								A						

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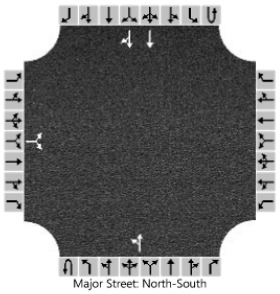
EXHIBIT 4.8
2029 BACKGROUND PEAK AM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2029	North/South Street	Albion Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background AM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		41		19						10	789				261	46
Percent Heavy Vehicles (%)		13		7						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		7.06		7.04						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.63		3.37						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			65							11						
Capacity, c (veh/h)			237							1237						
v/c Ratio			0.27							0.01						
95% Queue Length, Q_{95} (veh)			1.1							0.0						
Control Delay (s/veh)			25.8							7.9	0.1					
Level of Service (LOS)			D							A	A					
Approach Delay (s/veh)		25.8								0.2						
Approach LOS		D								A						

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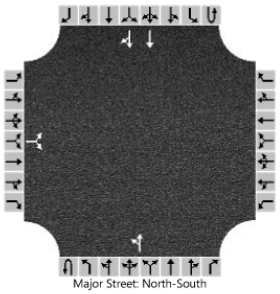
EXHIBIT 4.9
2029 BACKGROUND PEAK PM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2029	North/South Street	Albion Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background PM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		36		45						13	418				641	85
Percent Heavy Vehicles (%)		7		8						10						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		6.94		7.06						4.30						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.57		3.38						2.30						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			88							14						
Capacity, c (veh/h)			341							776						
v/c Ratio			0.26							0.02						
95% Queue Length, Q_{95} (veh)			1.0							0.1						
Control Delay (s/veh)			19.2							9.7	0.2					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		19.2								0.5						
Approach LOS		C								A						

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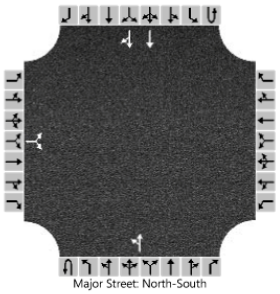
EXHIBIT 4.10
2024 TOTAL PEAK AM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2024	North/South Street	Albion Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total AM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		60		25						13	701				232	55
Percent Heavy Vehicles (%)		13		7						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		7.06		7.04						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.63		3.37						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			92							14						
Capacity, c (veh/h)			274							1260						
v/c Ratio			0.34							0.01						
95% Queue Length, Q_{95} (veh)			1.4							0.0						
Control Delay (s/veh)			24.7							7.9	0.2					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		24.7								0.3						
Approach LOS		C								A						

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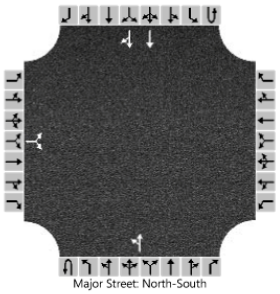
EXHIBIT 4.11
2024 TOTAL PEAK PM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2024	North/South Street	Albion Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total PM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		43		55						15	373				568	98
Percent Heavy Vehicles (%)		7		8						10						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		6.94		7.06						4.30						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.57		3.38						2.30						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			107							16						
Capacity, c (veh/h)			405							823						
v/c Ratio			0.26							0.02						
95% Queue Length, Q_{95} (veh)			1.0							0.1						
Control Delay (s/veh)			17.0							9.5	0.2					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		17.0								0.6						
Approach LOS		C								A						

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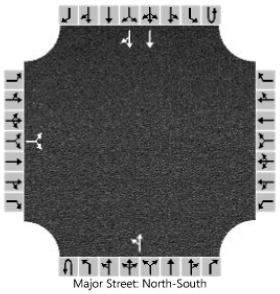
EXHIBIT 4.12
2029 TOTAL PEAK AM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2029	North/South Street	Albion Road
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total AM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		64		27						14	775				256	59
Percent Heavy Vehicles (%)		13		7						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		7.06		7.04						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.63		3.37						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			99							15						
Capacity, c (veh/h)			231							1228						
v/c Ratio			0.43							0.01						
95% Queue Length, Q_{95} (veh)			2.0							0.0						
Control Delay (s/veh)			31.8							8.0	0.2					
Level of Service (LOS)			D							A	A					
Approach Delay (s/veh)		31.8								0.3						
Approach LOS		D								A						

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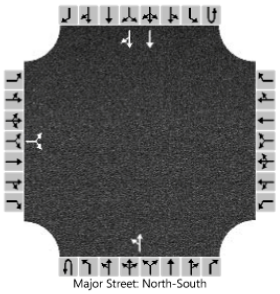
EXHIBIT 4.13
2029 TOTAL PEAK PM HOUR ANALYSIS - Site Access/Albion

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Albion
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Albion Access
Analysis Year	2029	North/South Street	Albion Road
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total PM		

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	0	0	0	0	1	0	0	0	2	0
Configuration			LR							LT					T	TR
Volume (veh/h)		46		59						16	412				629	106
Percent Heavy Vehicles (%)		7		8						10						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5		6.9						4.1						
Critical Headway (sec)		6.94		7.06						4.30						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.57		3.38						2.30						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			114							17						
Capacity, c (veh/h)			344							770						
v/c Ratio			0.33							0.02						
95% Queue Length, Q_{95} (veh)			1.4							0.1						
Control Delay (s/veh)			20.6							9.8	0.3					
Level of Service (LOS)			C							A	A					
Approach Delay (s/veh)		20.6								0.6						
Approach LOS		C								A						

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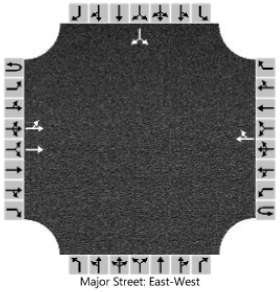
EXHIBIT 4.14
2022 EXISTING PEAK AM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2022	North/South Street	Mitch Owens Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Existing AM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		36	726				557	9						4		41
Percent Heavy Vehicles (%)		5												15		10
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.20												7.10		6.40
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.65		3.40

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		39													49	
Capacity, c (veh/h)		940													514	
v/c Ratio		0.04													0.10	
95% Queue Length, Q_{95} (veh)		0.1													0.3	
Control Delay (s/veh)		9.0	0.4												12.7	
Level of Service (LOS)		A	A												B	
Approach Delay (s/veh)	0.8												12.7			
Approach LOS	A												B			

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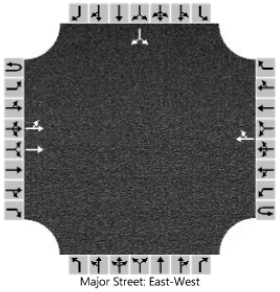
EXHIBIT 4.15
2022 EXISTING PEAK PM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2022	North/South Street	Mitch Owens Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Existing PM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		38	623				914	31						5		71
Percent Heavy Vehicles (%)		10												5		5
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.30												6.90		6.30
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.55		3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		41													83	
Capacity, c (veh/h)		626													302	
v/c Ratio		0.07													0.27	
95% Queue Length, Q_{95} (veh)		0.2													1.1	
Control Delay (s/veh)		11.2	0.8												21.3	
Level of Service (LOS)		B	A												C	
Approach Delay (s/veh)	1.4												21.3			
Approach LOS	A												C			

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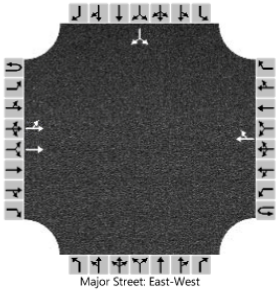
EXHIBIT 4.16
2024 BACKGROUND PEAK AM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2024	North/South Street	Mitch Owens Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background AM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		43	801				615	10						5		49
Percent Heavy Vehicles (%)		5												15		10
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.20												7.10		6.40
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.65		3.40

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		47													59	
Capacity, c (veh/h)		889													472	
v/c Ratio		0.05													0.12	
95% Queue Length, Q_{95} (veh)		0.2													0.4	
Control Delay (s/veh)		9.3	0.6												13.7	
Level of Service (LOS)		A	A												B	
Approach Delay (s/veh)	1.0												13.7			
Approach LOS	A												B			

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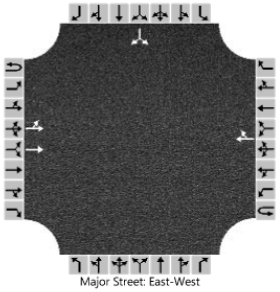
EXHIBIT 4.17
2024 BACKGROUND PEAK PM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2024	North/South Street	Mitch Owens Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background PM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		46	687				1007	37						6		85
Percent Heavy Vehicles (%)		10												5		5
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.30												6.90		6.30
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.55		3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		50													99	
Capacity, c (veh/h)		567													262	
v/c Ratio		0.09													0.38	
95% Queue Length, Q_{95} (veh)		0.3													1.7	
Control Delay (s/veh)		12.0	1.2												26.8	
Level of Service (LOS)		B	A												D	
Approach Delay (s/veh)	1.8												26.8			
Approach LOS	A												D			

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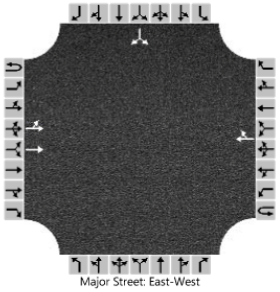
EXHIBIT 4.18
2029 BACKGROUND PEAK AM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2029	North/South Street	Mitch Owens Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background AM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		47	883				679	11						6		54
Percent Heavy Vehicles (%)		5												15		10
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.20												7.10		6.40
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.65		3.40

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		51													65	
Capacity, c (veh/h)		835													430	
v/c Ratio		0.06													0.15	
95% Queue Length, Q_{95} (veh)		0.2													0.5	
Control Delay (s/veh)		9.6	0.7												14.9	
Level of Service (LOS)		A	A												B	
Approach Delay (s/veh)	1.2												14.9			
Approach LOS	A												B			

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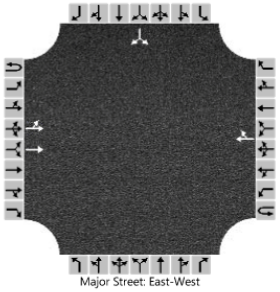
EXHIBIT 4.19
2029 BACKGROUND PEAK PM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2029	North/South Street	Mitch Owens Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Background PM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		51	758				1112	41						7		94
Percent Heavy Vehicles (%)		10												5		5
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.30												6.90		6.30
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.55		3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		55													110	
Capacity, c (veh/h)		509													224	
v/c Ratio		0.11													0.49	
95% Queue Length, Q_{95} (veh)		0.4													2.5	
Control Delay (s/veh)		12.9	1.6												35.6	
Level of Service (LOS)		B	A												E	
Approach Delay (s/veh)	2.3												35.6			
Approach LOS	A												E			

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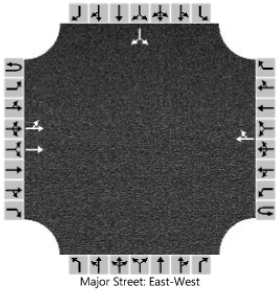
EXHIBIT 4.20
2024 TOTAL PEAK AM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2024	North/South Street	Mitch Owens Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total AM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		68	787				603	25						8		72
Percent Heavy Vehicles (%)		5												15		10
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.20												7.10		6.40
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.65		3.40

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		74													87	
Capacity, c (veh/h)		886													476	
v/c Ratio		0.08													0.18	
95% Queue Length, Q_{95} (veh)		0.3													0.7	
Control Delay (s/veh)		9.4	0.9												14.3	
Level of Service (LOS)		A	A												B	
Approach Delay (s/veh)	1.6												14.3			
Approach LOS	A												B			

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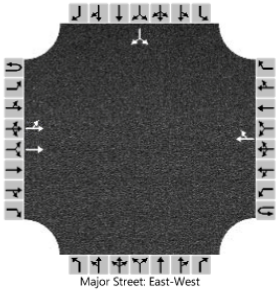
EXHIBIT 4.21
2024 TOTAL PEAK PM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2024	North/South Street	Mitch Owens Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total PM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		66	675				988	56						11		119
Percent Heavy Vehicles (%)		10												5		5
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.30												6.90		6.30
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.55		3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		72													141	
Capacity, c (veh/h)		567													270	
v/c Ratio		0.13													0.52	
95% Queue Length, Q_{95} (veh)		0.4													2.8	
Control Delay (s/veh)		12.3	1.6												32.2	
Level of Service (LOS)		B	A												D	
Approach Delay (s/veh)	2.6												32.2			
Approach LOS	A												D			

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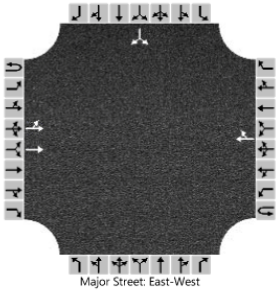
EXHIBIT 4.22
2029 TOTAL PEAK AM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2029	North/South Street	Mitch Owens Access
Time Analyzed	Peak AM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total AM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		72	869				667	26						9		77
Percent Heavy Vehicles (%)		5												15		10
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.20												7.10		6.40
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.65		3.40

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		78													93	
Capacity, c (veh/h)		833													430	
v/c Ratio		0.09													0.22	
95% Queue Length, Q_{95} (veh)		0.3													0.8	
Control Delay (s/veh)		9.8	1.1												15.7	
Level of Service (LOS)		A	A												C	
Approach Delay (s/veh)	1.7												15.7			
Approach LOS	A												C			

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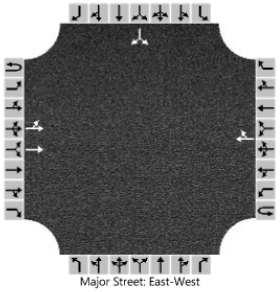
EXHIBIT 4.23
2029 TOTAL PEAK PM HOUR ANALYSIS - Site Access/Mitch Owens

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst		Intersection	Site Access/Mitch Owens
Agency/Co.		Jurisdiction	City of Ottawa
Date Performed	2/16/2023	East/West Street	Mitch Owens Road
Analysis Year	2029	North/South Street	Mitch Owens Access
Time Analyzed	Peak PM Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	MacEwen Service Centre - Total PM		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT	T					TR							LR	
Volume (veh/h)		71	746				1093	60						12		128
Percent Heavy Vehicles (%)		10												5		5
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.2
Critical Headway (sec)		4.30												6.90		6.30
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.55		3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		77													152	
Capacity, c (veh/h)		509													229	
v/c Ratio		0.15													0.66	
95% Queue Length, Q_{95} (veh)		0.5													4.1	
Control Delay (s/veh)		13.3	2.2												47.2	
Level of Service (LOS)		B	A												E	
Approach Delay (s/veh)	3.2												47.2			
Approach LOS	A												E			

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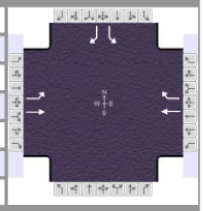
EXHIBIT 4.24
2019 EXISTING PEAK AM HOUR ANALYSIS - Albion/Mitch Owens

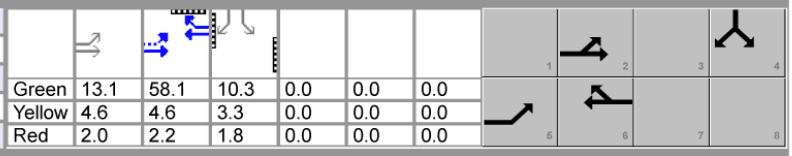
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	October 16, 2019	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2019_ex_am.xus		
Project Description	MacEwen Service Centre - Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	422	308			441	234				105		125

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	13.1	58.1	10.3	0.0	0.0	0.0
Yellow	4.6	4.6	3.3	0.0	0.0	0.0
Red	2.0	2.2	1.8	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	19.7	84.6		64.9				15.4
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	12.3							9.8
Green Extension Time (*g e*), s	0.8	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	459	335			479	203				114		114
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1702			1660	1573				1507		1407
Queue Service Time (*g s*), s	10.3	3.6			16.6	6.1				7.3		7.8
Cycle Queue Clearance Time (*g c*), s	10.3	3.6			16.6	6.1				7.3		7.8
Green Ratio (*g/C*)	0.73	0.85			0.59	0.59				0.11		0.11
Capacity (*c*), veh/h	684	1453			980	929				170		159
Volume-to-Capacity Ratio (*X*)	0.671	0.230			0.489	0.219				0.671		0.718
Back of Queue (*Q*), m/ln (50 th percentile)	18.9	2.1			46	15.6				23.4		24.5
Back of Queue (*Q*), veh/ln (50 th percentile)	2.4	0.3			5.6	1.9				2.7		2.8
Queue Storage Ratio (*RQ*) (50 th percentile)	0.07	0.00			0.09	0.10				0.17		0.05
Uniform Delay (*d 1*), s/veh	7.8	1.9			11.8	9.6				42.6		42.8
Incremental Delay (*d 2*), s/veh	0.4	0.4			1.7	0.5				1.7		2.3
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	8.3	2.3			13.5	10.2				44.3		45.1
Level of Service (LOS)	A	A			B	B				D		D
Approach Delay, s/veh / LOS	5.7	A		12.5	B		0.0			44.7	D	
Intersection Delay, s/veh / LOS	13.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.19	B	2.02	B	1.94	B
Bicycle LOS Score / LOS	1.80	B	1.62	B	0.00	A		F

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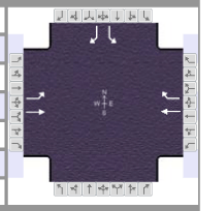
EXHIBIT 4.25
2019 EXISTING PEAK PM HOUR ANALYSIS - Albion/Mitch Owens

HCS Signalized Intersection Results Summary

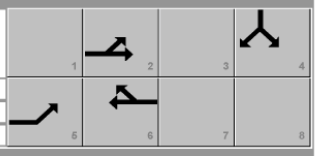
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	October 16, 2019	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2019_ex_pm.xus		
Project Description	MacEwen Service Centre - Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	212	416			553	142				170		392

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

Green	10.3	51.5	29.7	0.0	0.0	0.0
Yellow	4.6	4.6	3.3	0.0	0.0	0.0
Red	2.0	2.2	1.8	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	16.9	75.2		58.3				34.8
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	9.9							28.6
Green Extension Time (*g e*), s	0.4	0.0		0.0				1.1
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	230	452			601	124				185		404
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1581	1660			1660	1560				1511		1609
Queue Service Time (*g s*), s	7.9	12.7			32.6	5.0				11.0		26.6
Cycle Queue Clearance Time (*g c*), s	7.9	12.7			32.6	5.0				11.0		26.6
Green Ratio (*g/C*)	0.58	0.69			0.48	0.48				0.28		0.28
Capacity (*c*), veh/h	366	1146			792	745				422		449
Volume-to-Capacity Ratio (*X*)	0.630	0.394			0.759	0.166				0.438		0.900
Back of Queue (*Q*), m/ln (50 th percentile)	20.6	31.6			106.6	14.3				34.2		88.9
Back of Queue (*Q*), veh/ln (50 th percentile)	2.5	3.8			13.0	1.7				4.0		11.2
Queue Storage Ratio (*RQ*) (50 th percentile)	0.08	0.06			0.21	0.09				0.24		0.18
Uniform Delay (*d 1*), s/veh	18.3	8.5			23.5	16.3				32.5		38.2
Incremental Delay (*d 2*), s/veh	0.7	1.0			6.7	0.5				0.3		8.1
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	19.0	9.5			30.3	16.8				32.8		46.3
Level of Service (LOS)	B	A			C	B				C		D
Approach Delay, s/veh / LOS	12.7		B	28.0		C	0.0			42.1		D
Intersection Delay, s/veh / LOS	26.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.19	B	2.00	B	1.95	B
Bicycle LOS Score / LOS	1.62	B	1.68	B	0.00	A		F

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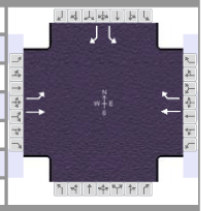
EXHIBIT 4.26
2024 BACKGROUND PEAK AM HOUR ANALYSIS - Albion/Mitch Owens

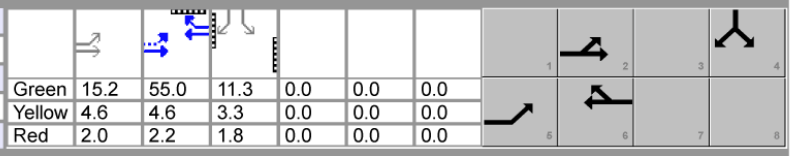
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2024_bak_am.xus		
Project Description	MacEwen Service Centre - Background AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	466	340			487	258				116		138

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	15.2	55.0	11.3	0.0	0.0	0.0
Yellow	4.6	4.6	3.3	0.0	0.0	0.0
Red	2.0	2.2	1.8	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	21.8	83.6		61.8				16.4
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	14.3							10.8
Green Extension Time (*g e*), s	0.9	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

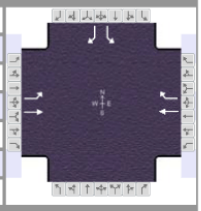
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	507	370			529	224				126		128
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1702			1660	1573				1508		1408
Queue Service Time (*g s*), s	12.3	4.3			20.6	7.3				8.0		8.8
Cycle Queue Clearance Time (*g c*), s	12.3	4.3			20.6	7.3				8.0		8.8
Green Ratio (*g/C*)	0.72	0.84			0.56	0.56				0.12		0.12
Capacity (*c*), veh/h	641	1437			929	881				185		173
Volume-to-Capacity Ratio (*X*)	0.790	0.257			0.570	0.254				0.681		0.742
Back of Queue (*Q*), m/ln (50 th percentile)	24.7	3.5			59.5	19.4				25.6		27.5
Back of Queue (*Q*), veh/ln (50 th percentile)	3.1	0.4			7.2	2.4				3.0		3.1
Queue Storage Ratio (*RQ*) (50 th percentile)	0.10	0.01			0.12	0.12				0.18		0.05
Uniform Delay (*d 1*), s/veh	10.8	2.2			14.2	11.3				42.0		42.3
Incremental Delay (*d 2*), s/veh	1.5	0.4			2.5	0.7				1.6		2.3
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	12.3	2.6			16.8	12.0				43.6		44.7
Level of Service (LOS)	B	A			B	B				D		D
Approach Delay, s/veh / LOS	8.2	A		15.3	B		0.0			44.2	D	
Intersection Delay, s/veh / LOS	15.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.18	B	2.03	B	1.94	B
Bicycle LOS Score / LOS	1.93	B	1.73	B	0.00	A		F

EXHIBIT 4.27
2024 BACKGROUND PEAK PM HOUR ANALYSIS - Albion/Mitch Owens

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2024_bak_pm.xus		
Project Description	MacEwen Service Centre - Background PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	234	459			611	157				188		433

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	Begin	Green	12.9	45.9		32.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6		3.3	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	2.2		1.8	0.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	19.5	72.2		52.7				37.8
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	12.4							31.5
Green Extension Time (*g e*), s	0.4	0.0		0.0				1.2
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	254	499			664	136				204		449
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1581	1660			1660	1560				1511		1610
Queue Service Time (*g s*), s	10.4	15.9			42.1	6.0				11.9		29.5
Cycle Queue Clearance Time (*g c*), s	10.4	15.9			42.1	6.0				11.9		29.5
Green Ratio (*g/C*)	0.55	0.66			0.43	0.43				0.31		0.31
Capacity (*c*), veh/h	296	1101			708	665				463		493
Volume-to-Capacity Ratio (*X*)	0.859	0.453			0.938	0.204				0.441		0.910
Back of Queue (*Q*), m/ln (50 th percentile)	30	41.6			160.2	17.9				36.7		101.3
Back of Queue (*Q*), veh/ln (50 th percentile)	3.6	5.1			19.5	2.2				4.3		12.8
Queue Storage Ratio (*RQ*) (50 th percentile)	0.12	0.08			0.32	0.11				0.26		0.20
Uniform Delay (*d 1*), s/veh	25.6	10.3			30.2	19.8				30.6		36.7
Incremental Delay (*d 2*), s/veh	2.8	1.3			21.7	0.7				0.2		11.2
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	28.4	11.7			51.9	20.5				30.8		47.9
Level of Service (LOS)	C	B			D	C				C		D
Approach Delay, s/veh / LOS	17.3	B		46.6	D		0.0			42.6	D	
Intersection Delay, s/veh / LOS	35.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.18	B	2.00	B	1.95	B
Bicycle LOS Score / LOS	1.73	B	1.81	B	0.00	A		F

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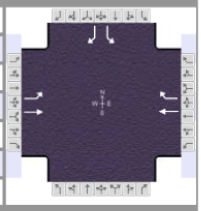
EXHIBIT 4.28
2029 BACKGROUND PEAK AM HOUR ANALYSIS - Albion/Mitch Owens

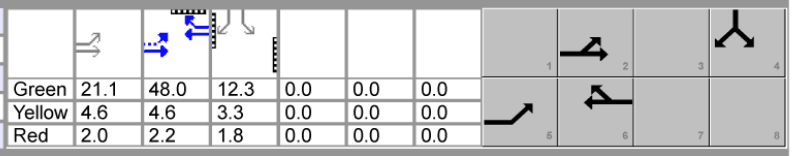
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2029_bak_am.xus		
Project Description	MacEwen Service Centre - Background AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	514	375			538	285				128		152

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	21.1	48.0	12.3	0.0	0.0	0.0						
Yellow	4.6	4.6	3.3	0.0	0.0	0.0						
Red	2.0	2.2	1.8	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	27.7	82.6		54.8				17.4
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	20.0							11.8
Green Extension Time (*g e*), s	0.9	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	559	408			585	248				139		143
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1702			1660	1573				1508		1409
Queue Service Time (*g s*), s	18.0	5.2			27.8	9.6				8.8		9.8
Cycle Queue Clearance Time (*g c*), s	18.0	5.2			27.8	9.6				8.8		9.8
Green Ratio (*g/C*)	0.71	0.83			0.49	0.49				0.13		0.13
Capacity (*c*), veh/h	606	1418			810	768				201		188
Volume-to-Capacity Ratio (*X*)	0.922	0.287			0.722	0.323				0.691		0.763
Back of Queue (*Q*), m/ln (50 th percentile)	59.2	5.2			87.7	27				28.1		30.7
Back of Queue (*Q*), veh/ln (50 th percentile)	7.5	0.6			10.7	3.3				3.3		3.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.23	0.01			0.18	0.17				0.20		0.06
Uniform Delay (*d 1*), s/veh	18.0	2.5			20.2	15.5				41.4		41.8
Incremental Delay (*d 2*), s/veh	11.8	0.5			5.5	1.1				1.6		2.4
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	29.8	3.0			25.7	16.7				42.9		44.2
Level of Service (LOS)	C	A			C	B				D		D
Approach Delay, s/veh / LOS	18.5	B		23.0	C		0.0			43.6	D	
Intersection Delay, s/veh / LOS	23.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.16	B	2.04	B	1.94	B
Bicycle LOS Score / LOS	2.08	B	1.86	B	0.00	A		F

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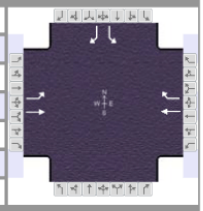
EXHIBIT 4.29
2029 BACKGROUND PEAK PM HOUR ANALYSIS - Albion/Mitch Owens

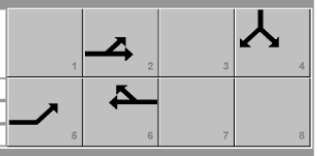
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2029_bak_pm.xus		
Project Description	MacEwen Service Centre - Background PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	258	507			675	173				208		478

Signal Information												
Cycle, s	110.0	Reference Phase	2									
Offset, s	0	Reference Point	Begin									
Uncoordinated	No	Simult. Gap E/W	Off									
Force Mode	Fixed	Simult. Gap N/S	Off									
				Green	16.8	38.8	36.0	0.0	0.0	0.0		
				Yellow	4.6	4.6	3.3	0.0	0.0	0.0		
				Red	2.0	2.2	1.8	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	23.4	68.9		45.6				41.1
Change Period, ($Y+R_c$), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (g_s), s	16.4							34.7
Green Extension Time (g_e), s	0.4	0.0		0.0				1.3
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	280	551			734	150				226		498
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1581	1660			1660	1559				1511		1610
Queue Service Time (g_s), s	14.4	20.0			39.8	7.5				12.8		32.7
Cycle Queue Clearance Time (g_c), s	14.4	20.0			39.8	7.5				12.8		32.7
Green Ratio (*g/C*)	0.52	0.63			0.36	0.36				0.34		0.34
Capacity (*c*), veh/h	321	1052			600	564				508		541
Volume-to-Capacity Ratio (*X*)	0.873	0.524			1.223	0.266				0.445		0.920
Back of Queue (*Q*), m/ln (50 th percentile)	59.9	54.6			278.8	23				39.2		115.1
Back of Queue (*Q*), veh/ln (50 th percentile)	7.3	6.6			33.9	2.8				4.6		14.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.23	0.11			0.56	0.14				0.28		0.23
Uniform Delay (d_1), s/veh	30.7	12.7			35.1	24.8				28.5		35.1
Incremental Delay (d_2), s/veh	3.0	1.9			114.8	1.2				0.2		14.4
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	33.7	14.5			149.9	26.0				28.7		49.5
Level of Service (LOS)	C	B			F	C				C		D
Approach Delay, s/veh / LOS	21.0		C	128.9		F	0.0			43.0		D
Intersection Delay, s/veh / LOS	66.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.16	B	2.01	B	1.95	B
Bicycle LOS Score / LOS	1.86	B	1.95	B	0.00	A		F

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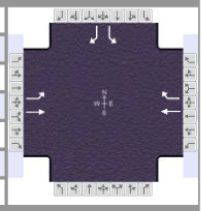
EXHIBIT 4.30
2024 TOTAL PEAK AM HOUR ANALYSIS - Albion/Mitch Owens

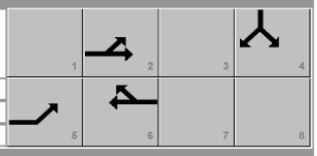
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2024_tot_am.xus		
Project Description	MacEwen Service Centre - Total AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	459	335			490	255				123		134

Signal Information					EB			WB			NB			SB		
Cycle, s	100.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	Begin	Green	14.9	55.6		11.1	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6		3.3	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	2.2		1.8	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	21.5	83.8		62.4				16.2
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	14.0							10.6
Green Extension Time (*g e*), s	0.9	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	499	364			533	222				134		124
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1702			1660	1573				1507		1408
Queue Service Time (*g s*), s	12.0	4.2			20.5	7.1				8.6		8.5
Cycle Queue Clearance Time (*g c*), s	12.0	4.2			20.5	7.1				8.6		8.5
Green Ratio (*g/C*)	0.72	0.85			0.57	0.57				0.12		0.12
Capacity (*c*), veh/h	640	1440			939	890				182		170
Volume-to-Capacity Ratio (*X*)	0.780	0.253			0.567	0.249				0.735		0.730
Back of Queue (*Q*), m/ln (50 th percentile)	23.5	3.1			58.9	18.8				27.6		26.5
Back of Queue (*Q*), veh/ln (50 th percentile)	3.0	0.4			7.2	2.3				3.2		3.0
Queue Storage Ratio (*RQ*) (50 th percentile)	0.09	0.01			0.12	0.12				0.20		0.05
Uniform Delay (*d 1*), s/veh	10.6	2.1			13.9	11.0				42.4		42.4
Incremental Delay (*d 2*), s/veh	1.2	0.4			2.5	0.7				2.2		2.3
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	11.7	2.5			16.4	11.6				44.6		44.7
Level of Service (LOS)	B	A			B	B				D		D
Approach Delay, s/veh / LOS	7.8	A		15.0	B		0.0			44.6	D	
Intersection Delay, s/veh / LOS	15.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.18	B	2.03	B	1.94	B
Bicycle LOS Score / LOS	1.91	B	1.73	B	0.00	A		F

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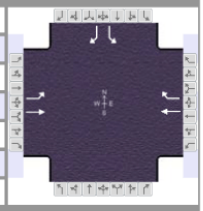
EXHIBIT 4.31
2024 TOTAL PEAK PM HOUR ANALYSIS - Albion/Mitch Owens

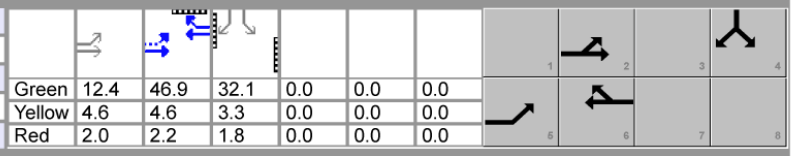
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2024_tot_pm.xus		
Project Description	MacEwen Service Centre - Total PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	232	453			619	156				195		425

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



Green	12.4	46.9	32.1	0.0	0.0	0.0	
Yellow	4.6	4.6	3.3	0.0	0.0	0.0	
Red	2.0	2.2	1.8	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	19.0	72.8		53.7				37.2
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	12.0							30.9
Green Extension Time (*g e*), s	0.4	0.0		0.0				1.2
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	252	492			673	133				212		440
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1581	1660			1660	1560				1511		1610
Queue Service Time (*g s*), s	10.0	15.4			42.4	5.8				12.5		28.9
Cycle Queue Clearance Time (*g c*), s	10.0	15.4			42.4	5.8				12.5		28.9
Green Ratio (*g/C*)	0.56	0.67			0.44	0.44				0.30		0.30
Capacity (*c*), veh/h	294	1110			722	679				455		485
Volume-to-Capacity Ratio (*X*)	0.857	0.444			0.931	0.195				0.465		0.908
Back of Queue (*Q*), m/ln (50 th percentile)	28.7	39.7			159.1	17.1				38.6		98.9
Back of Queue (*Q*), veh/ln (50 th percentile)	3.5	4.8			19.3	2.1				4.5		12.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.11	0.08			0.32	0.11				0.28		0.20
Uniform Delay (*d 1*), s/veh	24.9	10.0			29.5	19.2				31.2		37.0
Incremental Delay (*d 2*), s/veh	2.8	1.3			20.4	0.6				0.3		10.6
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	27.7	11.3			49.9	19.8				31.5		47.6
Level of Service (LOS)	C	B			D	B				C		D
Approach Delay, s/veh / LOS	16.8	B		44.9	D		0.0			42.4	D	
Intersection Delay, s/veh / LOS	34.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.18	B	2.01	B	1.95	B
Bicycle LOS Score / LOS	1.72	B	1.82	B	0.00	A		F

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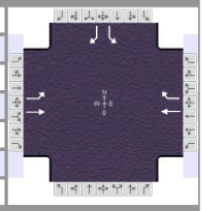
EXHIBIT 4.32
2029 TOTAL PEAK AM HOUR ANALYSIS - Albion/Mitch Owens

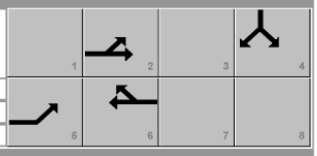
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2029_tot_am.xus		
Project Description	MacEwen Service Centre - Total AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	507	371			545	282				135		148

Signal Information												
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	Begin									
Uncoordinated	No	Simult. Gap E/W	Off									
Force Mode	Fixed	Simult. Gap N/S	Off									
				Green	20.3	49.2	12.1	0.0	0.0	0.0		
				Yellow	4.6	4.6	3.3	0.0	0.0	0.0		
				Red	2.0	2.2	1.8	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	26.9	82.8		56.0				17.2
Change Period, (*Y+R c*), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (*g s*), s	19.1							11.5
Green Extension Time (*g e*), s	0.9	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	551	403			592	246				147		139
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1702			1660	1573				1508		1408
Queue Service Time (*g s*), s	17.1	5.1			27.8	9.3				9.4		9.5
Cycle Queue Clearance Time (*g c*), s	17.1	5.1			27.8	9.3				9.4		9.5
Green Ratio (*g/C*)	0.71	0.84			0.50	0.50				0.13		0.13
Capacity (*c*), veh/h	599	1423			829	786				197		184
Volume-to-Capacity Ratio (*X*)	0.919	0.283			0.715	0.313				0.745		0.756
Back of Queue (*Q*), m/ln (50 th percentile)	58.4	4.7			86.5	25.9				30.2		29.8
Back of Queue (*Q*), veh/ln (50 th percentile)	7.4	0.6			10.5	3.2				3.5		3.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.23	0.01			0.17	0.16				0.22		0.06
Uniform Delay (*d 1*), s/veh	17.6	2.4			19.5	14.8				41.9		41.9
Incremental Delay (*d 2*), s/veh	10.9	0.5			5.2	1.0				2.1		2.4
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	28.5	2.9			24.7	15.9				44.0		44.3
Level of Service (LOS)	C	A			C	B				D		D
Approach Delay, s/veh / LOS	17.7	B		22.1	C		0.0			44.1	D	
Intersection Delay, s/veh / LOS	23.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.16	B	2.03	B	1.94	B
Bicycle LOS Score / LOS	2.06	B	1.87	B	0.00	A		F

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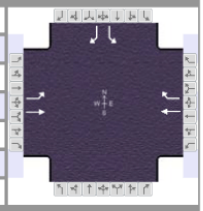
EXHIBIT 4.33
2029 TOTAL PEAK PM HOUR ANALYSIS - Albion/Mitch Owens

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	5546 Albion Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Albion/Mitch Owens	File Name	2029_tot_pm.xus		
Project Description	MacEwen Service Centre - Total PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	256	502			683	172				218		470

Signal Information												
Cycle, s	110.0	Reference Phase	2									
Offset, s	0	Reference Point	Begin	Green	16.6	39.5	35.4	0.0	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6	3.3	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	2.2	1.8	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	23.2	69.5		46.3				40.5
Change Period, ($Y+R_c$), s	6.6	6.8		6.8				5.1
Max Allow Headway (*MAH*), s	3.0	0.0		0.0				3.2
Queue Clearance Time (g_s), s	16.2							34.1
Green Extension Time (g_e), s	0.4	0.0		0.0				1.3
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	278	546			742	150				237		489
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1581	1660			1660	1559				1511		1610
Queue Service Time (g_s), s	14.2	19.4			40.5	7.4				13.7		32.1
Cycle Queue Clearance Time (g_c), s	14.2	19.4			40.5	7.4				13.7		32.1
Green Ratio (*g/C*)	0.53	0.64			0.37	0.37				0.33		0.33
Capacity (*c*), veh/h	319	1061			610	574				500		533
Volume-to-Capacity Ratio (*X*)	0.872	0.514			1.216	0.262				0.474		0.918
Back of Queue (*Q*), m/ln (50 th percentile)	59.4	52.7			279.3	22.7				41.9		112.6
Back of Queue (*Q*), veh/ln (50 th percentile)	7.2	6.4			34.0	2.8				4.9		14.2
Queue Storage Ratio (*RQ*) (50 th percentile)	0.23	0.11			0.56	0.14				0.30		0.23
Uniform Delay (d_1), s/veh	30.9	12.3			34.8	24.3				29.2		35.4
Incremental Delay (d_2), s/veh	2.9	1.8			111.7	1.1				0.3		13.8
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	33.8	14.0			146.5	25.4				29.5		49.1
Level of Service (LOS)	C	B			F	C				C		D
Approach Delay, s/veh / LOS	20.7	C		126.1	F		0.0			42.7	D	
Intersection Delay, s/veh / LOS	65.8						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.76	B	2.16	B	2.01	B	1.95	B
Bicycle LOS Score / LOS	1.85	B	1.96	B	0.00	A		F

HCS™ Streets Version 2023
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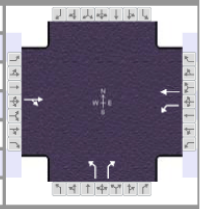
EXHIBIT 4.34
2019 EXISTING PEAK AM HOUR ANALYSIS - Stagecoach/Mitch Owens

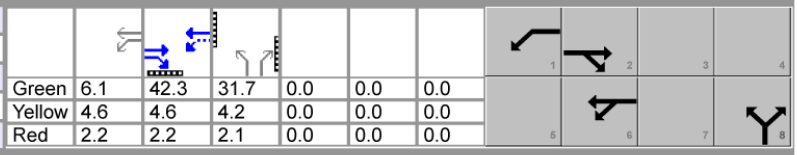
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	October 16, 2019	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2019_ex_am.xus		
Project Description	MacEwen Service Centre - Existing AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		314	55	107	465		161		427			

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	6.1	42.3	31.7	0.0	0.0	0.0	
Yellow	4.6	4.6	4.2	0.0	0.0	0.0	
Red	2.2	2.2	2.1	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		49.1	12.9	62.0		38.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.4		
Queue Clearance Time (*g s*), s			6.3			31.2		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.5		
Phase Call Probability			0.96			1.00		
Max Out Probability			1.00			1.00		

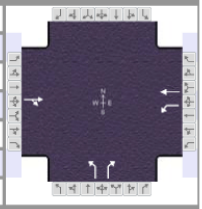
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		354		116	505		175		440			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1662		1447	1589		1632		1456			
Queue Service Time (*g s*), s		15.4		4.3	17.2		8.1		29.2			
Cycle Queue Clearance Time (*g c*), s		15.4		4.3	17.2		8.1		29.2			
Green Ratio (*g/C*)		0.43		0.50	0.63		0.33		0.33			
Capacity (*c*), veh/h		720		421	1002		533		476			
Volume-to-Capacity Ratio (*X*)		0.492		0.276	0.505		0.328		0.925			
Back of Queue (*Q*), m/ln (50 th percentile)		47.9		11.3	45.3		24.6		99.2			
Back of Queue (*Q*), veh/ln (50 th percentile)		5.9		1.3	5.3		3.1		12.7			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.10		0.05	0.09		0.16		0.07			
Uniform Delay (*d 1*), s/veh		20.4		14.7	11.7		25.4		32.5			
Incremental Delay (*d 2*), s/veh		2.4		0.1	1.8		0.1		21.8			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		22.8		14.8	13.5		25.5		54.2			
Level of Service (LOS)		C		B	B		C		D			
Approach Delay, s/veh / LOS	22.8	C		13.8	B		46.1	D		0.0		
Intersection Delay, s/veh / LOS	28.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.16	B	1.95	B	2.10	B	1.78	B
Bicycle LOS Score / LOS	1.07	A	1.34	A		F	0.00	A

EXHIBIT 4.35
2019 EXISTING PEAK PM HOUR ANALYSIS - Stagecoach/Mitch Owens

HCS Signalized Intersection Results Summary

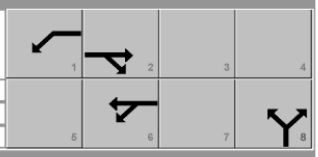
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	October 16, 2019	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2019_ex_pm.xus		
Project Description	MacEwen Service Centre - Existing PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		451	136	384	593		120		189			

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

Green	13.9	60.4	15.8	0.0	0.0	0.0	
Yellow	4.6	4.6	4.2	0.0	0.0	0.0	
Red	2.2	2.2	2.1	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		67.2	20.7	87.9		22.1		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.3		
Queue Clearance Time (*g s*), s			13.3			15.6		
Green Extension Time (*g e*), s		0.0	0.6	0.0		0.2		
Phase Call Probability			1.00			1.00		
Max Out Probability			0.00			1.00		

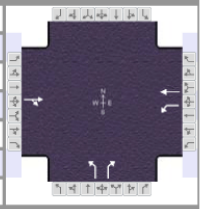
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		616		417	645		130		182			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1596		1661	1730		1695		1428			
Queue Service Time (*g s*), s		30.6		11.3	12.5		7.8		13.6			
Cycle Queue Clearance Time (*g c*), s		30.6		11.3	12.5		7.8		13.6			
Green Ratio (*g/C*)		0.56		0.69	0.81		0.15		0.15			
Capacity (*c*), veh/h		891		513	1399		258		218			
Volume-to-Capacity Ratio (*X*)		0.692		0.813	0.461		0.505		0.834			
Back of Queue (*Q*), m/ln (50 th percentile)		89.4		37	20.1		25		46.1			
Back of Queue (*Q*), veh/ln (50 th percentile)		10.9		4.7	2.5		3.3		5.8			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.18		0.17	0.04		0.17		0.09			
Uniform Delay (*d 1*), s/veh		17.5		15.8	4.0		42.8		45.3			
Incremental Delay (*d 2*), s/veh		4.4		3.8	1.1		0.6		17.9			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		21.9		19.6	5.1		43.4		63.2			
Level of Service (LOS)		C		B	A		D		E			
Approach Delay, s/veh / LOS	21.9	C		10.8	B		54.9	D		0.0		
Intersection Delay, s/veh / LOS	21.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.17	B	1.95	B	2.10	B	1.75	B
Bicycle LOS Score / LOS	1.51	B	2.06	B		F	0.00	A

EXHIBIT 4.36
2024 BACKGROUND PEAK AM HOUR ANALYSIS - Stagecoach/Mitch Owens

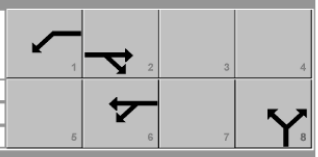
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2024_bak_am.xus		
Project Description	MacEwen Service Centre - Background AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		347	61	118	513		178		471			

Signal Information					EB		WB			
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	Begin	Green	5.2	41.2	33.7	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6	4.2	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.2	2.2	2.1	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	12.0	60.0		40.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.4		
Queue Clearance Time (*g s*), s			7.0			34.9		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.0		
Phase Call Probability			0.97			1.00		
Max Out Probability			1.00			1.00		

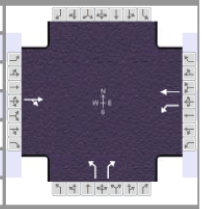
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		392		128	558		193		488			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1661		1447	1589		1632		1456			
Queue Service Time (*g s*), s		17.9		5.0	21.1		8.8		32.9			
Cycle Queue Clearance Time (*g c*), s		17.9		5.0	21.1		8.8		32.9			
Green Ratio (*g/C*)		0.42		0.48	0.61		0.35		0.35			
Capacity (*c*), veh/h		701		368	970		566		505			
Volume-to-Capacity Ratio (*X*)		0.560		0.348	0.575		0.342		0.966			
Back of Queue (*Q*), m/ln (50 th percentile)		56.7		13.2	57.4		26.4		120.1			
Back of Queue (*Q*), veh/ln (50 th percentile)		6.9		1.5	6.7		3.3		15.4			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.11		0.06	0.11		0.18		0.24			
Uniform Delay (*d 1*), s/veh		21.9		16.5	13.6		24.2		32.1			
Incremental Delay (*d 2*), s/veh		3.2		0.2	2.5		0.1		31.2			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		25.1		16.7	16.1		24.3		63.2			
Level of Service (LOS)		C		B	B		C		E			
Approach Delay, s/veh / LOS	25.1	C		16.2	B		52.2	D		0.0		
Intersection Delay, s/veh / LOS	32.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.16	B	1.95	B	2.10	B	1.78	B
Bicycle LOS Score / LOS	1.14	A	1.44	A		F	0.00	A

EXHIBIT 4.37
2024 BACKGROUND PEAK PM HOUR ANALYSIS - Stagecoach/Mitch Owens

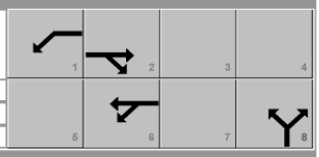
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2024_bak_pm.xus		
Project Description	MacEwen Service Centre - Background PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		498	150	424	655		132		209			

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



Green	23.4	51.0	15.7	0.0	0.0	0.0	
Yellow	4.6	4.6	4.2	0.0	0.0	0.0	
Red	2.2	2.2	2.1	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		57.8	30.2	88.0		22.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.3		
Queue Clearance Time (*g s*), s			23.3			17.5		
Green Extension Time (*g e*), s		0.0	0.1	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

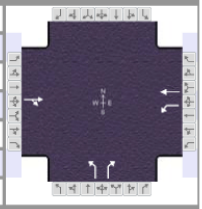
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		682		461	712		143		203			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1595		1661	1730		1695		1428			
Queue Service Time (*g s*), s		43.2		21.3	14.7		8.6		15.5			
Cycle Queue Clearance Time (*g c*), s		43.2		21.3	14.7		8.6		15.5			
Green Ratio (*g/C*)		0.47		0.69	0.81		0.15		0.15			
Capacity (*c*), veh/h		755		494	1400		257		217			
Volume-to-Capacity Ratio (*X*)		0.902		0.933	0.509		0.557		0.937			
Back of Queue (*Q*), m/ln (50 th percentile)		148.5		114.2	23.5		28.3		63.5			
Back of Queue (*Q*), veh/ln (50 th percentile)		18.1		14.5	3.0		3.7		8.0			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.30		0.52	0.05		0.19		0.13			
Uniform Delay (*d 1*), s/veh		26.6		28.9	4.3		43.2		46.1			
Incremental Delay (*d 2*), s/veh		16.1		23.7	1.3		1.6		43.3			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		42.7		52.6	5.6		44.9		89.5			
Level of Service (LOS)		D		D	A		D		F			
Approach Delay, s/veh / LOS	42.7	D		24.0	C		71.0	E		0.0		
Intersection Delay, s/veh / LOS	37.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.17	B	1.95	B	2.10	B	1.75	B
Bicycle LOS Score / LOS	1.61	B	2.24	B		F	0.00	A

EXHIBIT 4.38
2029 BACKGROUND PEAK AM HOUR ANALYSIS - Stagecoach/Mitch Owens

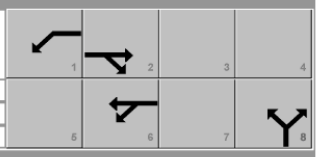
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2029_bak_am.xus		
Project Description	MacEwen Service Centre - Background AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		383	67	130	566		197		520			

Signal Information					EB		WB			
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	Begin							
Uncoordinated	No	Simult. Gap E/W	Off	Green	8.0	33.3	38.8	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Yellow	4.6	4.6	4.2	0.0	0.0	0.0
				Red	2.2	2.2	2.1	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		40.1	14.8	54.9		45.1		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.4		
Queue Clearance Time (*g s*), s			8.1			37.6		
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.2		
Phase Call Probability			0.98			1.00		
Max Out Probability			1.00			0.35		

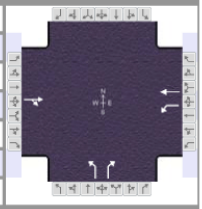
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		433		141	615		214		541			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1661		1447	1589		1632		1457			
Queue Service Time (*g s*), s		23.1		6.1	27.8		9.1		35.6			
Cycle Queue Clearance Time (*g c*), s		23.1		6.1	27.8		9.1		35.6			
Green Ratio (*g/C*)		0.34		0.43	0.56		0.40		0.40			
Capacity (*c*), veh/h		570		294	889		649		580			
Volume-to-Capacity Ratio (*X*)		0.759		0.481	0.692		0.330		0.934			
Back of Queue (*Q*), m/ln (50 th percentile)		81.1		16.8	81.6		27		114.8			
Back of Queue (*Q*), veh/ln (50 th percentile)		9.9		1.9	9.6		3.4		14.7			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.16		0.08	0.16		0.18		0.23			
Uniform Delay (*d 1*), s/veh		29.2		21.0	18.3		20.9		28.8			
Incremental Delay (*d 2*), s/veh		9.2		0.5	4.4		0.1		18.6			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		38.4		21.5	22.7		21.0		47.5			
Level of Service (LOS)		D		C	C		C		D			
Approach Delay, s/veh / LOS	38.4	D		22.5	C		40.0	D		0.0		
Intersection Delay, s/veh / LOS	32.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.16	B	1.95	B	2.10	B	1.79	B
Bicycle LOS Score / LOS	1.20	A	1.56	B		F	0.00	A

EXHIBIT 4.39
2029 BACKGROUND PEAK PM HOUR ANALYSIS - Stagecoach/Mitch Owens

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2029_bak_pm.xus		
Project Description	MacEwen Service Centre - Background PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		550	166	468	723		146		231			

Signal Information					EB			WB			NB			SB		
Cycle, s	110.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	Begin	Green	24.2	50.2		15.7	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6		4.2	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.2	2.2		2.1	0.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		57.0	31.0	88.0		22.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.3		
Queue Clearance Time (*g s*), s			27.2			18.7		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

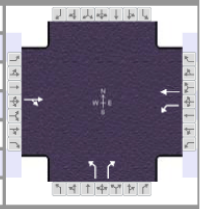
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		753		509	786		159		227			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1595		1661	1730		1695		1428			
Queue Service Time (*g s*), s		51.2		25.2	17.5		9.6		16.7			
Cycle Queue Clearance Time (*g c*), s		51.2		25.2	17.5		9.6		16.7			
Green Ratio (*g/C*)		0.47		0.69	0.81		0.15		0.15			
Capacity (*c*), veh/h		742		446	1400		257		217			
Volume-to-Capacity Ratio (*X*)		1.014		1.141	0.562		0.617		1.048			
Back of Queue (*Q*), m/ln (50 th percentile)		206		168	28.7		32.4		81.6			
Back of Queue (*Q*), veh/ln (50 th percentile)		25.0		21.4	3.6		4.2		10.3			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.41		0.76	0.06		0.22		0.16			
Uniform Delay (*d 1*), s/veh		29.4		35.6	4.6		43.7		46.6			
Incremental Delay (*d 2*), s/veh		36.7		87.1	1.6		3.3		74.2			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		66.1		122.7	6.2		46.9		120.8			
Level of Service (LOS)		F		F	A		D		F			
Approach Delay, s/veh / LOS	66.1	E		52.0	D		90.4	F		0.0		
Intersection Delay, s/veh / LOS	62.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.17	B	1.95	B	2.10	B	1.75	B
Bicycle LOS Score / LOS	1.73	B	2.45	B		F	0.00	A

EXHIBIT 4.40
2024 TOTAL PEAK AM HOUR ANALYSIS - Stagecoach/Mitch Owens

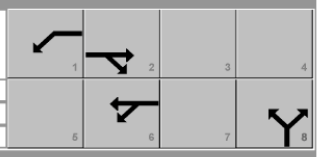
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2024_tot_am.xus		
Project Description	MacEwen Service Centre - Total AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		349	61	126	516		176		480			

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	5.2	41.2	33.7	0.0	0.0	0.0
Yellow	4.6	4.6	4.2	0.0	0.0	0.0
Red	2.2	2.2	2.1	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	12.0	60.0		40.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.4		
Queue Clearance Time (*g s*), s			7.4			35.9		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.0		
Phase Call Probability			0.98			1.00		
Max Out Probability			1.00			1.00		

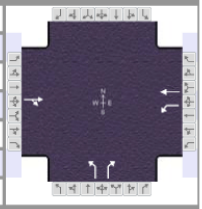
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		393		137	561		191		498			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1662		1447	1589		1632		1456			
Queue Service Time (*g s*), s		17.9		5.4	21.3		8.7		33.9			
Cycle Queue Clearance Time (*g c*), s		17.9		5.4	21.3		8.7		33.9			
Green Ratio (*g/C*)		0.42		0.48	0.61		0.35		0.35			
Capacity (*c*), veh/h		701		368	970		566		505			
Volume-to-Capacity Ratio (*X*)		0.561		0.372	0.578		0.338		0.985			
Back of Queue (*Q*), m/ln (50 th percentile)		56.9		14.2	58		26.1		128.1			
Back of Queue (*Q*), veh/ln (50 th percentile)		7.0		1.6	6.8		3.3		16.4			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.11		0.06	0.12		0.17		0.26			
Uniform Delay (*d 1*), s/veh		21.9		16.6	13.6		24.2		32.4			
Incremental Delay (*d 2*), s/veh		3.2		0.2	2.5		0.1		36.0			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		25.1		16.9	16.1		24.3		68.4			
Level of Service (LOS)		C		B	B		C		E			
Approach Delay, s/veh / LOS	25.1	C		16.3	B		56.1	E		0.0		
Intersection Delay, s/veh / LOS	33.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.16	B	1.95	B	2.10	B	1.79	B
Bicycle LOS Score / LOS	1.14	A	1.46	A		F	0.00	A

EXHIBIT 4.41
2024 TOTAL PEAK PM HOUR ANALYSIS - Stagecoach/Mitch Owens

HCS Signalized Intersection Results Summary

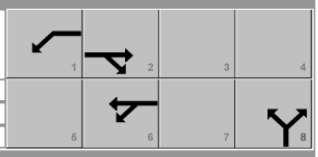
General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2024	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2024_tot_pm.xus		
Project Description	MacEwen Service Centre - Total PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		499	150	435	659		130		216			

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

Green	24.2	50.2	15.7	0.0	0.0	0.0
Yellow	4.6	4.6	4.2	0.0	0.0	0.0
Red	2.2	2.2	2.1	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		57.0	31.0	88.0		22.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.3		
Queue Clearance Time (*g s*), s			25.0			18.2		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

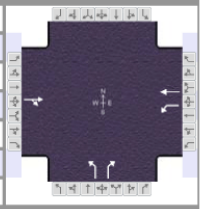
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		682		473	716		141		211			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1596		1661	1730		1695		1428			
Queue Service Time (*g s*), s		43.8		23.0	14.8		8.5		16.2			
Cycle Queue Clearance Time (*g c*), s		43.8		23.0	14.8		8.5		16.2			
Green Ratio (*g/C*)		0.47		0.69	0.81		0.15		0.15			
Capacity (*c*), veh/h		743		496	1400		257		217			
Volume-to-Capacity Ratio (*X*)		0.917		0.953	0.512		0.549		0.972			
Back of Queue (*Q*), m/ln (50 th percentile)		153.5		122.7	23.8		27.8		69.9			
Back of Queue (*Q*), veh/ln (50 th percentile)		18.7		15.6	3.0		3.6		8.8			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.31		0.56	0.05		0.19		0.14			
Uniform Delay (*d 1*), s/veh		27.4		30.1	4.3		43.2		46.4			
Incremental Delay (*d 2*), s/veh		18.1		28.6	1.3		1.4		52.8			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		45.5		58.8	5.6		44.6		99.3			
Level of Service (LOS)		D		E	A		D		F			
Approach Delay, s/veh / LOS	45.5	D		26.7	C		77.3	E		0.0		
Intersection Delay, s/veh / LOS	40.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.17	B	1.95	B	2.10	B	1.75	B
Bicycle LOS Score / LOS	1.61	B	2.27	B		F	0.00	A

EXHIBIT 4.42
2029 TOTAL PEAK AM HOUR ANALYSIS - Stagecoach/Mitch Owens

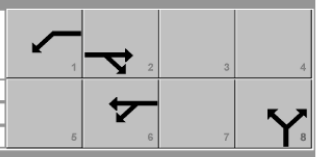
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak AM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2029_tot_am.xus		
Project Description	MacEwen Service Centre - Total AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		385	67	138	569		195		529			

Signal Information					EB			WB			NB			SB		
Cycle, s	100.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	Begin	Green	8.5	32.2		39.4	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.6	4.6		4.2	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.2	2.2		2.1	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		39.0	15.3	54.3		45.7		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.4		
Queue Clearance Time (*g s*), s			8.6			38.3		
Green Extension Time (*g e*), s		0.0	0.0	0.0		1.1		
Phase Call Probability			0.98			1.00		
Max Out Probability			1.00			0.46		

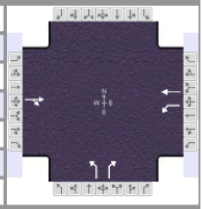
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		434		150	618		212		551			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1662		1447	1589		1632		1457			
Queue Service Time (*g s*), s		23.6		6.6	28.5		8.9		36.3			
Cycle Queue Clearance Time (*g c*), s		23.6		6.6	28.5		8.9		36.3			
Green Ratio (*g/C*)		0.33		0.43	0.55		0.40		0.40			
Capacity (*c*), veh/h		552		288	879		659		588			
Volume-to-Capacity Ratio (*X*)		0.786		0.520	0.704		0.322		0.937			
Back of Queue (*Q*), m/ln (50 th percentile)		84.4		18.3	84.2		26.3		117.6			
Back of Queue (*Q*), veh/ln (50 th percentile)		10.3		2.1	9.9		3.3		15.1			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.17		0.08	0.17		0.18		0.24			
Uniform Delay (*d 1*), s/veh		30.2		21.7	18.8		20.4		28.6			
Incremental Delay (*d 2*), s/veh		10.8		0.5	4.7		0.1		19.3			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		41.0		22.3	23.5		20.5		47.9			
Level of Service (LOS)		D		C	C		C		D			
Approach Delay, s/veh / LOS	41.0	D		23.3	C		40.3	D		0.0		
Intersection Delay, s/veh / LOS	33.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.16	B	1.95	B	2.10	B	1.79	B
Bicycle LOS Score / LOS	1.20	A	1.58	B		F	0.00	A

EXHIBIT 4.43
2029 TOTAL PEAK PM HOUR ANALYSIS - Stagecoach/Mitch Owens

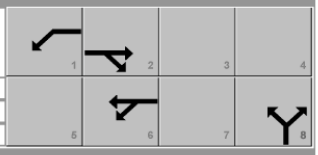
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	Feb 17, 2023	Area Type	Other
Jurisdiction	City of Ottawa	Time Period	Peak PM Hour	PHF	0.92
Urban Street	Stagecoach Road	Analysis Year	Year 2029	Analysis Period	1> 7:00
Intersection	Stagecoach/Mitch Owens	File Name	2029_tot_pm.xus		
Project Description	MacEwen Service Centre - Total PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		551	166	479	727		144		238			

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



Green	24.2	50.2	15.7	0.0	0.0	0.0
Yellow	4.6	4.6	4.2	0.0	0.0	0.0
Red	2.2	2.2	2.1	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		57.0	31.0	88.0		22.0		
Change Period, (*Y+R c*), s		6.8	6.8	6.8		6.3		
Max Allow Headway (*MAH*), s		0.0	3.0	0.0		3.3		
Queue Clearance Time (*g s*), s			27.2			18.7		
Green Extension Time (*g e*), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		755		521	790		157		235			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1595		1661	1730		1695		1428			
Queue Service Time (*g s*), s		51.2		25.2	17.7		9.5		16.7			
Cycle Queue Clearance Time (*g c*), s		51.2		25.2	17.7		9.5		16.7			
Green Ratio (*g/C*)		0.47		0.69	0.81		0.15		0.15			
Capacity (*c*), veh/h		742		446	1400		257		217			
Volume-to-Capacity Ratio (*X*)		1.018		1.168	0.565		0.608		1.083			
Back of Queue (*Q*), m/ln (50 th percentile)		207.4		177.9	29.1		31.8		86.7			
Back of Queue (*Q*), veh/ln (50 th percentile)		25.2		22.6	3.7		4.1		10.9			
Queue Storage Ratio (*RQ*) (50 th percentile)		0.41		0.81	0.06		0.21		0.17			
Uniform Delay (*d 1*), s/veh		29.4		35.6	4.6		43.6		46.6			
Incremental Delay (*d 2*), s/veh		37.5		97.2	1.7		3.0		84.9			
Initial Queue Delay (*d 3*), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		66.9		132.8	6.2		46.6		131.5			
Level of Service (LOS)		F		F	A		D		F			
Approach Delay, s/veh / LOS	66.9	E		56.5	E		97.5	F		0.0		
Intersection Delay, s/veh / LOS	66.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.17	B	1.95	B	2.10	B	1.75	B
Bicycle LOS Score / LOS	1.74	B	2.47	B		F	0.00	A