DILLON CONSULTING

BADGER DAYLIGHTING INC.

3025 Carp Road Office & Warehouse

Transportation Impact Assessment

November 2019 - 19-1661

Certification

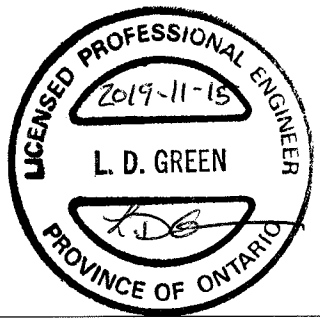
1. I have reviewed and have a sound understanding of the objectives, needs, and requirements of the City of Ottawa's Official Plan and the Transportation Impact Assessment (2017) Guidelines;

2. I have a sound knowledge of industry standard practice with respect to the presentation of transportation impact assessment reports, including multimodal level of service review;

3. 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,

4. I am either a licensed or registered professional in good standing, whose field of expertise is either transportation engineering or transportation planning.

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



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1.0 Screening

1.1 Description of Proposed Development

Description of Location	The site is located on the west side of Carp Road, approximately 160 metres north of McGee Side Road. The site is bound by a farm field to the north, to the east by 3047 Carp Road and Carp Road itself, to the south by 2205 McGee Side Road and McGee Side Road, and to the west by Mineral Extraction (ME) zone. The building is to be located west of 3037 and 3047 Carp Road with a driveway access to Carp Road.
Ward	Ward 5 – West Carleton – March (Eli El-Chantiry)
Land Use Classification	RC9 – Rural Commercial Zone 9 for Carp Road Corridor (Highway commercial Restricted). Relevant permitted uses include: automobile service station, heavy equipment and vehicle sales, rental and servicing, parking lot, warehouse, light industrial, service and repair shop, and office.
Development Size	Two-story building with a ground floor footprint of 874.25 square metres (sq.m). There will be six truck repair bays on the first level and 133.15 sq.m. on the second level, for a total of 1,007.4 sq.m. GFA. Heavy equipment servicing will occupy 741.10 sq.m. and 266.3 sq.m. will be dedicated to office use. The site will provide 24 hydro-vac truck parking spaces and 60 parking spaces for employees.
Accesses	One access on Carp Road
Phases	One phase
Build-out year	2021

1.2 Trip Generation Trigger

Land Use Type	Minimum Development Size	Yes	No
Single-family homes	40 units		x
Townhomes or apartments	90 units		x
Office	3,500 sq.m.		x
Industrial	5,000 sq.m.		x
Fast-food restaurant or coffee shop	100 sq.m.		x
Destination retail	1,000 sq.m.		x
Gas station or convenience market	75 sq.m.		x
Other	60 person trips or more during weekday peak hours		x

1.3 Location Triggers

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

1.4 Safety Triggers

	Yes	No
Are posted speed limits on a boundary street 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

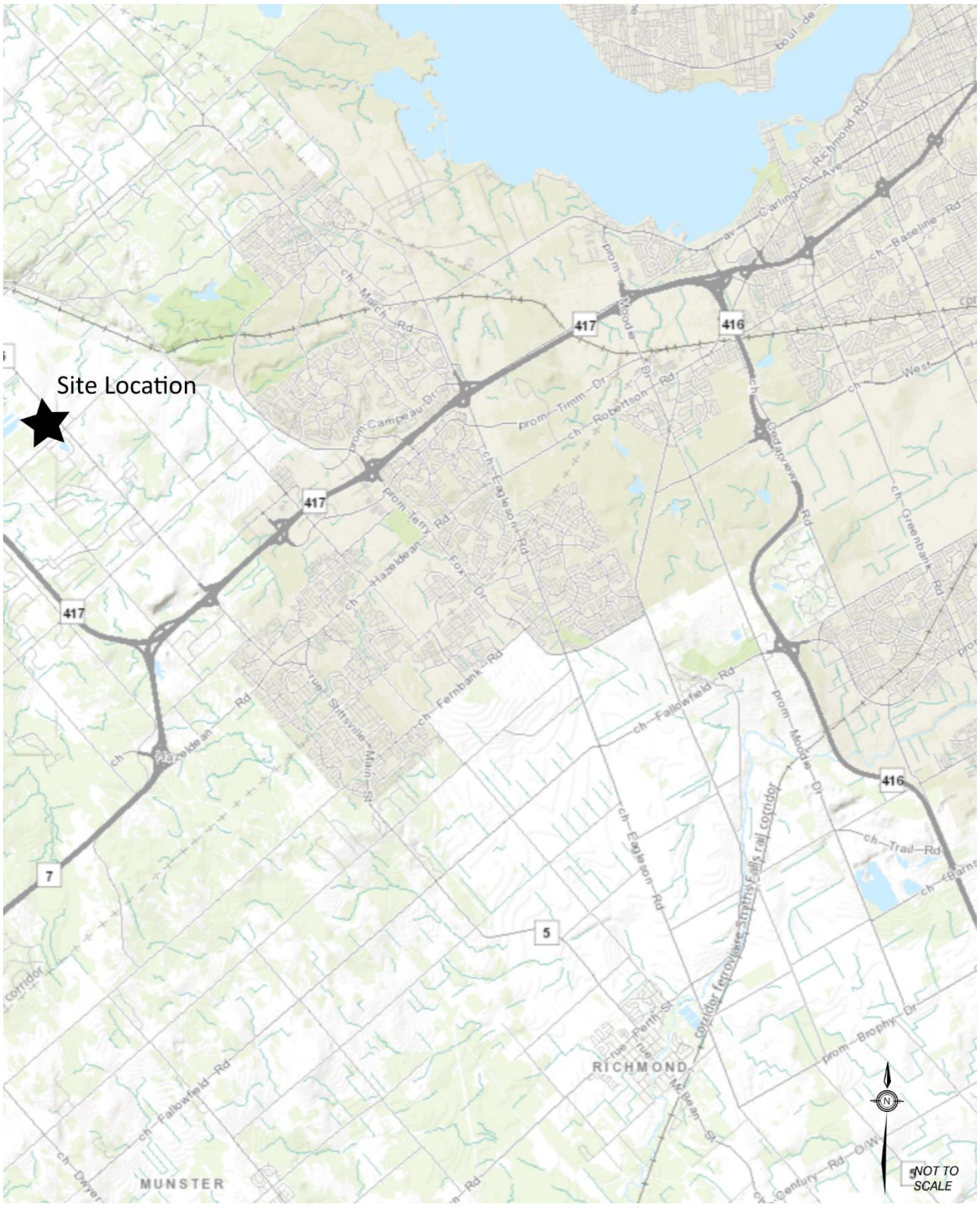
1.5 Summary

	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	

Since the development satisfies the location and safety triggers, both the design review component and the network impact component will be addressed in the TIA.

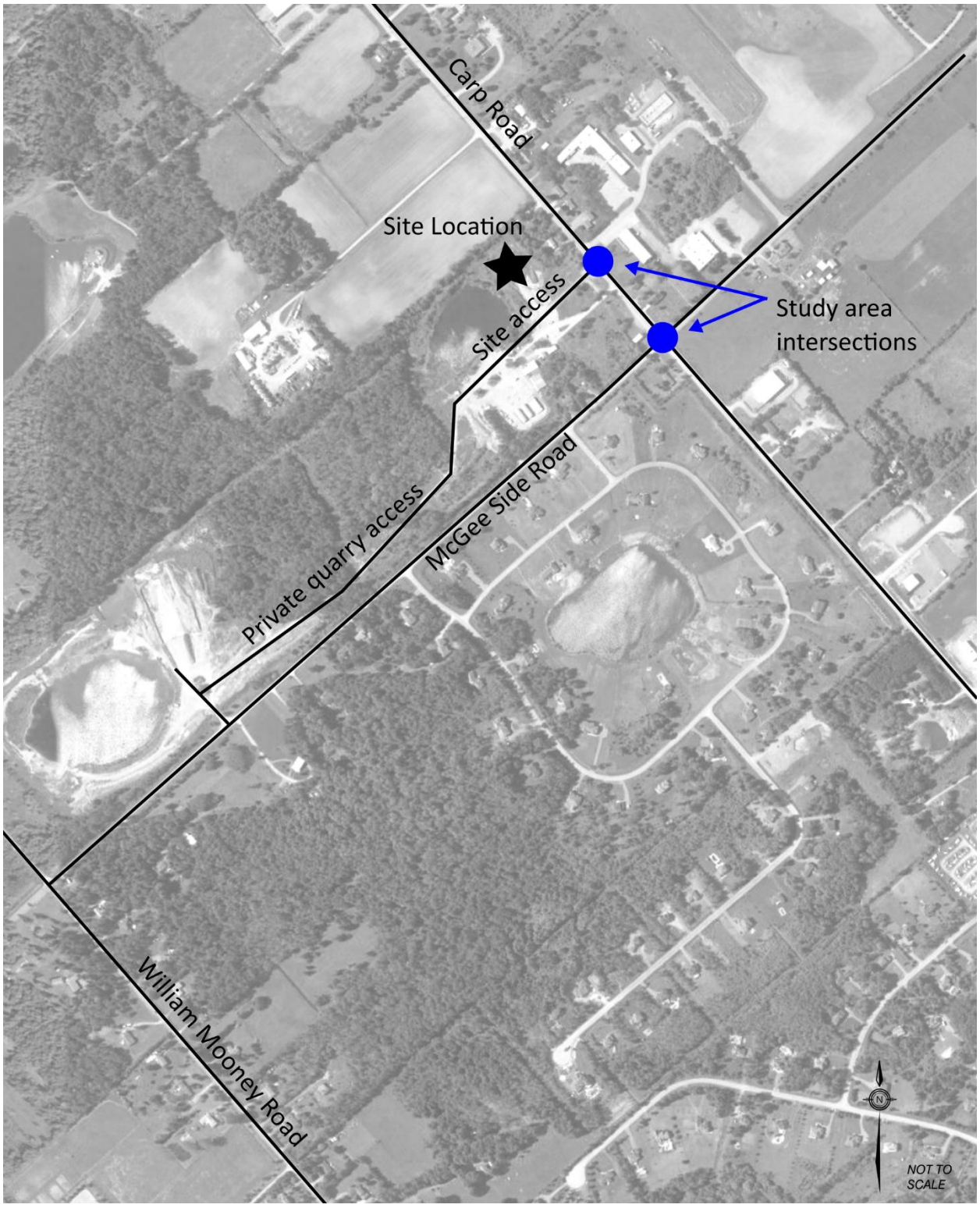
Figure 1 illustrates the site location. **Figure 2** illustrates the study area intersections.

Figure 1: Site Location



Background map source: geoOttawa, accessed September 2019

Figure 2: Study Area Intersections



Background map source: Google Maps, accessed September 2019

2.0 Scoping

2.1 Existing and Planned Conditions

2.1.1 Proposed Development

Badger Daylighting (Badger) proposes to construct two (2) connected warehouse buildings to house six (6) truck repair bays and two (2) floors of related office space, to lay gravel on the site for use as an outdoor storage yard, and to construct parking areas for staff and vehicles. Two of the truck repair bays will be rented to others.

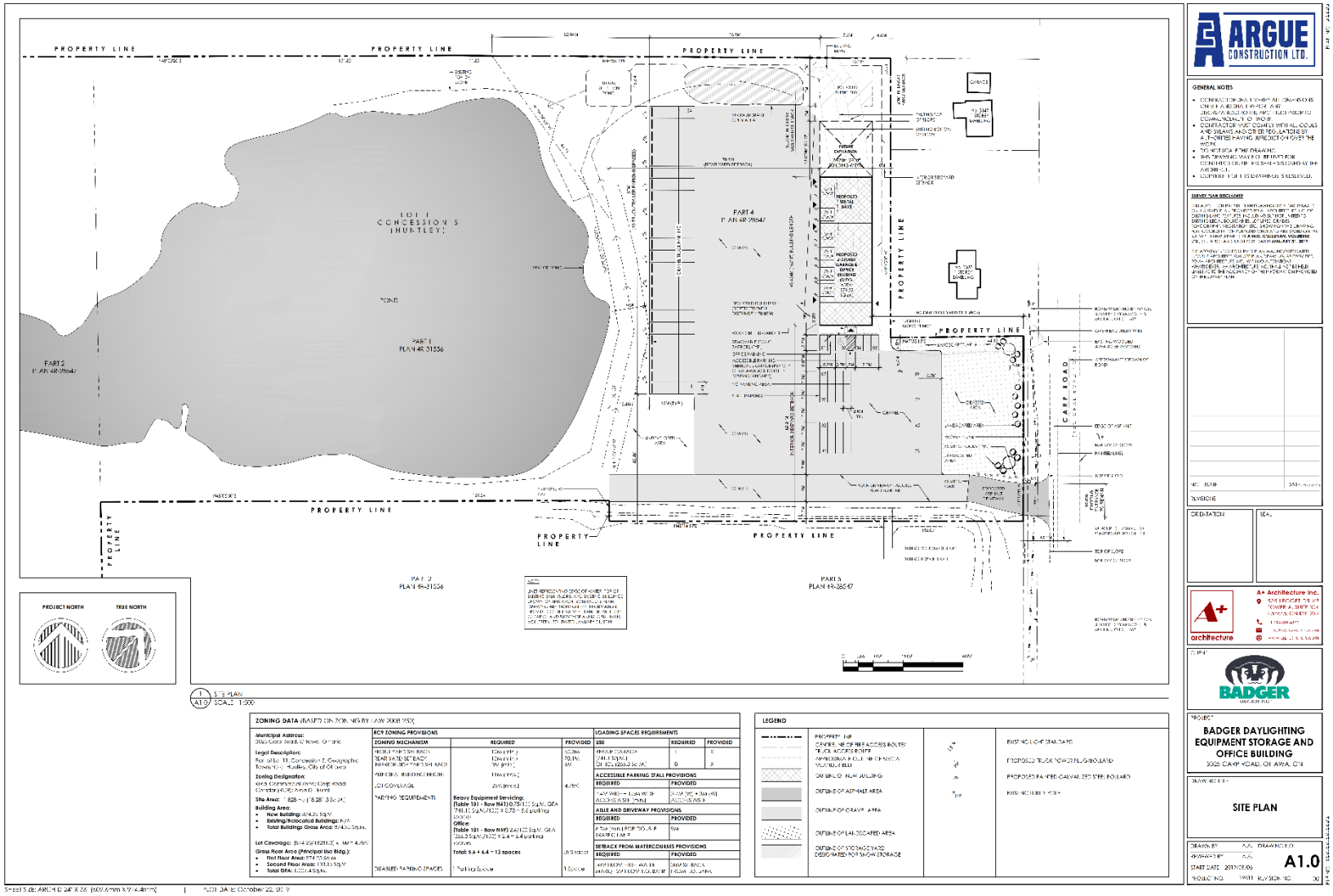
Badger will use the site as their office and to store their hydro-vac trucks overnight. The hydro-vac trucks currently dump excavated fill material at a quarry located west of the proposed development. There is a private access to the quarry which runs through the site. Hydro-vac trucks currently use McGee Side Road to access the quarry but in the future the trucks will use the private internal quarry access at the end of the day (to return to the office), and during seasonal load restrictions on McGee Side Road.

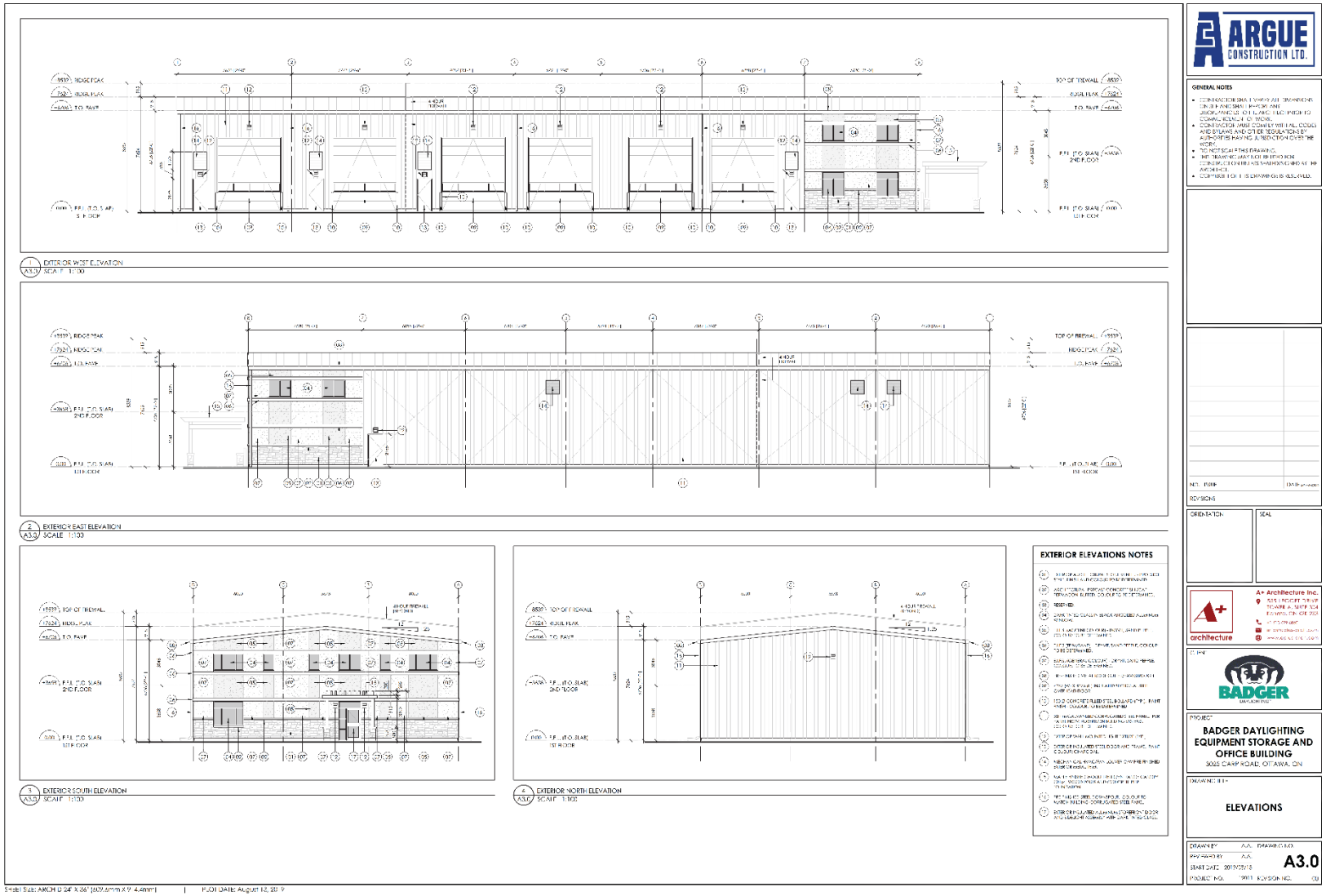
Badger currently has 46 hydro-vac employees to operate 21 hydro-vac trucks and four (4) office employees, for a total of 50 employees. The proposed development will provide them with room to expand to their target of 25 hydro-vac trucks and 55 employees. The site plan provides for 60 parking spaces total; the remaining five (5) parking spaces on the site will be used by others using the rental bays.

The 25 different crews will arrive at the shop between 5:30 AM and 8:00 AM. These crews will leave the site between 5:30 and 8:00 AM, with the majority of the crews leaving the site by approximately 6:00 AM, to be on the job site in Ottawa for 7:00 AM. At the end of the day, the crews will return to the site between 2:00 and 7:00 PM, with the peak occurring between 3:00 and 4:00 PM. The site operations are not expected to be seasonally impacted by winter weather.

Figure 3 illustrates the proposed site plan.

Figure 3: Proposed Site Plan





Source: Site plan dated 2019-10-22, provided by Badger Daylighting

Figure 4 and **Figure 5**, respectively, illustrate the existing and future site operations relative to the study area.

Figure 4: Site Operations - Existing

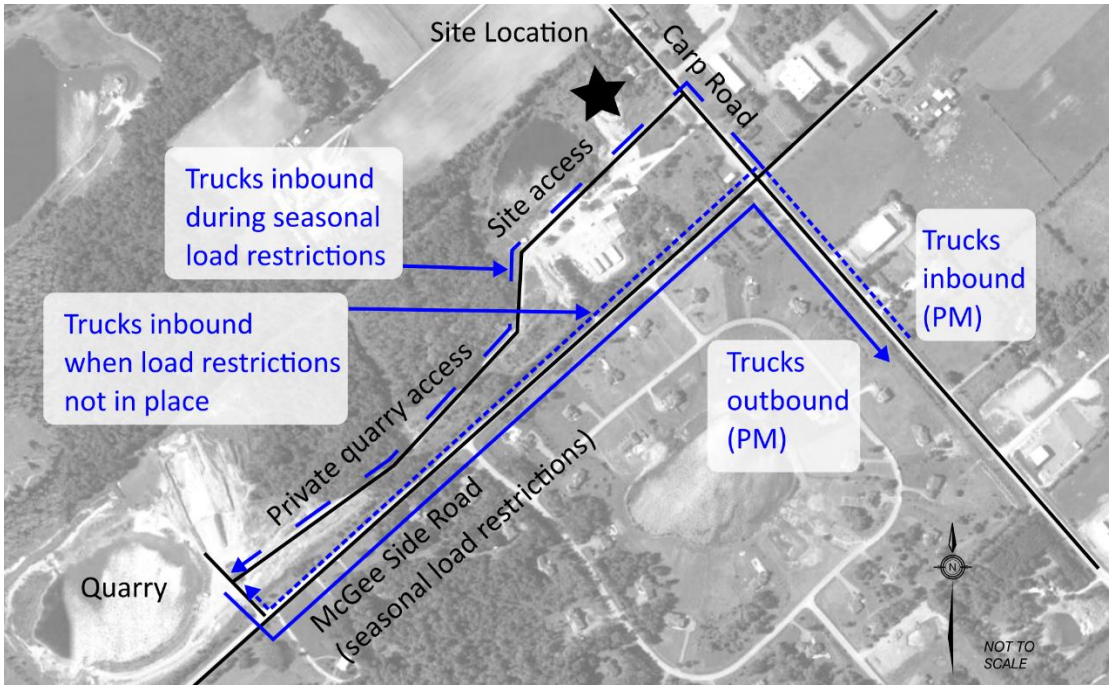
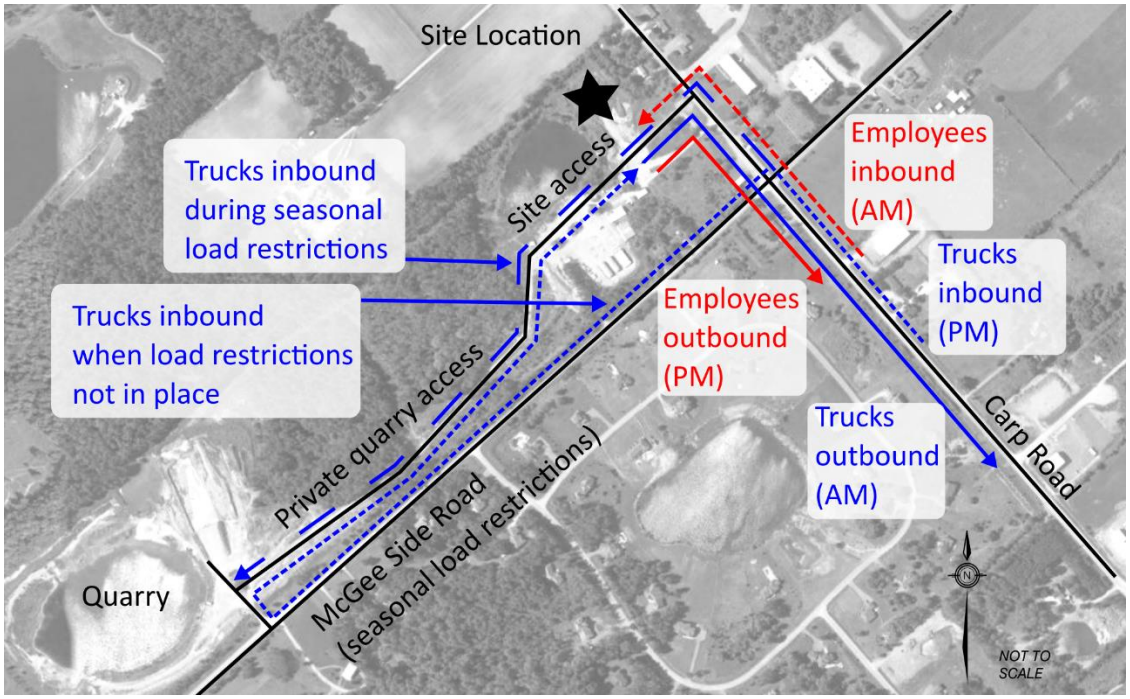


Figure 5: Site Operations - Future



The main transportation impact of the proposed development will be during the AM peak hour, when 55 employees and the five (5) other rental users turn left from Carp Road into the site, and 25 hydro-vac trucks turn right out of the site to Carp Road.

Since the start time and end time of hydro-vac jobs can vary, the analysis examines the following time periods:

1) Weekday AM peak hour of the site;
2) Weekday AM peak hour of the roadway;
3) Weekday PM peak hour of the site; and,
4) Weekday PM peak hour of the roadway.

2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

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

Carp Road is a two-lane undivided, municipally-owned rural Arterial road with a posted speed limit of 80 km/h with paved shoulders. Carp Road is a truck route which runs north-south from Stittsville to Fitzroy Township.

The operating speed on Carp Road frequently approaches 100 km/h; the nearest traffic control signals are located three (3) kilometers north and south of the site at March Road and at Richardson Side Road. There are no auxiliary turning lanes on Carp Road between these two signalized intersections.

McGee Side Road is a two-lane undivided, municipally-owned rural Collector road with a posted speed limit of 70 km/h and gravel shoulders. It is only 6.4 km long and runs east-west from Spruce Ridge Road in the west (near Highway 417) to Old Creek Road in the east. McGee Side Road is not a truck route and there are seasonal load restrictions during the spring months.

2.1.2.2 Existing Driveways to Adjacent Developments

Within 200 metres north of the site driveway, there are six driveways to residential and small commercial properties. Approximately 30 metres north of the site driveway is John Cavanaugh Drive, which provides access to a small industrial park subdivision. To the south of the site driveway there is a single residential use and an Anglican Church that does not have a driveway or parking lot.

2.1.2.3 Walking and Cycling

There is a paved shoulder on Carp Road which could be used by pedestrians and cyclists, but otherwise there are no pedestrian or cycling facilities in the vicinity of the site.

2.1.2.4 Transit

There are virtually no transit routes in the study area. OC Transpo route #303 travels north on Carp Road once a week on Wednesday.

2.1.2.5 Traffic Management Measures

There are no traffic management measures in the study area.

2.1.2.6 Traffic Volumes

Table 1 summarizes the traffic count data used for this study. Historical counts were obtained to identify an appropriate background growth rate for the study area.

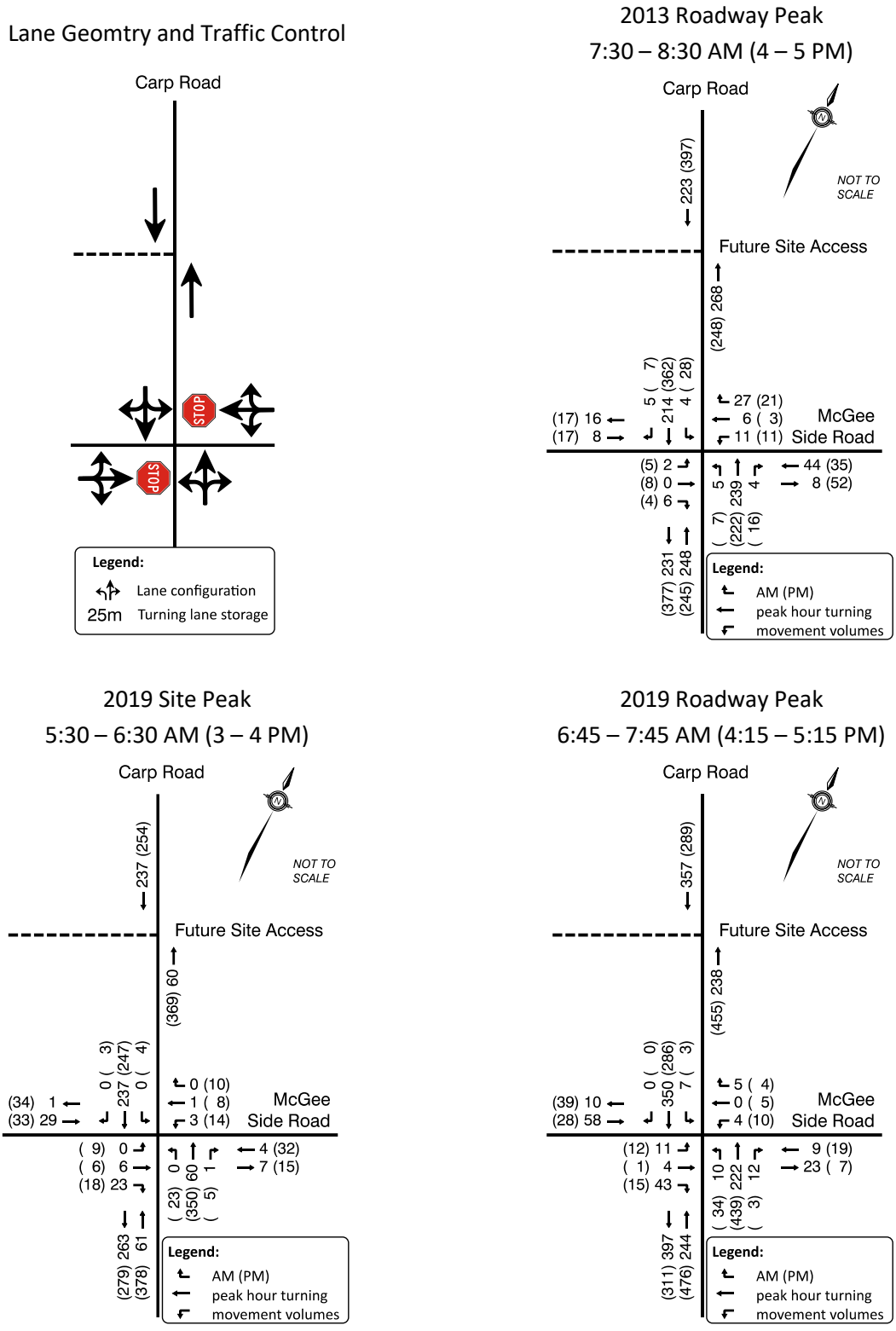
Table 1: Traffic Count Data

Intersection	Date	Source	Roadway Peak Hour
Carp Road / McGee Side Road	December 2013	Delcan Corporation (now Parsons)	**AM:** 7:30 – 8:30 **PM:** 4:00 – 5:00
	October 2019	Dillon Consulting Limited	**AM**: 6:45 – 7:45 **PM**: 4:15 – 5:15

Figure 6 illustrates the existing traffic volumes, lane geometry and traffic control. The 2013 site peak hour traffic volumes were not available. The AM site peak (5:30 AM – 6:30 AM) is anticipated to occur before the start of the 2019 traffic count (6 AM), so the 6:00 AM – 6:30 AM traffic volumes were adjusted to represent the 5:30 AM – 6:30 AM site peak traffic volumes.

Appendix A contains the existing traffic counts. The 2019 traffic volumes are significantly higher southbound during the AM peak hour and northbound during the PM peak hour, as compared to the December 2013 traffic volume data.

Figure 6: Existing Lane Geometry, Traffic Control, and Traffic Volumes



2.1.2.7 Collision History

At the intersection of Carp Road / McGee Side Road, there have only been four (4) collisions between 2013 and 2018 (inclusive). A brief summary is below:

- there were no injuries or fatalities;
- all collisions occurred during clear weather;
- types of collisions were single motor vehicle (SMV), turning movement, rear end, or sideswipe;
- three collisions occurred during the dark and one occurred during daylight; and,
- three collisions occurred during dry road conditions and one occurred during wet conditions.

Overall there does not appear to be a history of collisions at the intersection and therefore no further investigation will be performed.

2.1.3 Planned Conditions

2.1.3.1 Road and Transit Network Modifications

The City of Ottawa Transportation Master Plan (2013) does not identify any planned road network or transit network modifications in the vicinity of the site.

2.1.3.2 Walking and Cycling

Carp Road is identified as a spine cycling route on the City's Ultimate Cycling Network.

2.1.3.3 Future Background Developments

The City of Ottawa's Development Application website was reviewed to identify development applications in the vicinity of the site that might impact traffic volumes at study area intersections. The following applications were found, however may be dormant as they are a number of years old:

- 3119 Carp Road (a rural commercial/industrial subdivision of approximately 300,000 sq.ft.); and,
- 1500 Thomas Argue Drive (West Capital Airpark; additional information is not provided since an electronic copy of the TIA was not available).

2.2 Study Parameters

2.2.1 Study Area

The study area consists of the intersection of Carp Road at McGee Side Road and the proposed site access to Carp Road.

2.2.2 Time Periods

The analysis will consider the weekday AM site peak, the weekday AM roadway peak, and the weekday PM site and roadway peak hours.

2.2.3 Horizon Years

Full occupancy of the site is expected in 2021. The analysis will assess transportation for existing conditions, 2021 horizon year, and the 2026 horizon year.

2.3 Exemptions Review

Table 2 lists the TIA modules that will be excluded from this TIA.

Table 2: Exemptions Review

Module	Element	Exemption Consideration	Status
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Included
	4.1.3 New Street Networks	Only required for plans of subdivision	Excluded
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Included
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Included
4.3 Boundary Street	All Elements	Exempted at pre-consultation meeting.	Exempt
Network Impact Component			
4.5 Transportation Demand Mgmt.	All Elements	Not required for non-residential sites plans expected to have < 60 employees and/or students on location at any given time	Exempt
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on Local or Collector streets for access and total volumes exceed ATM capacity thresholds	Exempt
4.7 Transit		Exempted at pre-consultation meeting.	Exempt
4.8 Network Concept		Only required when proposed development generates more than 200 person trips during the peak hour in excess of the equivalent volume permitted by zoning	Exempt
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met	Included

3.0 Forecasting

3.1 Development-Generated Travel Demand

3.1.1 Trip Generation and Mode Shares

Table 3 summarizes the anticipated trip generation for the site which is based on information provided by the Badger. The site is not anticipated to generate pass-by trips. Given the location of the site and the lack of active transportation facilities in the vicinity, the mode share was assumed to be 100% automobile.

Table 3: Site Trip Generation Profile

Time	Employee Vehicle Activity		Truck Activity	
	IN	OUT	IN	OUT
5:30 AM – 6:30 AM	49			20
6:30 AM – 7:30 AM	6			4
7:30 AM – 8:30 AM	5			1
AM TOTAL	**60**			**25**
2:00 PM – 3:00 PM		4	2	
3:00 PM – 4:00 PM		28	14	
4:00 PM – 5:00 PM		11	3	
5:00 PM – 6:00 PM		9	3	
6:00 PM – 7:00 PM		8	3	
PM TOTAL		**60**	**25**	

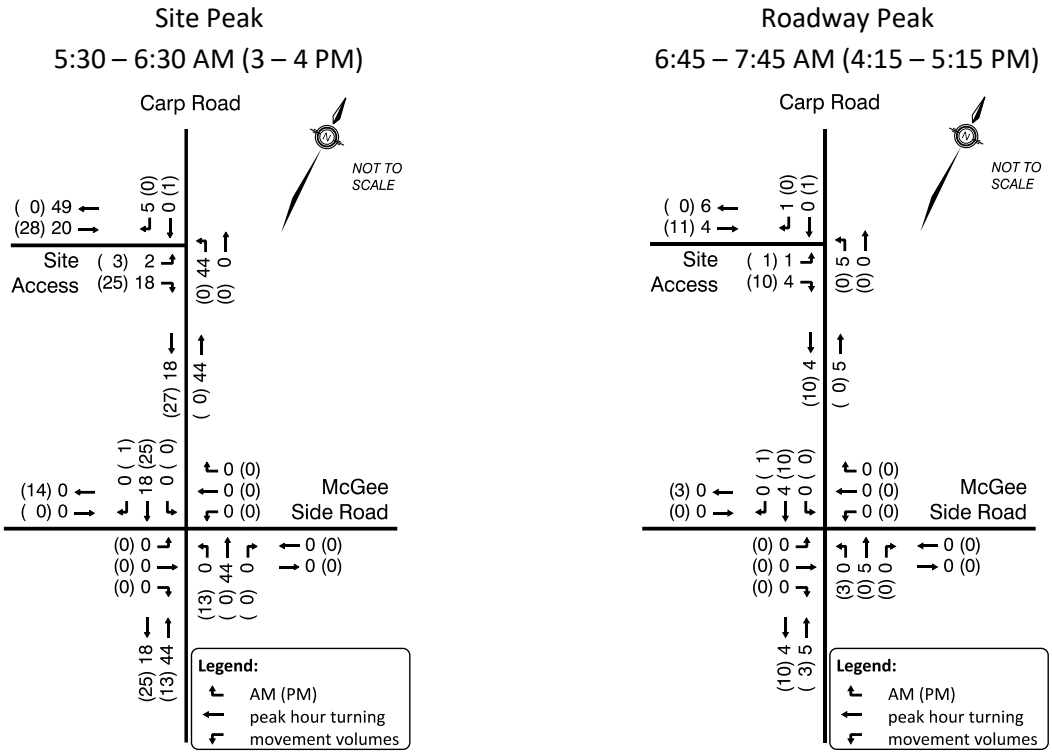
3.1.2 Trip Distribution

Trip distribution was identified based on the client indicating that the majority of their work is in the City of Ottawa which is south of the proposed development. The trip distribution assumed within this analysis is 10% to/from the north and 90% to/from the south along Carp Road.

3.1.3 Trip Assignment

Figure 7 illustrates the site generated traffic volumes.

Figure 7: Site Generated Traffic Volumes



3.2 Background Network Travel Demand

3.2.1 Transportation Network Plan

There are no planned transportation network changes that would result in a change to the background network travel demands.

3.2.2 Background Traffic Volume Growth

The 2013 traffic count data was compared to the 2019 traffic count data to determine the growth rate in background traffic volumes. **Table 4** summarizes the traffic volume growth rates at the Carp Road and McGee Side Road intersection based on the peak hours of each count. **Table 5** summarizes traffic volume growth rates based on using the exact same peak hour as was observed in the 2013 traffic count.

The southbound direction has experienced 5-8% annual increase for the weekday AM peak hour and a 5-6% annual decrease during the weekday PM peak hour. The northbound direction shows virtually no change during the weekday AM peak hour and a 12% annual increase during the weekday PM peak hour.

Table 4: Carp Road/McGee Side Road Traffic Growth Rates – Different Traffic Peak Hours

Approach	2013		2019		Compound Annual Growth Rate (CAGR)	
	AM 7:30 8:30	PM 4-5	AM 6:45-7:30	PM 4:15-5:15	AM	PM
Southbound	223	397	357	289	**8%**	**-5%**
Northbound	248	245	244	476	**0%**	**12%**
Total	**471**	**642**	**601**	**765**	**4%**	**4%**

Table 5: Carp Road/McGee Side Road Traffic Growth Rates – Same Traffic Peak Hour

Approach	2013		2019		Compound Annual Growth Rate (CAGR)	
	AM 7:30 8:30	PM 4-5	AM 7:30 8:30	PM 4-5	AM	PM
Southbound	223	397	301	281	**5%**	**-6%**
Northbound	248	245	244	482	**0%**	**12%**
Total	**471**	**642**	**545**	**763**	**2%**	**3%**

These large increases or decreases are likely due to a single large development, construction activity, or may be a result of the limited amount of available historical traffic volume data. Growth rates of 5-12% annually are high and unlikely to be sustained.

For the purpose of this analysis, the following growth rates were reviewed and approved by the City for use in this report:

- 3% for side streets;
- 3% for southbound approach during the AM peak hour;
- 0% for northbound approach during the AM peak hour;
- 3% for northbound approach during the PM peak hour; and,
- 0% for southbound approach during the PM peak hour.

3.2.3 Other Developments

The City of Ottawa's development applications search tool was used to identify other developments within the study area that could impact study area intersections.

The following background developments were identified:

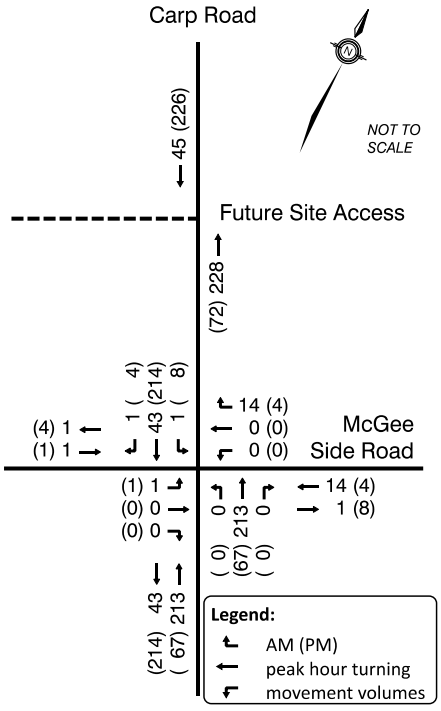
- 3119 Carp Road (a rural commercial/industrial subdivision of approximately 300,000 sq.ft.); and,
- 1500 Thomas Argue Drive (West Capital Airpark; additional information is not provided since an electronic copy of the TIA was not available).

Figure 8 illustrates the total traffic from the two developments listed above. These traffic volumes have been added to the roadway peak hour traffic. A portion of this traffic was also applied to the site peak hour traffic.

The portion applied to the site peak hour traffic was 72% and 84% for the AM and PM peak periods, respectively. These values were calculated as the ratio of site peak hour traffic volumes / roadway peak hour traffic volumes.

Appendix B contains the TIA for 3119 Carp Road and the site trip generation figure for the development at 1500 Thomas Argue Drive; an electronic format was not available so City staff provided a figure showing site generated traffic volumes.

Figure 8: Traffic From Other Developments (Road Peak Hour)



3.2.4 Future Background Traffic Volumes

Figure 9 illustrates the 2021 and 2026 future background traffic volumes based on background traffic volume growth rates and the other developments listed above. Note that the traffic volumes have been rounded to the nearest five.

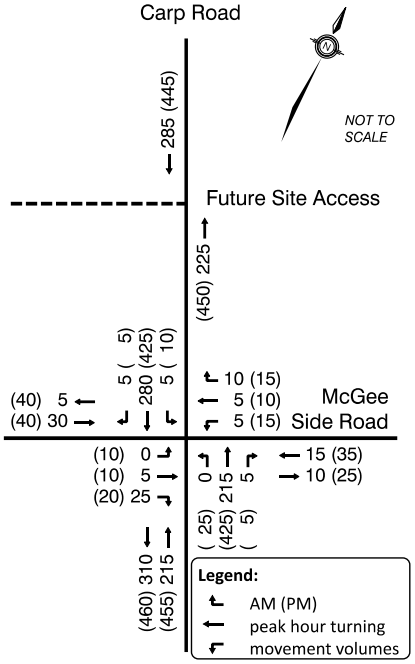
3.3 Total Traffic

The total traffic volumes were calculated by adding the background traffic volumes and the site generated traffic volumes. **Figure 10** illustrates the total future traffic volumes, rounded to the nearest five.

Figure 9: Background Traffic Volumes – 2021 and 2026

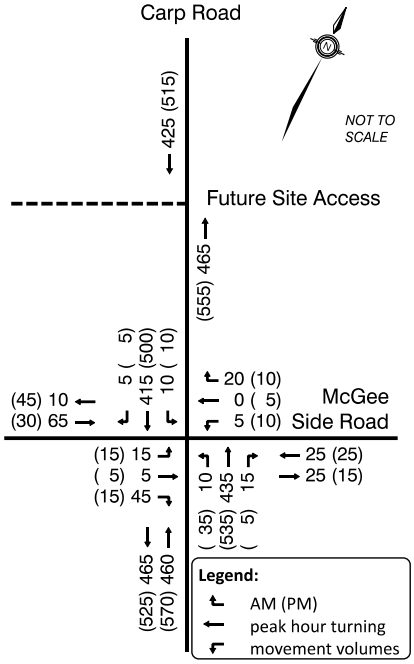
2021 Site Peak

5:30 – 6:30 AM (3 – 4 PM)



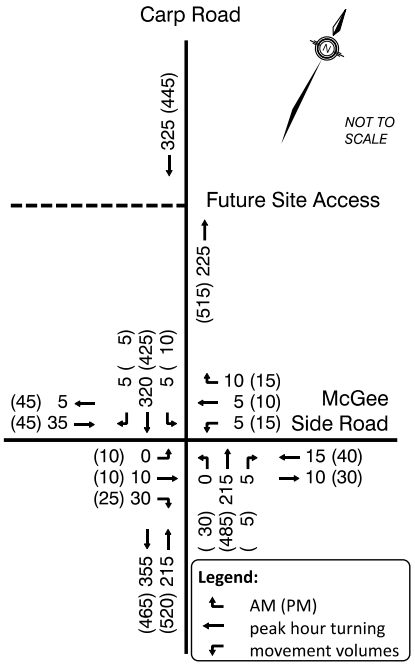
2021 Roadway Peak

6:45 – 7:45 AM (4:15 – 5:15 PM)



2026 Site Peak

5:30 – 6:30 AM (3 – 4 PM)



2026 Roadway Peak

6:45 – 7:45 AM (4:15 – 5:15 PM)

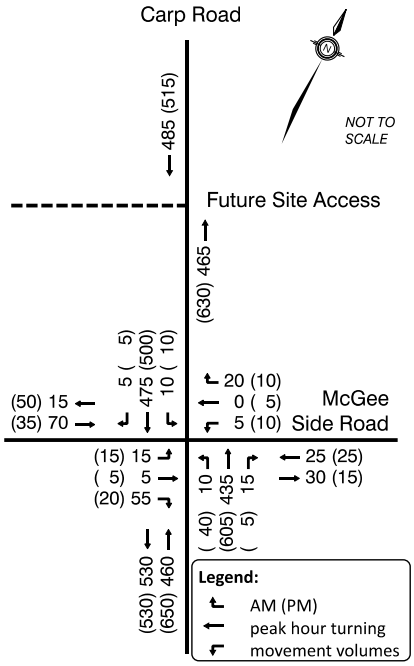
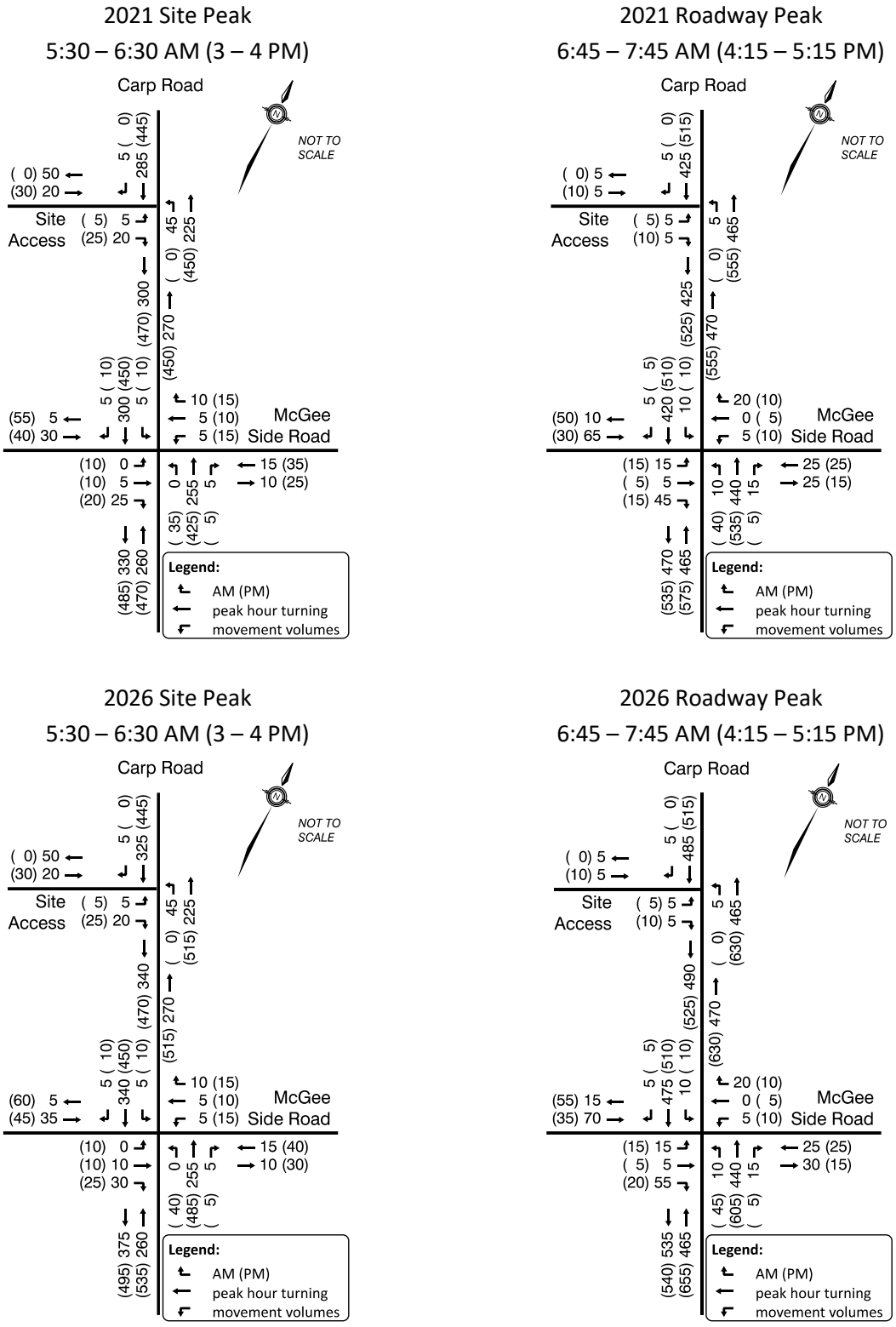


Figure 10: Total Traffic Volumes – 2021 and 2026



4.0 Analysis

4.1 Development Design

4.1.1 Design for Sustainable Modes

Exempted at pre-consultation meeting with City staff.

4.1.2 Circulation and Access

The site access and site layout will be fairly open and it is not anticipated to pose an issue for access and circulation for municipal services.

4.1.3 New Street Networks

Exempted at pre-consultation meeting with City staff.

4.2 Parking

4.2.1 Parking Supply

Table 6 indicates the parking requirements for the proposed development based on Part 4 of the City of Ottawa Zoning by-law 2016-249. The parking rate is based on an office land use in a rural area (Area D on Schedule 1A from the by-law).

The proposed development has a mix of office and warehouse/repair/light industrial/heavy industrial uses; there is no single land use in the zoning by-law that describes the building completely. Therefore, the parking requirements for various types of land uses were evaluated and the highest requirement was used for the analysis.

The by-law requirements shows that 13 vehicle parking spaces are required and two (2) bicycle parking spaces are required. The building design includes 58 vehicle parking spaces for staff, one (1) accessible parking space for staff, and 24 parking spaces for hydro-vac trucks. The site plan provides more than enough space for the 50 hydro-vac truck employees (two per truck) and the six (6) office employees.

The by-law requirement for two (2) bicycle parking spaces can easily be accommodated at a later date if there is a need for it.

Table 6: City of Ottawa By-law Parking Requirements (By-law 2016-249)

Land Use	Size (sq.m.)	Vehicle Parking Spaces (Table 101)		Bicycle Parking Spaces (Table 111A)	
		Rate (per 100 sq.m GFA)	Spaces Required	Rate	Spaces Required
Heavy Equipment and Vehicle Sales, Rental, and Servicing	1,007	0.75	8	None	None
Heavy Industrial	741	0.8	6	None	None
Light Industrial	741	0.8	6	1 per 1000 sq.m. GFA	0.7
Warehouse	741	0.8	6	1 per 2000 sq.m. GFA	0.4
Office	266	2.4	7	1 per 250 sq.m. GFA	1.1
Total based on highest rate(s)	**1,007**		**7+6=13**		**0.7+1.1=2**

4.2.2 Spillover Parking

Exempted during screening and scoping report.

4.3 Boundary Street Design

Exempted at pre-consultation meeting.

4.4 Access Intersections

4.4.1 Location and Design of Access

The site access is located on the west side of Carp Road approximately 167 metres north of the McGee Side Road intersection, which is an unsignalized, two-way stop-controlled intersection. John Cavanaugh Drive is located across the road and north of the proposed site access. John Cavanaugh Drive also connects to McGee Side Road and provides access to a few buildings.

The majority of traffic generated by the site is anticipated to occur outside of the peak hour of road traffic and it will be primarily to and from the south of the site. Site traffic is not anticipated to create a safety concern with the Carp Road / McGee Side Road or the Carp Road / John Cavanaugh Drive intersection.

4.4.2 Intersection Control

Table 7 summarizes the site access intersection performance based on the future traffic volumes and **Appendix B** contains the Synchro reports. The analysis demonstrates that the site access will operate well as a two-way, stop-controlled intersection. The 2021 horizon was not analyzed since the 2026 intersection performance is acceptable.

Table 7: Intersection Performance - Site Access

Scenario	Peak Hour	Mvmt.	LOS		Delay (s)		V/C		Queue (veh)	
			AM	PM	AM	PM	AM	PM	AM	PM
2026 Total Traffic	Road Peak	EBL/R	C	C	21.0	16.2	0.05	0.05	0.1	0.2
		NBL/T	A	A	0.1	0.0	0.01	-	0.0	0.0
		SBT/R	-	-	-	-	-	-	-	-
	Site Peak	EBL/R	B	B	13.8	13.0	0.06	0.07	0.2	0.2
		NBL/T	A	A	8.1	0.0	0.04	-	0.1	0.0
		SBT/R	-	-	-	-	-	-	-	-

Note: LOS means Level of Service, Mvmt. means turning movement, "V/C" means Volume-to-Capacity ratio, Queue (veh) means 95th percentile queue length in terms of the number of vehicles queued.

4.4.3 Intersection Design - Site Access

Table 8 summarizes the left turn lane warrant analysis for the Carp Road / Site Access intersection. **Appendix D** contains the TAC Left Turn Lane Warrant Nomographs.

Typical Conditions – No Seasonal Load Restrictions

The analysis shows that a northbound left turn lane is marginally warranted during the AM peak hour of the site (5:30 – 6:30 AM) for both the 2021 and 2026 horizons, assuming that the background traffic volume growth and identified background developments materialize. The left turn lane is not warranted at any other time due to the low volume of northbound left turning traffic to the site.

The analysis assumes that trucks are returning to the site turn using McGee Side Road, empty their load at the quarry, and then use the internal road to return to the office. This type of operation will occur throughout the year except during the spring between mid-March and late May when load restrictions are in place on McGee Side Road.

Periods with Seasonal Load Restrictions

During load restriction periods, trucks will turn into the site at the site access and use the internal road to access the quarry. The impact of the trucks turning into the site has been evaluated as part of a sensitivity analysis for the 2026 site PM peak hour (the critical time period for trucks entering the site).

Figure 11 illustrates the 2026 traffic volumes for the periods with seasonal load restrictions. The sensitivity analysis indicates that left-turning vehicles make up only 2.4% of the advancing volume during the PM site peak hour, therefore a left turn lane is not warranted to accommodate the PM site peak hour trips during seasonal load restrictions.

Background Traffic Volumes Sensitivity Analysis

The preceding analysis is based on a forecasted background traffic volume growth of 3% per year in addition to explicit traffic volume growth due to the two background developments. A sensitivity analysis was performed to determine if a left turn lane remains warranted if the two background developments do not materialize (these applications are stale). To be conservative, this sensitivity analysis also assumes that all trucks are inbound at the site access which occurs during seasonal load restrictions.

Figure 11 illustrates the 2026 traffic volumes for the sensitivity analysis. The sensitivity analysis indicates that a northbound left turn lane to the site during the AM site peak hour is not warranted as the background advancing and opposing traffic volumes are too low. During the site PM peak hour, the left-turning vehicles make up only 2.7% of the advancing volume, therefore a left turn lane is not warranted due to the low volume of turning vehicles.

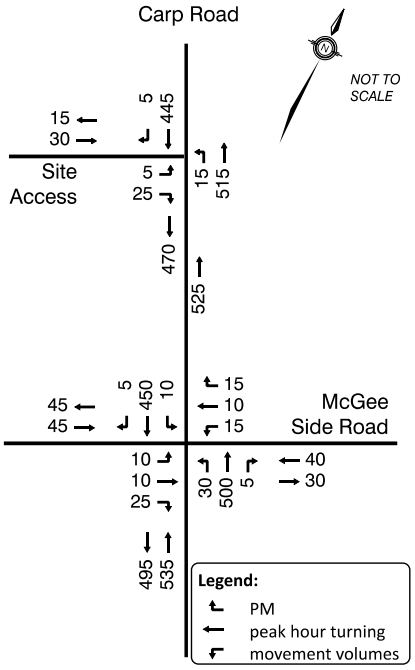
Table 8: Left Turn Lane Warrant Analysis – Carp Road / Site Access

Scenario	Horizon	Peak Hour	Va	Vo	% LT in Va	% HV in LT	Storage (m)
Typical future conditions, (Trucks inbound on McGee Side Road)	2021	AM Site	268	289	16%	0%	15
		AM Road	471	424	1%	0%	N/A
		PM Site	451	445	0%	0%	N/A
		PM Road	555	515	0%	0%	N/A
	2026	AM Site	268	329	16%	0%	15
		AM Road	471	485	1%	0%	N/A
		PM Site	514	445	0%	0%	N/A
		PM Road	632	515	0%	0%	N/A
Seasonal Load Restriction (Trucks inbound at site access)	2026	PM Site	526	445	2.4%	100%	N/A
Background Traffic Sensitivity (Trucks inbound at site access and no explicit background growth)	2026	AM Site	104	296	42%	0%	Not warranted
	2026	PM Site	466	255	2.7%	100%	N/A

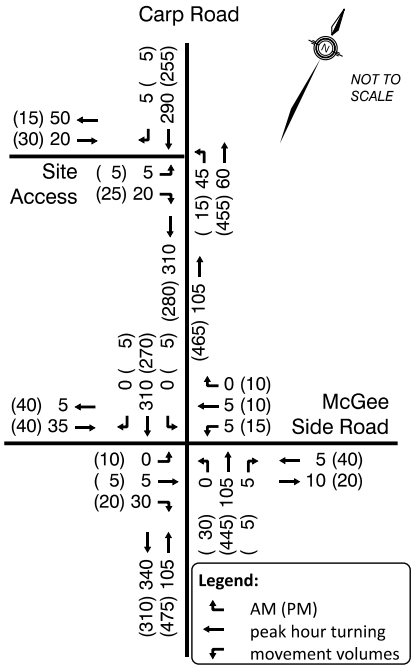
Notes: Va means vehicles advancing (i.e. number of vehicles approaching the intersection in the single lane that is being considered for a left turn lane); Vo means vehicles opposing (i.e. conflicting with Va); % LT in Va means the percentage of left-turning vehicles in Va, % HV in LT means the percentage of heavy vehicles (i.e. trucks) in the left-turning traffic; Movements with high percentage of heavy vehicles require additional storage; and, N/A means not applicable, because the volume of vehicles turning left is too low to warrant a left turn lane.

Figure 11: Total Traffic Volumes – 2026 Sensitivity Analyses

2026 Site Peak, 3 – 4 PM
Seasonal Load Restrictions
(Trucks Inbound at Site Access)



2026 Site Peak, 5:30 – 6:30 AM (3 – 4 PM)
Background Traffic Volumes Sensitivty Analysis
(and trucks inbound at site access)



Summary

A northbound left turn lane at the site driveway with 15 metres of storage is warranted if the background traffic volumes materialize. There are two explicit background development applications which are now stale. If these two background developments do not materialize, a northbound left turn lane to the site is not warranted.

During periods of seasonal load restrictions on McGee Side Road, the returning trucks will be required to access the site via the Carp Road driveway. The low volume of left turn vehicles entering the site during the PM site peak hour does not warrant a left turn lane.

4.5 Transportation Demand Management

Exempted at pre-consultation meeting.

4.6 Neighbourhood Traffic Management

Exempted at pre-consultation meeting.

4.7 Transit

Exempted at pre-consultation meeting.

4.8 Network Concept

Exempted at pre-consultation meeting.

4.9 Intersection Control and Design

4.9.1 Intersection Control

The intersection of Carp Road and McGee Side Road is currently a two-way stop-controlled intersection.

Table 9 summarizes the performance of the Carp Road/McGee Side Road intersection for future traffic volumes. **Appendix B** contains the Synchro reports.

The 2026 analysis demonstrated that the intersection operates well and therefore analysis for the 2021 horizon was unnecessary since traffic operations would only be improved.

Based on the results of a Synchro analysis, two-way stop-control is appropriate for the forecasted future traffic volumes. This is consistent with the other intersections along Carp Road.

Table 9: Intersection Performance – Carp Road/McGee Side Road

Scenario	Peak Hour	Mvmt.	LOS		Delay (s)		V/C		Queue (veh)	
			AM	PM	AM	PM	AM	PM	AM	PM
2019 Existing Traffic	Road Peak	EBL/T/R	B	C	12.6	15.5	0.12	0.08	0.4	0.3
		WBL/T/R	B	C	12.6	18.4	0.02	0.07	0.1	0.2
		NBL/T/R	A	A	8.5	8.0	0.01	0.03	0.0	0.1
		SBL/T/R	A	A	7.9	8.3	0.01	0.00	0.0	0.0
2026 Background Traffic	Road Peak	EBL/T/R	C	D	17.6	29.5	0.22	0.23	0.0	0.9
		WBL/T/R	B	D	14.8	30.0	0.07	0.16	0.0	0.6
		NBL/T/R	A	A	9.0	8.8	0.01	0.04	0.0	0.1
		SBL/T/R	A	A	8.6	8.9	0.01	0.01	0.0	0.0
2026 Total Traffic	Road Peak	EBL/T/R	C	D	17.6	30.7	0.22	0.24	0.8	0.9
		WBL/T/R	B	D	14.9	31.3	0.07	0.17	0.2	0.6
		NBL/T/R	A	A	9.0	8.9	0.01	0.05	0.0	0.2
		SBL/T/R	A	A	8.6	8.9	0.01	0.01	0.0	0.0
	Site Peak	EBL/T/R	B	C	11.9	21.1	0.08	0.18	0.2	0.6
		WBL/T/R	B	D	12.7	26.6	0.05	0.21	0.1	0.8
		NBL/T/R	A	A	0.0	9.2	0.00	0.05	0.0	0.2
		SBL/T/R	A	A	7.8	8.5	0.01	0.01	0.0	0.0

Note: LOS means Level of Service, Mvmt. means turning movement, "V/C" means Volume-to-Capacity ratio, Queue (veh) means 95th percentile queue length in terms of the number of vehicles queued.

4.9.2 Intersection Design

Table 10 summarizes the northbound left turn lane warrant analysis for the Carp Road / McGee Side Road intersection. **Appendix D** contained the TAC Left Turn Lane Warrant Nomographs.

The analysis indicates that a northbound left turn lane is warranted for the existing conditions at the intersection. The length of the northbound left turn storage lane increases as traffic volumes increase in the future conditions. Ultimately a northbound left turn lane with 40 metres of storage (25 metres as identified by the nomograph plus an additional 15 metres to accommodate truck volumes) is warranted. The City should consider modifying the intersection to accommodate the existing and future traffic volumes at the intersection.

Table 10: Northbound Left Turn Lane Warrant Analysis – Carp Road / McGee Side Road

Scenario	Horizon	Peak Hour	Va	Vo	% LT in Va	% HV in LT	Storage Length (m)
Existing Traffic	2019	AM Road	244	357	4%	30%	Not warranted
	2019	PM Road	476	289	7%	6%	15
Background Traffic	2021	AM Road	458	424	2%	30%	N/A
		PM Road	572	515	6%	6%	25
	2026	AM Road	462	484	3%	30%	15+10=25
		PM Road	652	516	6%	6%	25
Total Traffic	2021	AM Site	259	302	0%	0%	N/A
		AM Road	464	427	2%	30%	N/A
		PM Site	470	471	8%	43%	25+15=40
		PM Road	575	525	7%	12%	25+10=35
	2026	AM Site	259	342	0%	0%	N/A
		AM Road	467	488	3%	30%	15+10=25
		PM Site	533	472	8%	40%	25+15=40
		PM Road	655	526	7%	12%	25+10=35

Note: Va means vehicles advancing (i.e. approaching the intersection in the single lane that is being considered for a left turn lane), Vo means vehicles opposing (i.e. conflicting with Va), % LT in Va means the percentage of left-turning vehicles in Va, % HV in LT means the percentage of heavy vehicles (i.e. trucks) in the left-turning traffic. Movements with high percentage of heavy vehicles require additional storage. N/A means not applicable because the volume vehicles turning left is too low to justify a left turn lane.

5.0 Conclusions

Carp Road at McGee Side Road

From a level of service standpoint, the Carp Road / McGee Side Road intersection is anticipated to operate well under the existing two-way stop-control to the 2026 horizon year for this study. Two-way stop-control is appropriate and consistent with the majority of other site accesses on Carp Road.

The analysis contained within this report demonstrates that a northbound left turn lane with 15m of storage is currently warranted at the Carp Road / McGee Side Road intersection to accommodate the existing traffic volumes at the intersection, based on the TAC methodology for unsignalized intersections.

The northbound left turn storage length requirement increases with the inclusion of traffic from the two explicit background developments and the general background growth rate of 3% per year. The forecasted background traffic volumes warrant a northbound left turn lane with 25m of storage. The additional Badger Daylighting's site traffic increases the northbound left turn storage requirement to 40m, plus the parallel length and taper.

It is recommended that the City provide a northbound left turn lane with 40m of storage, a parallel length and taper at the intersection.

Carp Road at Site Access

The background traffic volumes have assumed that two potential stale developments could be developed within this studies horizon. Should these two developments occur, the Badger Daylighting site access on Carp Road would warrant a northbound left turn lane with 15m of storage in the AM site peak hour (5:30 – 6:30 AM). However, outside of the AM site peak hour, the left turn lane is not warranted as the traffic volumes turning into the site are too low to warrant a left turn lane.

From a level of service standpoint, the Carp Road / Site Access intersection is anticipated to operate well under stop-control facing drivers exiting the site onto Carp Road.

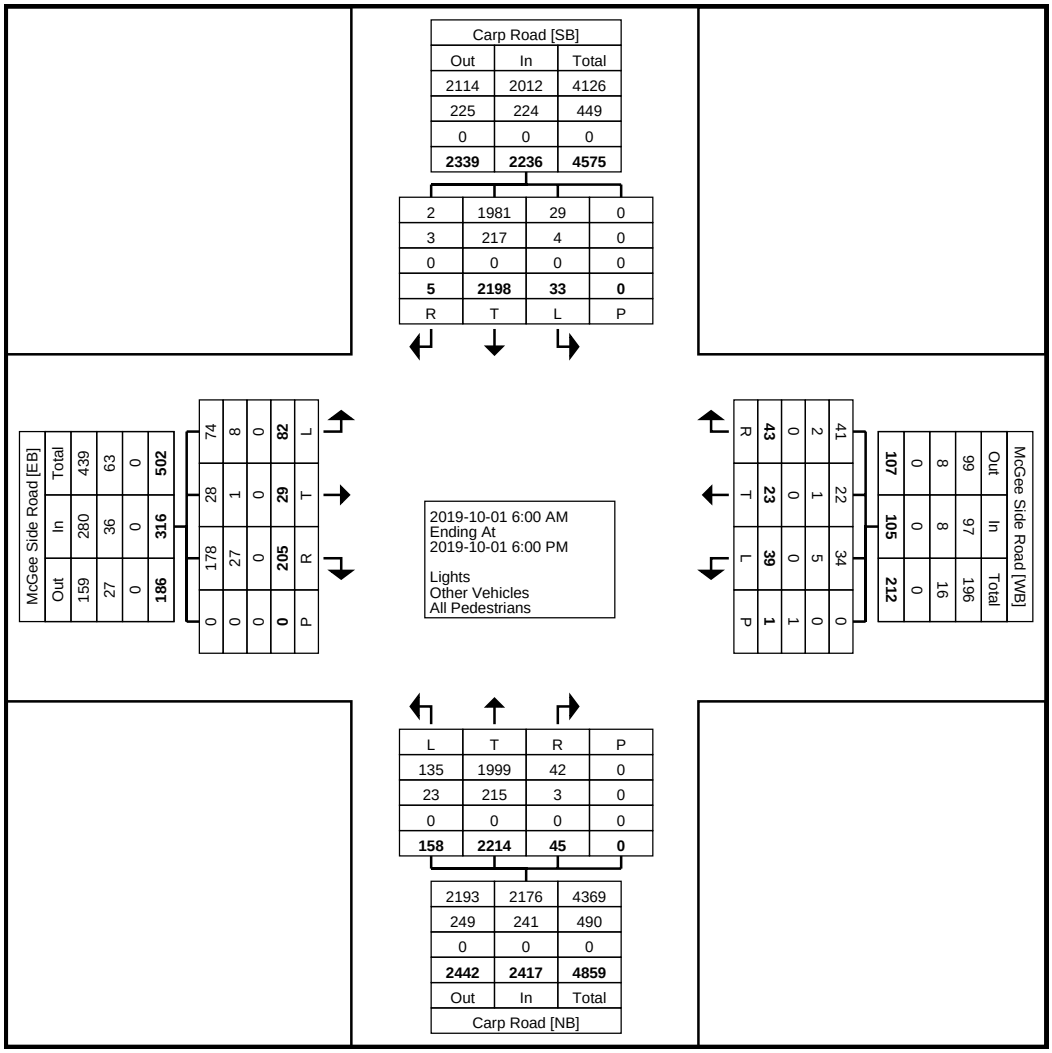
Based on the analysis presented in this report, Badger Daylighting's proposed development should be permitted to proceed from a transportation impact perspective without the inclusion of a northbound left turn lane.

Appendix A

Traffic Counts

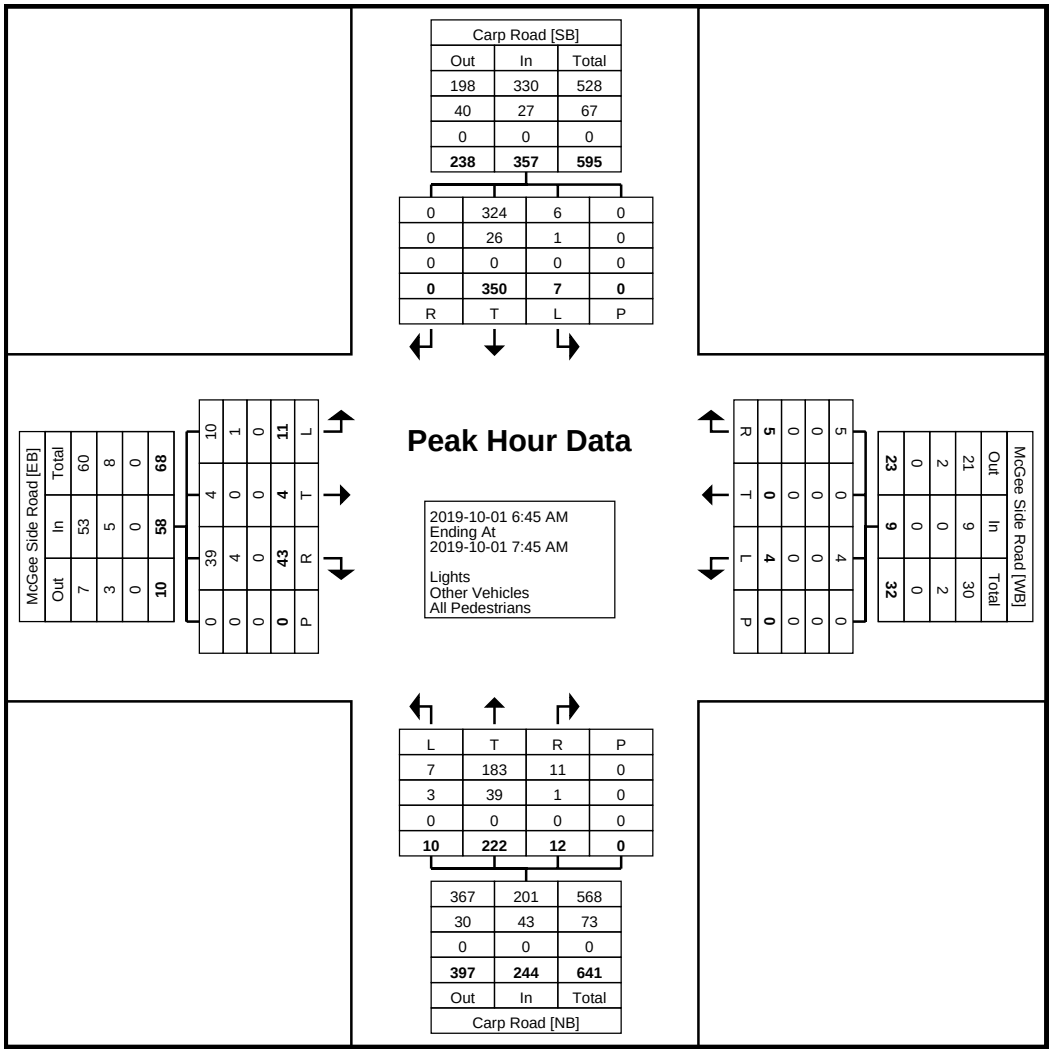
Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca

Count Name: 191661 Badger
Daylighting 3025 Carp Road TIA
Site Code:
Start Date: 2019-10-01



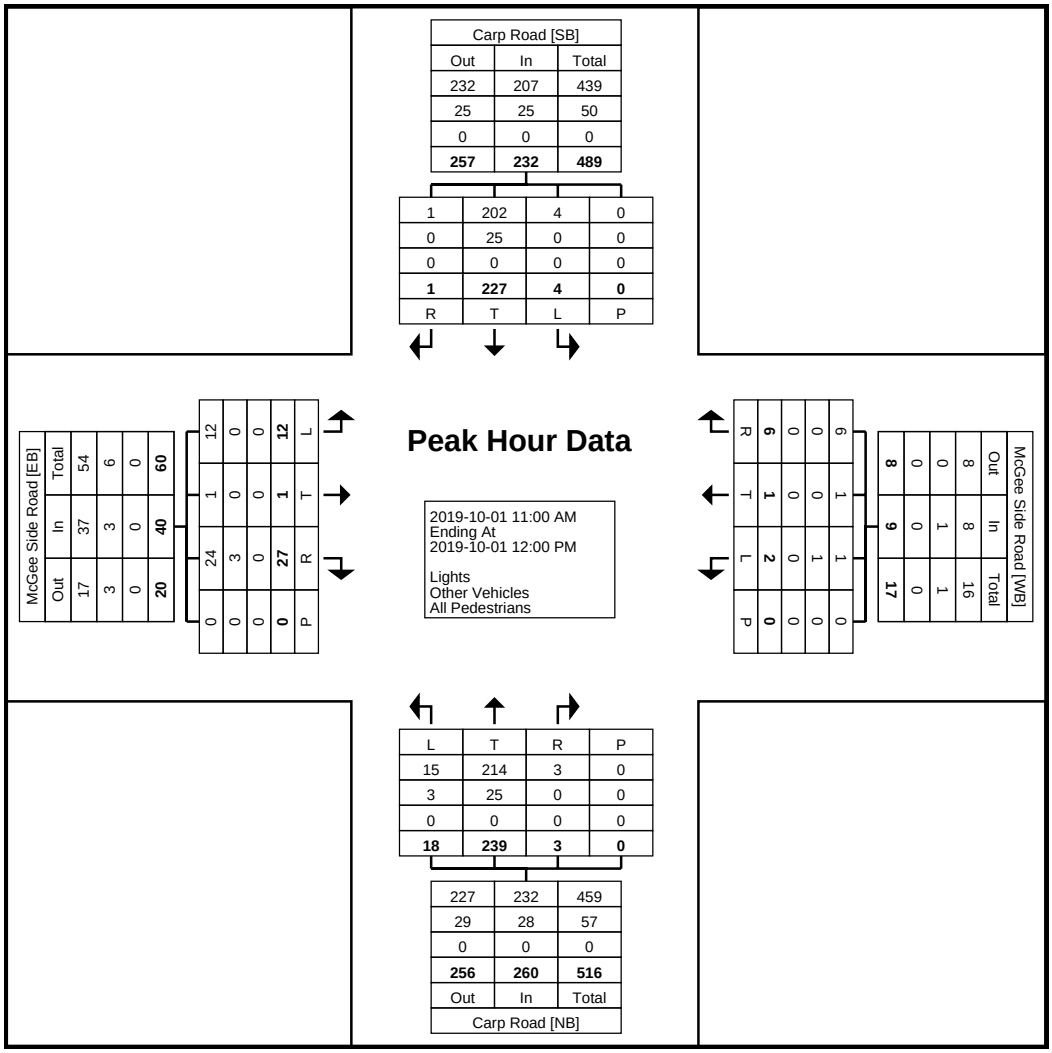
Turning Movement Data Plot

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca



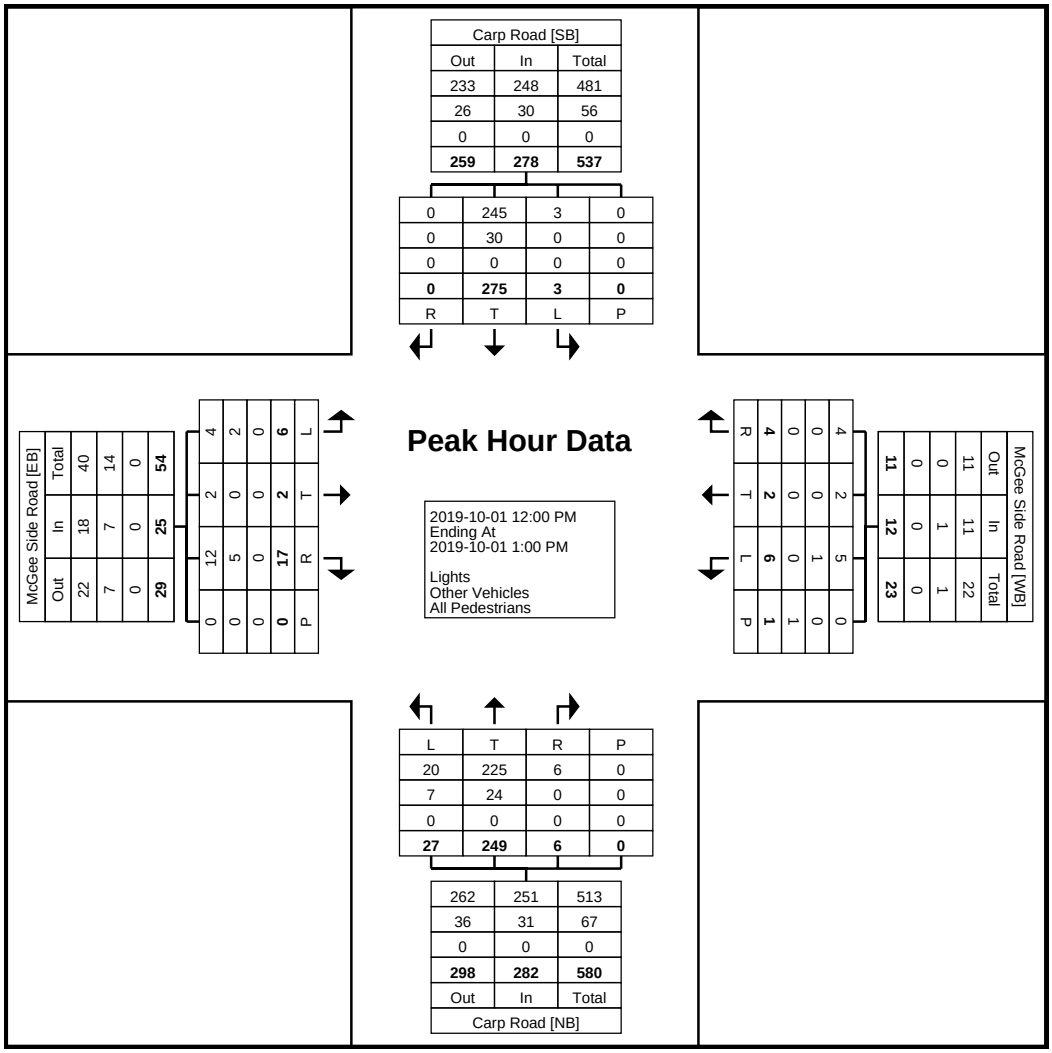
Turning Movement Peak Hour Data Plot (6:45 AM)

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca



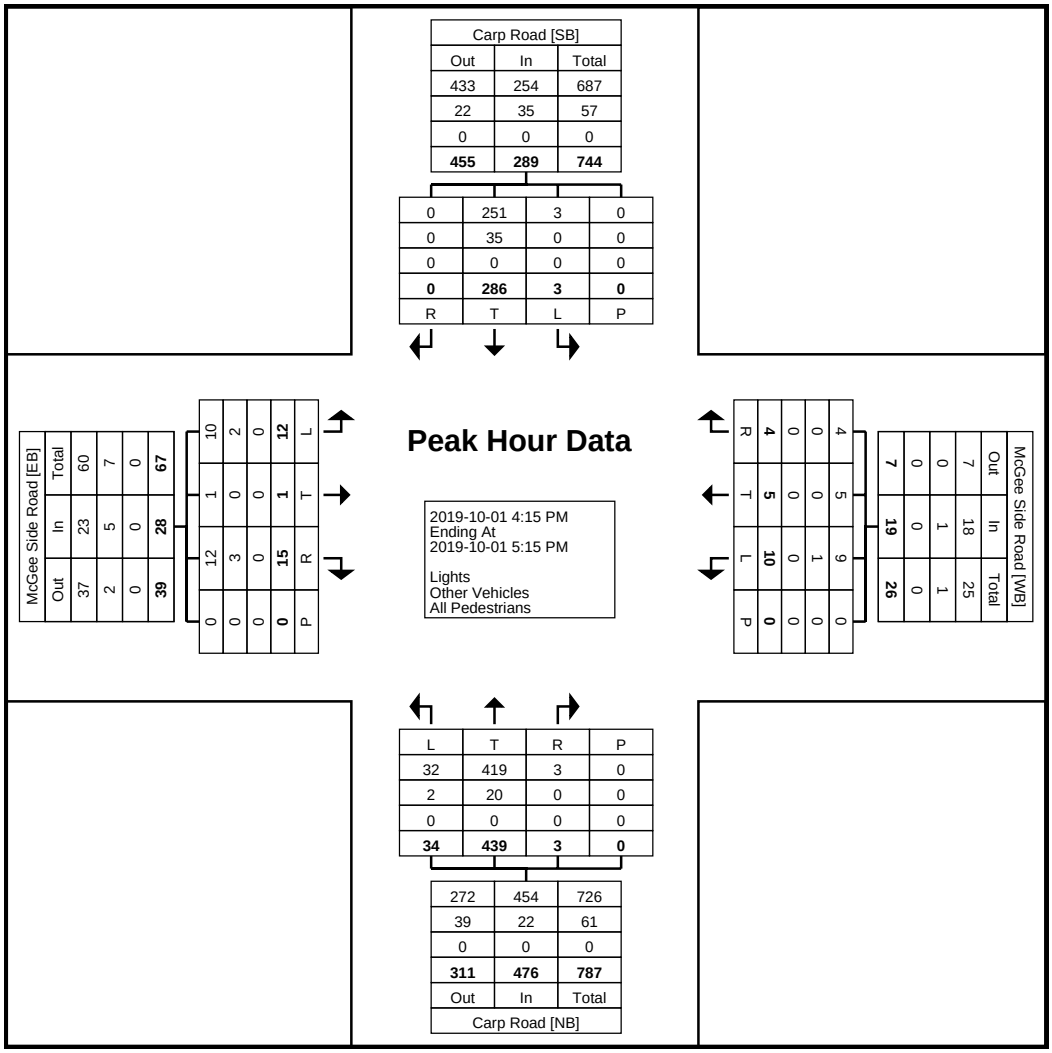
Turning Movement Peak Hour Data Plot (11:00 AM)

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca



Turning Movement Peak Hour Data Plot (12:00 PM)

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca



Turning Movement Peak Hour Data Plot (4:15 PM)

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca

Count Name: 191661 Badger
Daylighting 3025 Carp Road TIA
Site Code:
Start Date: 2019-10-01

Turning Movement Data

Start Time	Carp Road Southbound					McGee Side Road Westbound					Carp Road Northbound					McGee Side Road Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
6:00 AM	0	46	0	0	46	0	0	1	0	1	0	10	0	0	10	6	1	0	0	7	64
6:15 AM	0	99	0	0	99	0	1	0	0	1	1	30	0	0	31	5	3	0	0	8	139
6:30 AM	1	108	2	0	111	1	0	0	0	1	5	30	1	0	36	10	1	1	0	12	160
6:45 AM	0	93	4	0	97	1	0	1	0	2	5	53	3	0	61	11	1	1	0	13	173
Hourly Total	1	346	6	0	353	2	1	2	0	5	11	123	4	0	138	32	6	2	0	40	536
7:00 AM	0	77	1	0	78	2	0	2	0	4	3	43	2	0	48	9	1	3	0	13	143
7:15 AM	0	97	1	0	98	1	0	1	0	2	4	64	3	0	71	14	0	3	0	17	188
7:30 AM	0	83	1	0	84	1	0	0	0	1	0	62	2	0	64	9	2	4	0	15	164
7:45 AM	0	63	1	0	64	2	0	1	0	3	0	69	2	0	71	12	1	4	0	17	155
Hourly Total	0	320	4	0	324	6	0	4	0	10	7	238	9	0	254	44	4	14	0	62	650
8:00 AM	0	80	2	0	82	0	2	1	0	3	0	53	1	0	54	7	2	12	0	21	160
8:15 AM	0	71	0	0	71	1	0	0	0	1	1	52	2	0	55	9	3	2	0	14	141
8:30 AM	0	55	2	0	57	1	0	0	0	1	2	44	0	0	46	6	1	1	0	8	112
8:45 AM	0	76	2	0	78	5	2	0	0	7	2	64	4	0	70	5	0	4	0	9	164
Hourly Total	0	282	6	0	288	7	4	1	0	12	5	213	7	0	225	27	6	19	0	52	577
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	0	53	0	0	53	2	1	1	0	4	1	56	5	0	62	6	0	3	0	9	128
11:15 AM	1	59	1	0	61	3	0	0	0	3	0	62	4	0	66	4	1	5	0	10	140
11:30 AM	0	59	1	0	60	0	0	1	0	1	0	55	6	0	61	8	0	4	0	12	134
11:45 AM	0	56	2	0	58	1	0	0	0	1	2	66	3	0	71	9	0	0	0	9	139
Hourly Total	1	227	4	0	232	6	1	2	0	9	3	239	18	0	260	27	1	12	0	40	541
12:00 PM	0	76	0	0	76	2	1	0	1	3	0	61	4	0	65	5	1	0	0	6	150
12:15 PM	0	77	2	0	79	0	0	4	0	4	1	61	11	0	73	4	1	3	0	8	164
12:30 PM	0	70	0	0	70	0	0	0	0	0	3	58	8	0	69	4	0	2	0	6	145
12:45 PM	0	52	1	0	53	2	1	2	0	5	2	69	4	0	75	4	0	1	0	5	138
Hourly Total	0	275	3	0	278	4	2	6	1	12	6	249	27	0	282	17	2	6	0	25	597
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	3	57	2	0	62	0	2	2	0	4	0	78	6	0	84	6	3	1	0	10	160
3:15 PM	0	66	2	0	68	2	0	0	0	2	1	88	5	0	94	3	1	5	0	9	173
3:30 PM	0	56	0	0	56	4	3	11	0	18	1	102	6	0	109	4	1	1	0	6	189
3:45 PM	0	68	0	0	68	4	3	1	0	8	3	82	6	0	91	5	1	2	0	8	175
Hourly Total	3	247	4	0	254	10	8	14	0	32	5	350	23	0	378	18	6	9	0	33	697
4:00 PM	0	69	1	0	70	2	0	0	0	2	1	113	11	0	125	5	1	1	0	7	204
4:15 PM	0	73	1	0	74	1	1	1	0	3	1	92	11	0	104	2	0	4	0	6	187
4:30 PM	0	74	0	0	74	2	2	4	0	8	0	127	9	0	136	2	0	3	0	5	223
4:45 PM	0	61	2	0	63	1	0	1	0	2	1	107	9	0	117	6	0	4	0	10	192
Hourly Total	0	277	4	0	281	6	3	6	0	15	3	439	40	0	482	15	1	12	0	28	806
5:00 PM	0	78	0	0	78	0	2	4	0	6	1	113	5	0	119	5	1	1	0	7	210
5:15 PM	0	52	1	0	53	0	0	0	0	0	1	98	9	0	108	4	1	2	0	7	168
5:30 PM	0	45	1	0	46	0	1	0	0	1	3	80	10	0	93	7	1	1	0	9	149
5:45 PM	0	49	0	0	49	2	1	0	0	3	0	72	6	0	78	9	0	4	0	13	143
Hourly Total	0	224	2	0	226	2	4	4	0	10	5	363	30	0	398	25	3	8	0	36	670
Grand Total	5	2198	33	0	2236	43	23	39	1	105	45	2214	158	0	2417	205	29	82	0	316	5074
Approach %	0.2	98.3	1.5	-	-	41.0	21.9	37.1	-	-	1.9	91.6	6.5	-	-	64.9	9.2	25.9	-	-	-
Total %	0.1	43.3	0.7	-	44.1	0.8	0.5	0.8	-	2.1	0.9	43.6	3.1	-	47.6	4.0	0.6	1.6	-	6.2	-
Lights	2	1981	29	-	2012	41	22	34	-	97	42	1999	135	-	2176	178	28	74	-	280	4565
% Lights	40.0	90.1	87.9	-	90.0	95.3	95.7	87.2	-	92.4	93.3	90.3	85.4	-	90.0	86.8	96.6	90.2	-	88.6	90.0
Other Vehicles	3	217	4	-	224	2	1	5	-	8	3	215	23	-	241	27	1	8	-	36	509
% Other Vehicles	60.0	9.9	12.1	-	10.0	4.7	4.3	12.8	-	7.6	6.7	9.7	14.6	-	10.0	13.2	3.4	9.8	-	11.4	10.0
All Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% All Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Dillon Consulting Ltd. (Ottawa)
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Count Name: 191661 Badger
Daylighting 3025 Carp Road TIA
Site Code:
Start Date: 2019-10-01

Turning Movement Peak Hour Data (6:45 AM)

Start Time	Carp Road Southbound					McGee Side Road Westbound					Carp Road Northbound					McGee Side Road Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
6:45 AM	0	93	4	0	97	1	0	1	0	2	5	53	3	0	61	11	1	1	0	13	173
7:00 AM	0	77	1	0	78	2	0	2	0	4	3	43	2	0	48	9	1	3	0	13	143
7:15 AM	0	97	1	0	98	1	0	1	0	2	4	64	3	0	71	14	0	3	0	17	188
7:30 AM	0	83	1	0	84	1	0	0	0	1	0	62	2	0	64	9	2	4	0	15	164
Total	0	350	7	0	357	5	0	4	0	9	12	222	10	0	244	43	4	11	0	58	668
Approach %	0.0	98.0	2.0	-	-	55.6	0.0	44.4	-	-	4.9	91.0	4.1	-	-	74.1	6.9	19.0	-	-	-
Total %	0.0	52.4	1.0	-	53.4	0.7	0.0	0.6	-	1.3	1.8	33.2	1.5	-	36.5	6.4	0.6	1.6	-	8.7	-
PHF	0.000	0.902	0.438	-	0.911	0.625	0.000	0.500	-	0.563	0.600	0.867	0.833	-	0.859	0.768	0.500	0.688	-	0.853	0.888
Lights	0	324	6	-	330	5	0	4	-	9	11	183	7	-	201	39	4	10	-	53	593
% Lights	-	92.6	85.7	-	92.4	100.0	-	100.0	-	100.0	91.7	82.4	70.0	-	82.4	90.7	100.0	90.9	-	91.4	88.8
Other Vehicles	0	26	1	-	27	0	0	0	-	0	1	39	3	-	43	4	0	1	-	5	75
% Other Vehicles	-	7.4	14.3	-	7.6	0.0	-	0.0	-	0.0	8.3	17.6	30.0	-	17.6	9.3	0.0	9.1	-	8.6	11.2
All Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% All Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca

Turning Movement Peak Hour Data (11:00 AM)

Start Time	Carp Road Southbound					McGee Side Road Westbound					Carp Road Northbound					McGee Side Road Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	0	53	0	0	53	2	1	1	0	4	1	56	5	0	62	6	0	3	0	9	128
11:15 AM	1	59	1	0	61	3	0	0	0	3	0	62	4	0	66	4	1	5	0	10	140
11:30 AM	0	59	1	0	60	0	0	1	0	1	0	55	6	0	61	8	0	4	0	12	134
11:45 AM	0	56	2	0	58	1	0	0	0	1	2	66	3	0	71	9	0	0	0	9	139
Total	1	227	4	0	232	6	1	2	0	9	3	239	18	0	260	27	1	12	0	40	541
Approach %	0.4	97.8	1.7	-	-	66.7	11.1	22.2	-	-	1.2	91.9	6.9	-	-	67.5	2.5	30.0	-	-	-
Total %	0.2	42.0	0.7	-	42.9	1.1	0.2	0.4	-	1.7	0.6	44.2	3.3	-	48.1	5.0	0.2	2.2	-	7.4	-
PHF	0.250	0.962	0.500	-	0.951	0.500	0.250	0.500	-	0.563	0.375	0.905	0.750	-	0.915	0.750	0.250	0.600	-	0.833	0.966
Lights	1	202	4	-	207	6	1	1	-	8	3	214	15	-	232	24	1	12	-	37	484
% Lights	100.0	89.0	100.0	-	89.2	100.0	100.0	50.0	-	88.9	100.0	89.5	83.3	-	89.2	88.9	100.0	100.0	-	92.5	89.5
Other Vehicles	0	25	0	-	25	0	0	1	-	1	0	25	3	-	28	3	0	0	-	3	57
% Other Vehicles	0.0	11.0	0.0	-	10.8	0.0	0.0	50.0	-	11.1	0.0	10.5	16.7	-	10.8	11.1	0.0	0.0	-	7.5	10.5
All Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% All Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Carp Road Southbound					McGee Side Road Westbound					Carp Road Northbound					McGee Side Road Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 PM	0	76	0	0	76	2	1	0	1	3	0	61	4	0	65	5	1	0	0	6	150
12:15 PM	0	77	2	0	79	0	0	4	0	4	1	61	11	0	73	4	1	3	0	8	164
12:30 PM	0	70	0	0	70	0	0	0	0	0	3	58	8	0	69	4	0	2	0	6	145
12:45 PM	0	52	1	0	53	2	1	2	0	5	2	69	4	0	75	4	0	1	0	5	138
Total	0	275	3	0	278	4	2	6	1	12	6	249	27	0	282	17	2	6	0	25	597
Approach %	0.0	98.9	1.1	-	-	33.3	16.7	50.0	-	-	2.1	88.3	9.6	-	-	68.0	8.0	24.0	-	-	-
Total %	0.0	46.1	0.5	-	46.6	0.7	0.3	1.0	-	2.0	1.0	41.7	4.5	-	47.2	2.8	0.3	1.0	-	4.2	-
PHF	0.000	0.893	0.375	-	0.880	0.500	0.500	0.375	-	0.600	0.500	0.902	0.614	-	0.940	0.850	0.500	0.500	-	0.781	0.910
Lights	0	245	3	-	248	4	2	5	-	11	6	225	20	-	251	12	2	4	-	18	528
% Lights	-	89.1	100.0	-	89.2	100.0	100.0	83.3	-	91.7	100.0	90.4	74.1	-	89.0	70.6	100.0	66.7	-	72.0	88.4
Other Vehicles	0	30	0	-	30	0	0	1	-	1	0	24	7	-	31	5	0	2	-	7	69
% Other Vehicles	-	10.9	0.0	-	10.8	0.0	0.0	16.7	-	8.3	0.0	9.6	25.9	-	11.0	29.4	0.0	33.3	-	28.0	11.6
All Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% All Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Dillon Consulting Ltd. (Ottawa)
177 Colonnade Rd
Suite 101
Ottawa, Ontario, Canada K2E 7J4
(613) 745-2213 estewart@dillon.ca

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Carp Road Southbound					McGee Side Road Westbound					Carp Road Northbound					McGee Side Road Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
4:15 PM	0	73	1	0	74	1	1	1	0	3	1	92	11	0	104	2	0	4	0	6	187
4:30 PM	0	74	0	0	74	2	2	4	0	8	0	127	9	0	136	2	0	3	0	5	223
4:45 PM	0	61	2	0	63	1	0	1	0	2	1	107	9	0	117	6	0	4	0	10	192
5:00 PM	0	78	0	0	78	0	2	4	0	6	1	113	5	0	119	5	1	1	0	7	210
Total	0	286	3	0	289	4	5	10	0	19	3	439	34	0	476	15	1	12	0	28	812
Approach %	0.0	99.0	1.0	-	-	21.1	26.3	52.6	-	-	0.6	92.2	7.1	-	-	53.6	3.6	42.9	-	-	-
Total %	0.0	35.2	0.4	-	35.6	0.5	0.6	1.2	-	2.3	0.4	54.1	4.2	-	58.6	1.8	0.1	1.5	-	3.4	-
PHF	0.000	0.917	0.375	-	0.926	0.500	0.625	0.625	-	0.594	0.750	0.864	0.773	-	0.875	0.625	0.250	0.750	-	0.700	0.910
Lights	0	251	3	-	254	4	5	9	-	18	3	419	32	-	454	12	1	10	-	23	749
% Lights	-	87.8	100.0	-	87.9	100.0	100.0	90.0	-	94.7	100.0	95.4	94.1	-	95.4	80.0	100.0	83.3	-	82.1	92.2
Other Vehicles	0	35	0	-	35	0	0	1	-	1	0	20	2	-	22	3	0	2	-	5	63
% Other Vehicles	-	12.2	0.0	-	12.1	0.0	0.0	10.0	-	5.3	0.0	4.6	5.9	-	4.6	20.0	0.0	16.7	-	17.9	7.8
All Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% All Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

DIRECTIONAL TRAFFIC FLOW

Intersection: **Carp** at **McGee Side**

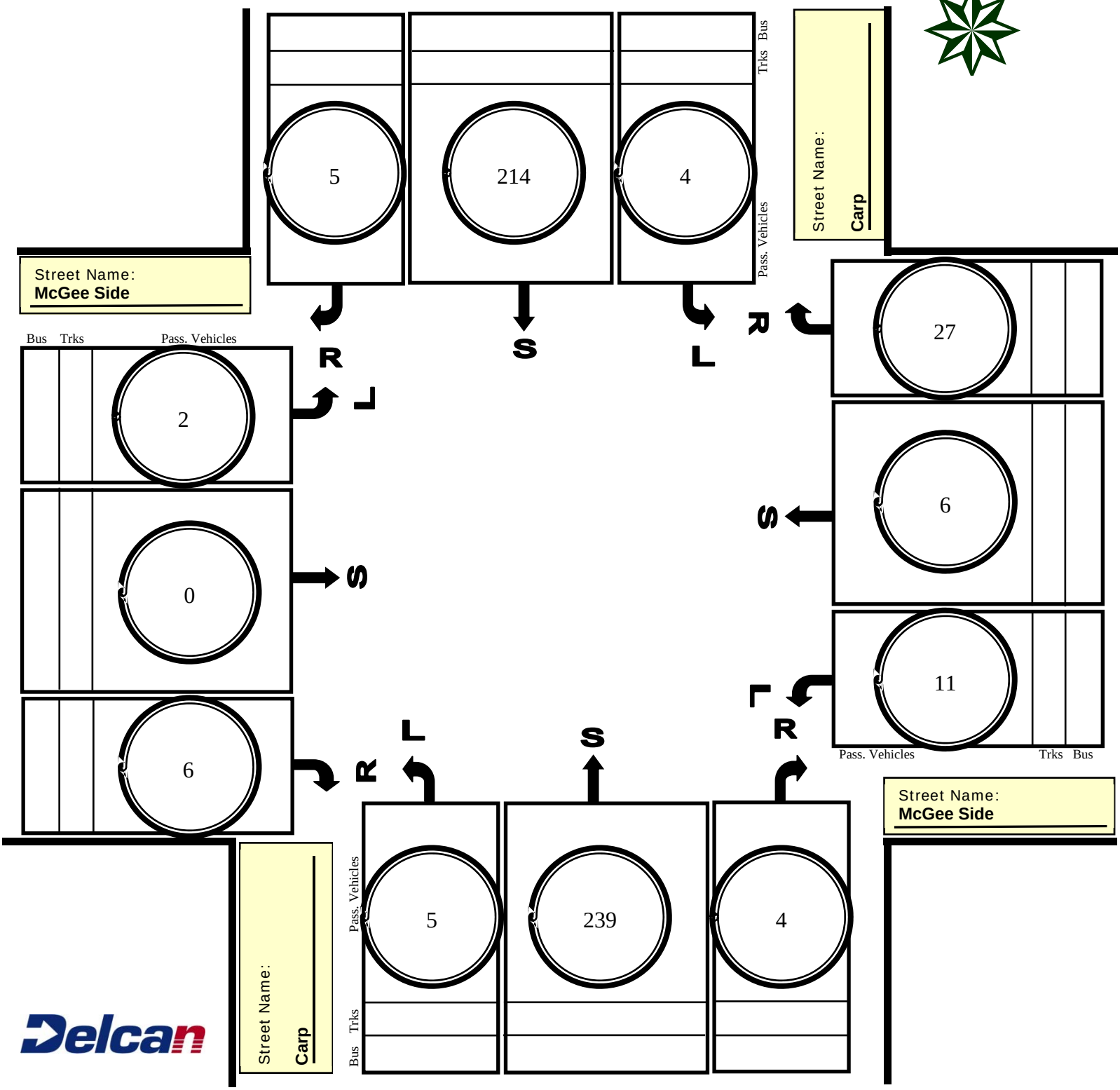
DATE: Day: **4** Month: **December** Year: **2013** Day of Week: **Wednesday**

Observer: **Cathie Lytle** Weather: **Clear**

Chkd by: ..... Date: .....

TIME PERIOD: From: **7 : 30** To: **8 : 30**

Instructions: 1) Use tally marks to indicate vehicles.
2) Use one sheet for each 15-minute period.



Delcan

DIRECTIONAL TRAFFIC FLOW

Intersection: **Carp** at **McGee Side**

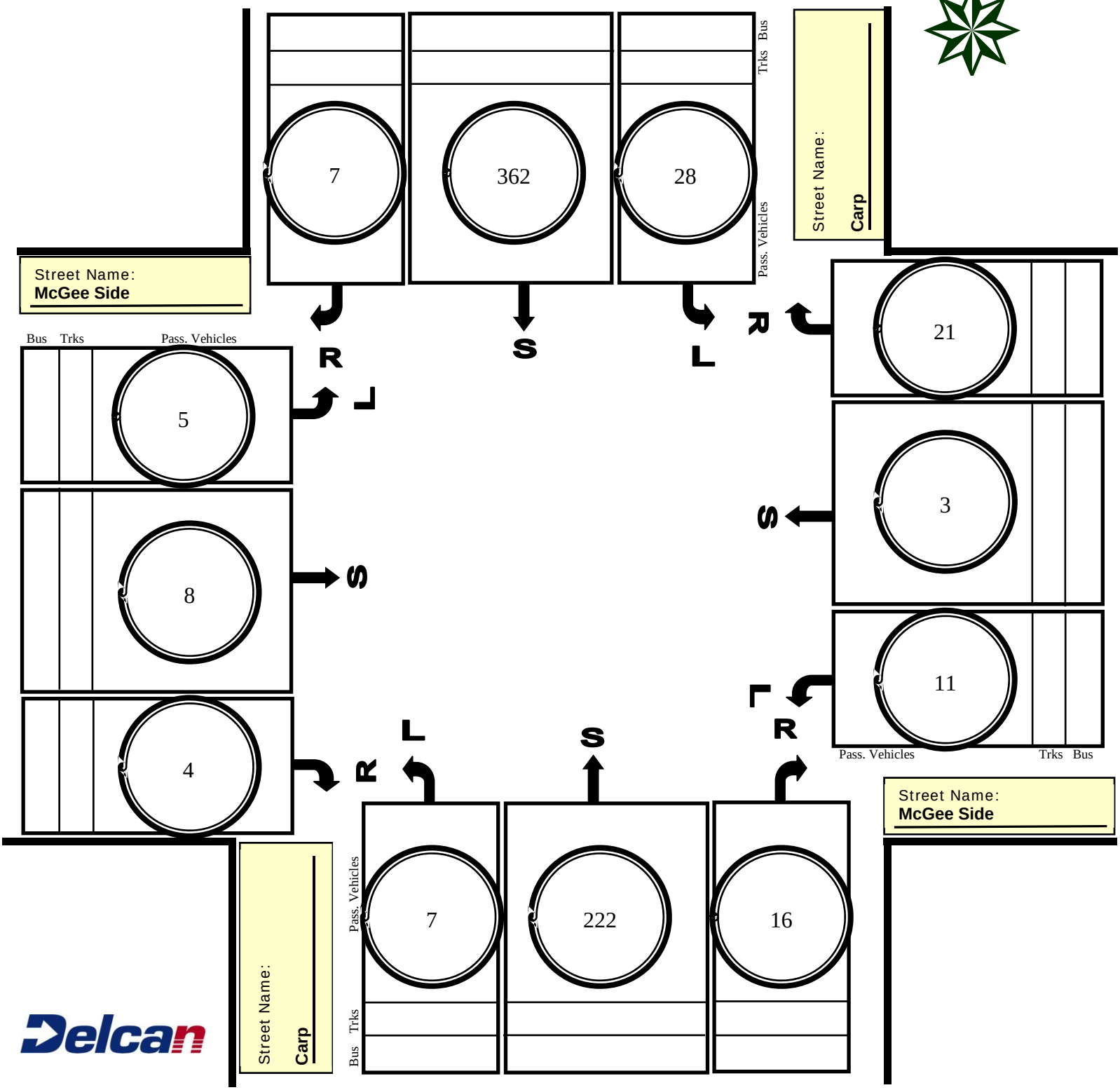
DATE: Day: **4** Month: **December** Year: **2013** Day of Week: **Wednesday**

Observer: **Cathie Lytle** Weather: **Clear**

Chkd by: ..... Date: .....

TIME PERIOD: From: **4 : 00** To: **5 : 00**

Instructions: 1) Use tally marks to indicate vehicles.
2) Use one sheet for each 15-minute period.



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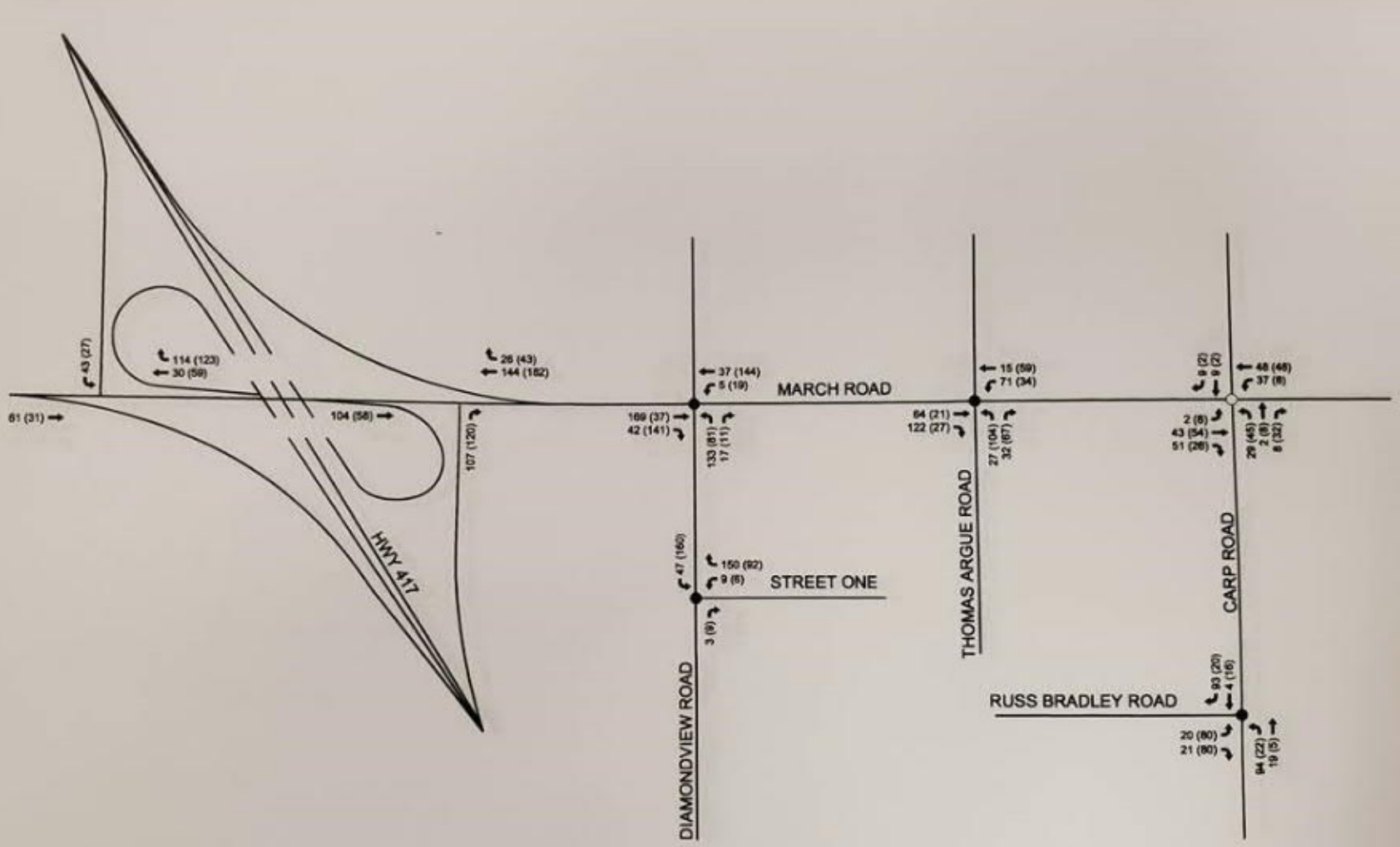
Appendix B

Background Developments



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LEGEND

- ● Unsignalized Intersection
- ○ Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

BUILDOUT SITE TRIPS

NOV 2011 102085 FIGURE 7

Figure 5: Assignment of Projected Site-Generated Traffic

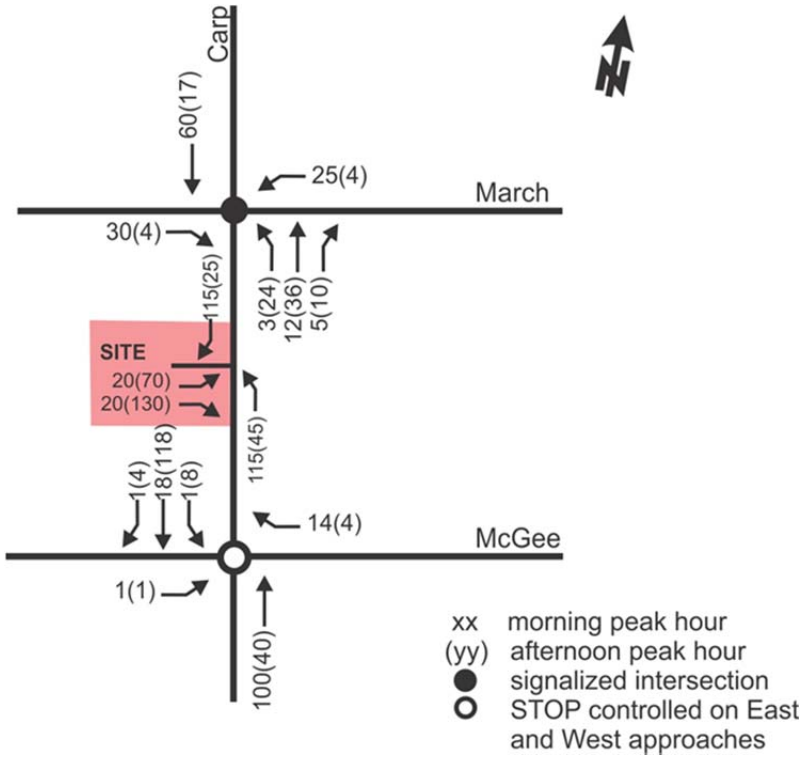
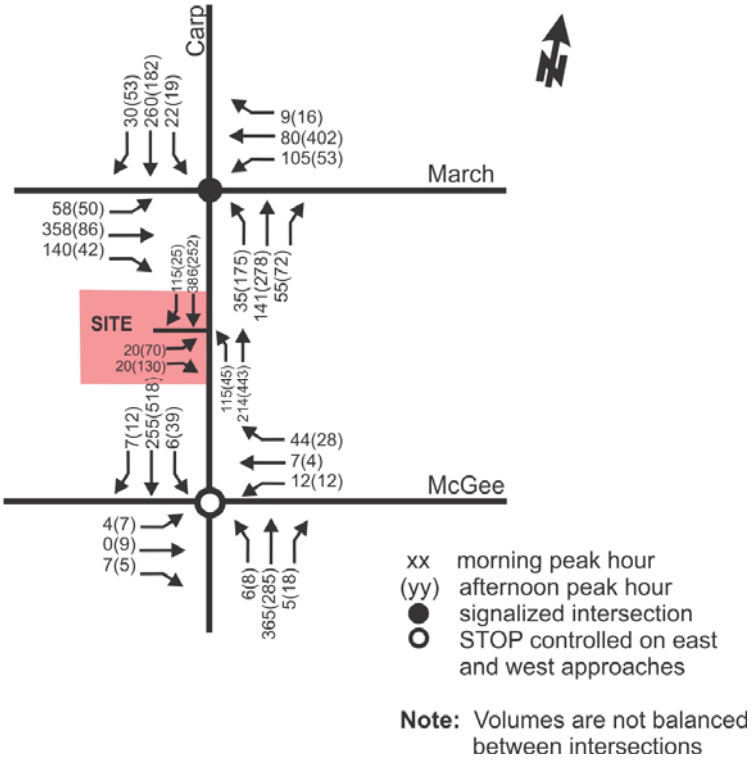


Figure 6: Total Projected Horizon Year Traffic Volumes



Appendix C

Synchro Reports

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	4	43	4	0	5	10	222	12	7	350	0
Future Vol, veh/h	11	4	43	4	0	5	10	222	12	7	350	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	9	0	9	0	0	0	30	18	8	14	7	0
Mvmt Flow	12	4	47	4	0	5	11	241	13	8	380	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	668	672	380	692	666	248	380	0	0	254	0	0
Stage 1	396	396	-	270	270	-	-	-	-	-	-	-
Stage 2	272	276	-	422	396	-	-	-	-	-	-	-
Critical Hdwy	7.19	6.5	6.29	7.1	6.5	6.2	4.4	-	-	4.24	-	-
Critical Hdwy Stg 1	6.19	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.19	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.581	4	3.381	3.5	4	3.3	2.47	-	-	2.326	-	-
Pot Cap-1 Maneuver	362	380	652	361	383	796	1041	-	-	1244	-	-
Stage 1	616	607	-	740	690	-	-	-	-	-	-	-
Stage 2	719	685	-	613	607	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	354	372	652	327	375	796	1041	-	-	1244	-	-
Mov Cap-2 Maneuver	354	372	-	327	375	-	-	-	-	-	-	-
Stage 1	609	602	-	731	682	-	-	-	-	-	-	-
Stage 2	706	677	-	560	602	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.6	12.6	0.3	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1041	-	-	538	486	1244	-	-
HCM Lane V/C Ratio	0.01	-	-	0.117	0.02	0.006	-	-
HCM Control Delay (s)	8.5	0	-	12.6	12.6	7.9	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	1	15	10	5	4	34	439	3	3	286	0
Future Vol, veh/h	12	1	15	10	5	4	34	439	3	3	286	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	17	0	20	10	0	0	6	5	0	0	12	0
Mvmt Flow	13	1	16	11	5	4	37	477	3	3	311	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	874	871	311	879	870	479	311	0	0	480	0	0
Stage 1	317	317	-	553	553	-	-	-	-	-	-	-
Stage 2	557	554	-	326	317	-	-	-	-	-	-	-
Critical Hdwy	7.27	6.5	6.4	7.2	6.5	6.2	4.16	-	-	4.1	-	-
Critical Hdwy Stg 1	6.27	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.27	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.653	4	3.48	3.59	4	3.3	2.254	-	-	2.2	-	-
Pot Cap-1 Maneuver	254	291	689	260	292	591	1227	-	-	1093	-	-
Stage 1	664	658	-	503	518	-	-	-	-	-	-	-
Stage 2	489	517	-	670	658	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	240	278	689	245	279	591	1227	-	-	1093	-	-
Mov Cap-2 Maneuver	240	278	-	245	279	-	-	-	-	-	-	-
Stage 1	637	656	-	482	497	-	-	-	-	-	-	-
Stage 2	460	496	-	651	656	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	18.4	0.6	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1227	-	-	372	290	1093	-	-
HCM Lane V/C Ratio	0.03	-	-	0.082	0.071	0.003	-	-
HCM Control Delay (s)	8	0	-	15.5	18.4	8.3	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	5	55	5	0	20	10	435	15	10	475	5
Future Vol, veh/h	15	5	55	5	0	20	10	435	15	10	475	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	0	9	0	0	0	30	9	8	13	7	0
Mvmt Flow	16	5	60	5	0	22	11	473	16	11	516	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1055	1052	519	1076	1046	481	521	0	0	489	0	0
Stage 1	541	541	-	503	503	-	-	-	-	-	-	-
Stage 2	514	511	-	573	543	-	-	-	-	-	-	-
Critical Hdwy	7.18	6.5	6.29	7.1	6.5	6.2	4.4	-	-	4.23	-	-
Critical Hdwy Stg 1	6.18	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.18	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4	3.381	3.5	4	3.3	2.47	-	-	2.317	-	-
Pot Cap-1 Maneuver	198	228	543	199	230	589	917	-	-	1020	-	-
Stage 1	515	524	-	555	545	-	-	-	-	-	-	-
Stage 2	532	540	-	508	523	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	186	221	543	170	223	589	917	-	-	1020	-	-
Mov Cap-2 Maneuver	186	221	-	170	223	-	-	-	-	-	-	-
Stage 1	506	516	-	546	536	-	-	-	-	-	-	-
Stage 2	504	531	-	441	515	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.6	14.8	0.2	0.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	917	-	-	367	395	1020	-	-
HCM Lane V/C Ratio	0.012	-	-	0.222	0.069	0.011	-	-
HCM Control Delay (s)	9	0	-	17.6	14.8	8.6	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	5	20	10	5	10	40	605	5	10	500	5
Future Vol, veh/h	15	5	20	10	5	10	40	605	5	10	500	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	0	20	10	0	0	6	4	0	0	7	0
Mvmt Flow	16	5	22	11	5	11	43	658	5	11	543	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1323	1317	546	1328	1317	661	548	0	0	663	0	0
Stage 1	568	568	-	747	747	-	-	-	-	-	-	-
Stage 2	755	749	-	581	570	-	-	-	-	-	-	-
Critical Hdwy	7.26	6.5	6.4	7.2	6.5	6.2	4.16	-	-	4.1	-	-
Critical Hdwy Stg 1	6.26	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.26	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.644	4	3.48	3.59	4	3.3	2.254	-	-	2.2	-	-
Pot Cap-1 Maneuver	124	159	504	127	159	466	1002	-	-	935	-	-
Stage 1	484	510	-	393	423	-	-	-	-	-	-	-
Stage 2	380	422	-	486	509	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	110	146	504	110	146	466	1002	-	-	935	-	-
Mov Cap-2 Maneuver	110	146	-	110	146	-	-	-	-	-	-	-
Stage 1	451	501	-	366	394	-	-	-	-	-	-	-
Stage 2	341	393	-	452	500	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.5	30	0.5	0.2
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1002	-	-	190	171	935	-	-
HCM Lane V/C Ratio	0.043	-	-	0.229	0.159	0.012	-	-
HCM Control Delay (s)	8.8	0	-	29.5	30	8.9	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	0.6	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	5	465	485	5
Future Vol, veh/h	5	5	5	465	485	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	0	9	7	0
Mvmt Flow	5	5	5	505	527	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1045	530	532	0	-	0
Stage 1	530	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Critical Hdwy	7.4	7.2	4.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	2.2	-	-	-
Pot Cap-1 Maneuver	169	398	1046	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	398	1046	-	-	-
Mov Cap-2 Maneuver	168	-	-	-	-	-
Stage 1	430	-	-	-	-	-
Stage 2	441	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1046	-	236	-	-
HCM Lane V/C Ratio	0.005	-	0.046	-	-
HCM Control Delay (s)	8.5	0	21	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	5	55	5	0	20	10	440	15	10	475	5
Future Vol, veh/h	15	5	55	5	0	20	10	440	15	10	475	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized		-	None		-	None		-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	0	9	0	0	0	30	9	8	13	7	0
Mvmt Flow	16	5	60	5	0	22	11	478	16	11	516	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1060	1057	519	1081	1051	486	521	0	0	494	0	0
Stage 1	541	541	-	508	508	-	-	-	-	-	-	-
Stage 2	519	516	-	573	543	-	-	-	-	-	-	-
Critical Hdwy	7.18	6.5	6.29	7.1	6.5	6.2	4.4	-	-	4.23	-	-
Critical Hdwy Stg 1	6.18	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.18	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4	3.381	3.5	4	3.3	2.47	-	-	2.317	-	-
Pot Cap-1 Maneuver	197	227	543	197	229	585	917	-	-	1015	-	-
Stage 1	515	524	-	551	542	-	-	-	-	-	-	-
Stage 2	529	538	-	508	523	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	185	220	543	168	222	585	917	-	-	1015	-	-
Mov Cap-2 Maneuver	185	220	-	168	222	-	-	-	-	-	-	-
Stage 1	506	516	-	542	533	-	-	-	-	-	-	-
Stage 2	501	529	-	441	515	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.6	14.9	0.2	0.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	917	-	-	366	391	1015	-	-
HCM Lane V/C Ratio	0.012	-	-	0.223	0.069	0.011	-	-
HCM Control Delay (s)	9	0	-	17.6	14.9	8.6	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	20	45	225	325	5
Future Vol, veh/h	5	20	45	225	325	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	0	3	5	0
Mvmt Flow	5	22	49	245	353	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	699	356	358	0	-	0
Stage 1	356	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Critical Hdwy	7.4	7.2	4.1	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	2.2	-	-	-
Pot Cap-1 Maneuver	289	514	1212	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	275	514	1212	-	-	-
Mov Cap-2 Maneuver	275	-	-	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	544	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.8	1.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1212	-	438	-	-
HCM Lane V/C Ratio	0.04	-	0.062	-	-
HCM Control Delay (s)	8.1	0	13.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	10	30	5	5	10	0	255	5	5	340	5
Future Vol, veh/h	0	10	30	5	5	10	0	255	5	5	340	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized		-	None		-	None		-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	4	0	0	0	0	2	0	0	10	0
Mvmt Flow	0	11	33	5	5	11	0	277	5	5	370	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	671	665	373	685	665	280	375	0	0	282	0	0
Stage 1	383	383	-	280	280	-	-	-	-	-	-	-
Stage 2	288	282	-	405	385	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.24	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	373	383	669	365	383	764	1195	-	-	1292	-	-
Stage 1	644	616	-	731	683	-	-	-	-	-	-	-
Stage 2	724	681	-	626	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	362	381	669	338	381	764	1195	-	-	1292	-	-
Mov Cap-2 Maneuver	362	381	-	338	381	-	-	-	-	-	-	-
Stage 1	644	613	-	731	683	-	-	-	-	-	-	-
Stage 2	708	681	-	582	611	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.9	12.7	0	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1195	-	-	563	488	1292	-	-
HCM Lane V/C Ratio	-	-	-	0.077	0.045	0.004	-	-
HCM Control Delay (s)	0	-	-	11.9	12.7	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	0	630	515	0
Future Vol, veh/h	5	10	0	630	515	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	4	7	0
Mvmt Flow	5	11	0	685	560	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1245	560	560	0	-	0
Stage 1	560	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	194	532	1021	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	194	532	1021	-	-	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1021	-	337	-	-
HCM Lane V/C Ratio	-	-	0.048	-	-
HCM Control Delay (s)	0	-	16.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	5	20	10	5	10	45	605	5	10	510	5
Future Vol, veh/h	15	5	20	10	5	10	45	605	5	10	510	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized		-	None		-	None		-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	0	20	10	0	0	12	4	0	0	7	7
Mvmt Flow	16	5	22	11	5	11	49	658	5	11	554	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1346	1340	557	1351	1340	661	559	0	0	663	0	0
Stage 1	579	579	-	759	759	-	-	-	-	-	-	-
Stage 2	767	761	-	592	581	-	-	-	-	-	-	-
Critical Hdwy	7.26	6.5	6.4	7.2	6.5	6.2	4.22	-	-	4.1	-	-
Critical Hdwy Stg 1	6.26	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.26	5.5	-	6.2	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.644	4	3.48	3.59	4	3.3	2.308	-	-	2.2	-	-
Pot Cap-1 Maneuver	120	154	497	122	154	466	964	-	-	935	-	-
Stage 1	477	504	-	387	418	-	-	-	-	-	-	-
Stage 2	374	417	-	479	503	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	105	139	497	105	139	466	964	-	-	935	-	-
Mov Cap-2 Maneuver	105	139	-	105	139	-	-	-	-	-	-	-
Stage 1	438	495	-	356	384	-	-	-	-	-	-	-
Stage 2	331	383	-	445	494	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.7	31.3	0.6	0.2
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	964	-	-	183	164	935	-	-
HCM Lane V/C Ratio	0.051	-	-	0.238	0.166	0.012	-	-
HCM Control Delay (s)	8.9	0	-	30.7	31.3	8.9	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	0.6	0	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	25	0	515	445	0
Future Vol, veh/h	5	25	0	515	445	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	5	10	0
Mvmt Flow	5	27	0	560	484	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1044	484	484	0	-	0
Stage 1	484	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	256	587	1089	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	256	587	1089	-	-	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	576	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1089	-	483	-	-
HCM Lane V/C Ratio	-	-	0.068	-	-
HCM Control Delay (s)	0	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	10	25	15	10	15	40	485	5	10	450	10
Future Vol, veh/h	10	10	25	15	10	15	40	485	5	10	450	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized		-	None		-	None		-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	27	14	12	0	40	6	0	0	9	63
Mvmt Flow	11	11	27	16	11	16	43	527	5	11	489	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1146	1135	495	1152	1138	530	500	0	0	532	0	0
Stage 1	517	517	-	616	616	-	-	-	-	-	-	-
Stage 2	629	618	-	536	522	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.47	7.24	6.62	6.2	4.5	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.24	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.24	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.543	3.626	4.108	3.3	2.56	-	-	2.2	-	-
Pot Cap-1 Maneuver	178	204	527	165	193	553	894	-	-	1046	-	-
Stage 1	545	537	-	458	466	-	-	-	-	-	-	-
Stage 2	474	484	-	507	515	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	155	187	527	140	177	553	894	-	-	1046	-	-
Mov Cap-2 Maneuver	155	187	-	140	177	-	-	-	-	-	-	-
Stage 1	508	529	-	427	434	-	-	-	-	-	-	-
Stage 2	418	451	-	464	507	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.1	26.6	0.7	0.2
HCM LOS	C	D		

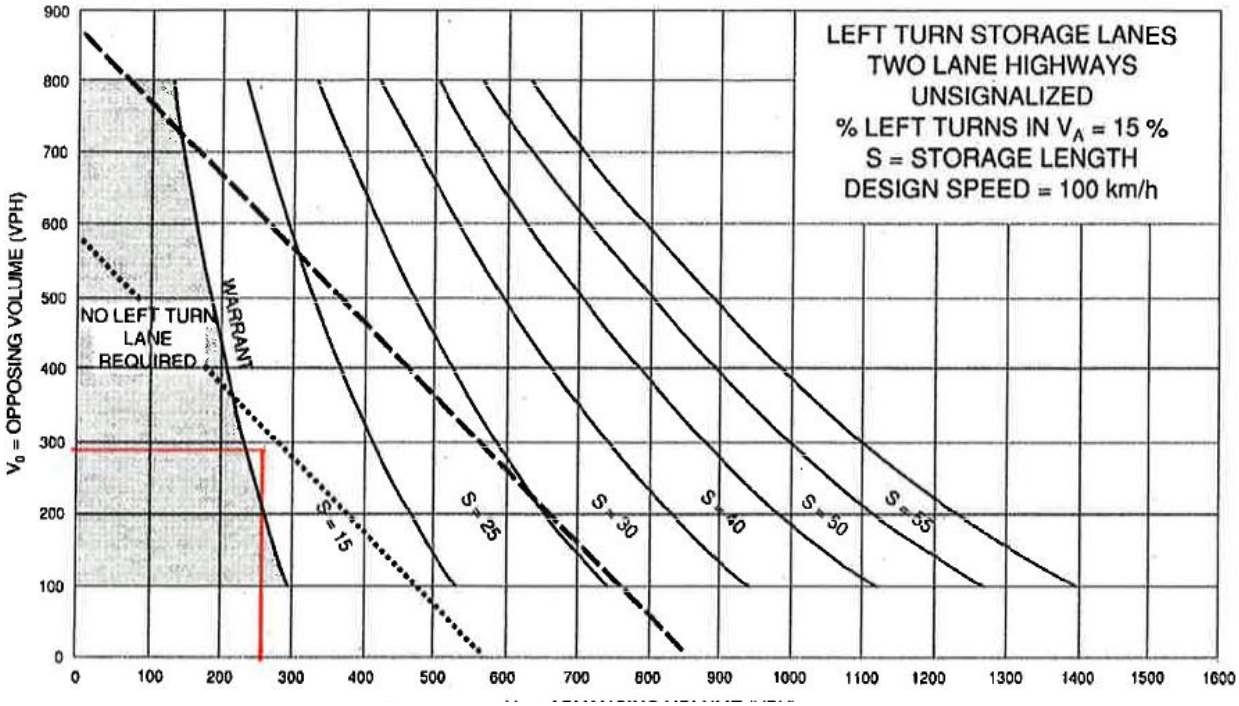
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	894	-	-	272	210	1046	-	-
HCM Lane V/C Ratio	0.049	-	-	0.18	0.207	0.01	-	-
HCM Control Delay (s)	9.2	0	-	21.1	26.6	8.5	0	-
HCM Lane LOS	A	A	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.8	0	-	-

Appendix D

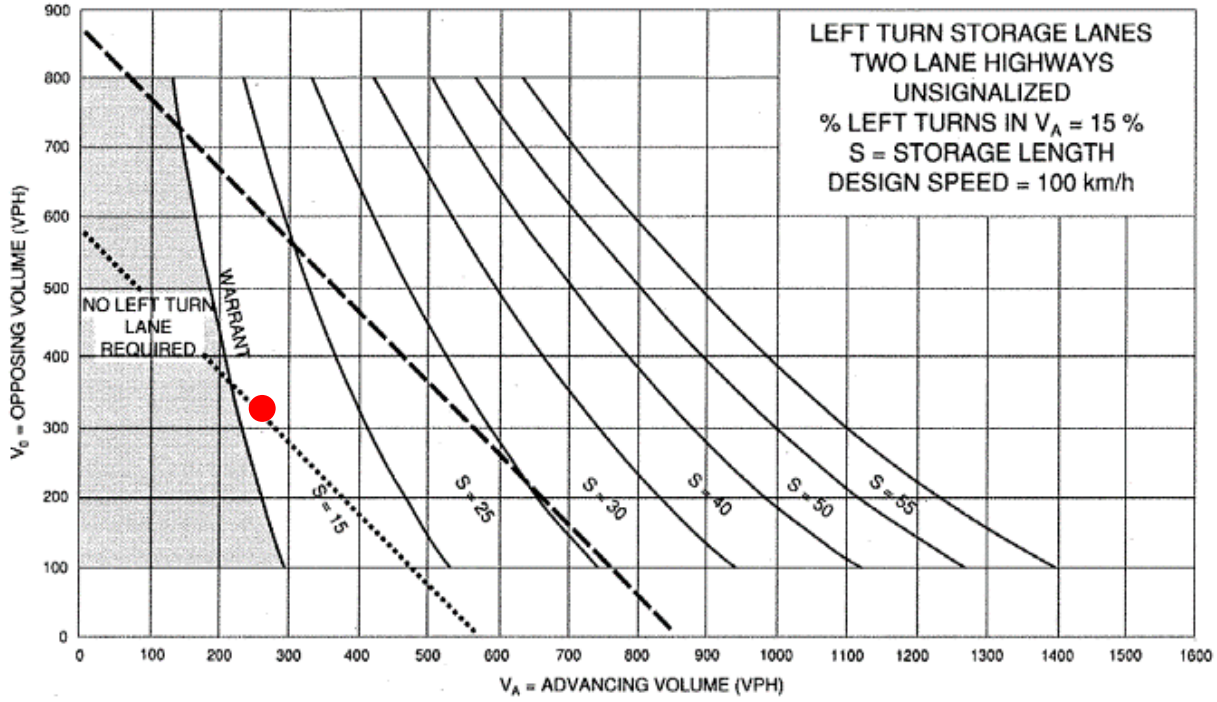
TAC Left Turn Lane Warrant Nomographs

DILLON CONSULTING

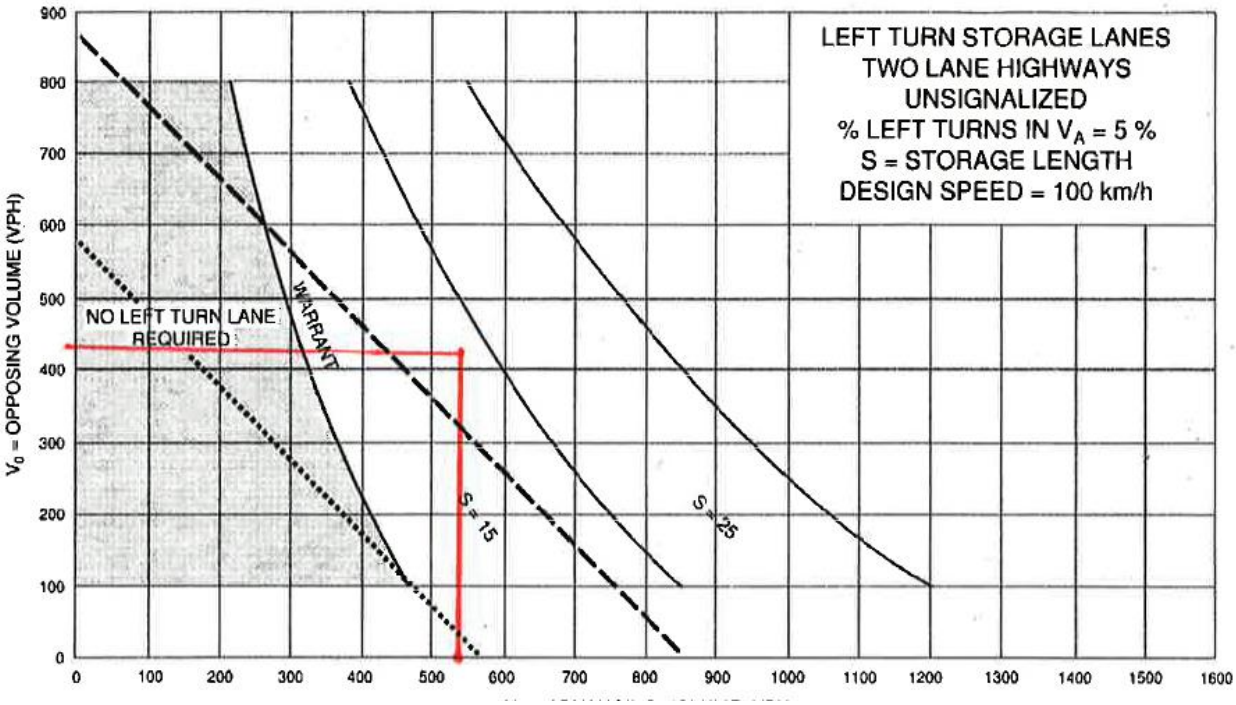
Carp Road / Site Access – Total Traffic - 2021 AM Site



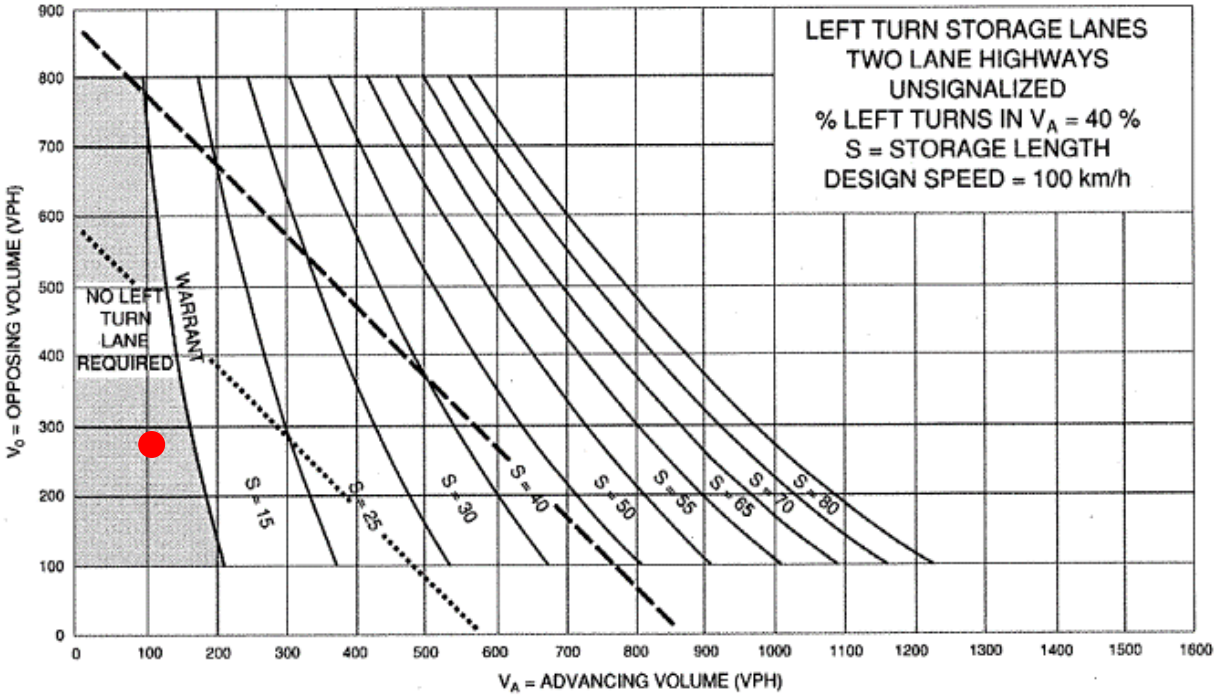
Carp Road / Site Access – Total Traffic - 2026 AM Site



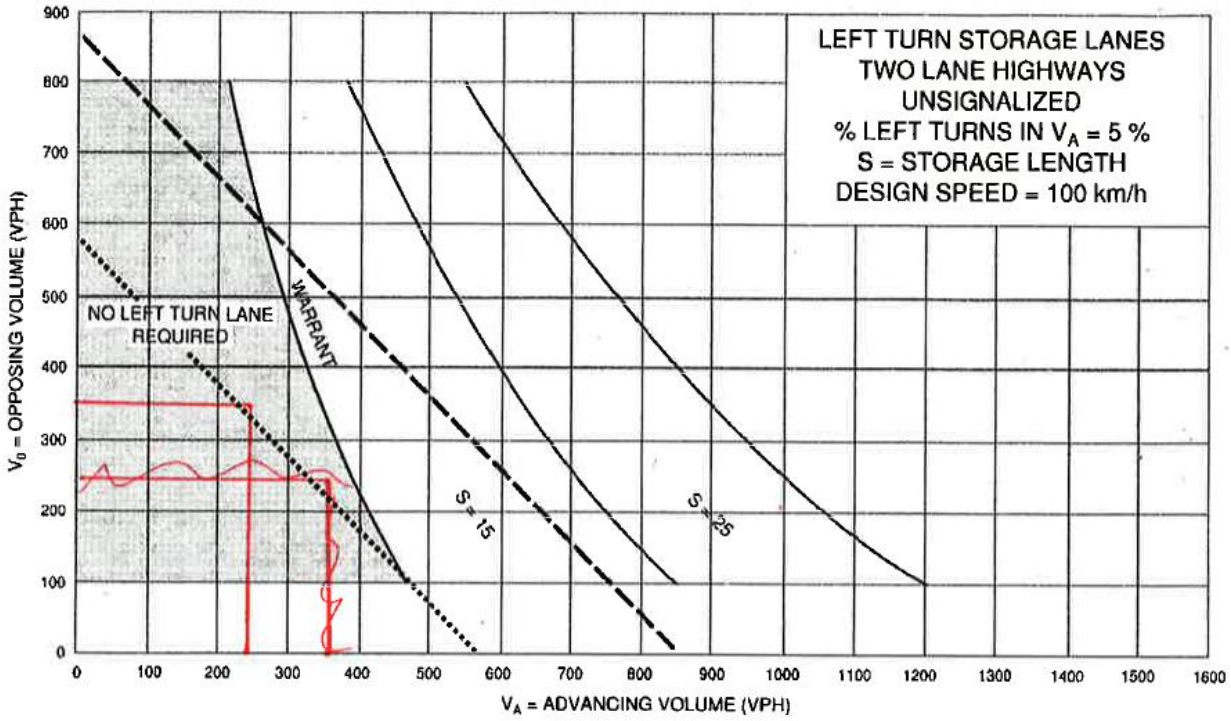
Carp Road / Site Access – Total Traffic – Seasonal Load Restriction - 2026 PM Site



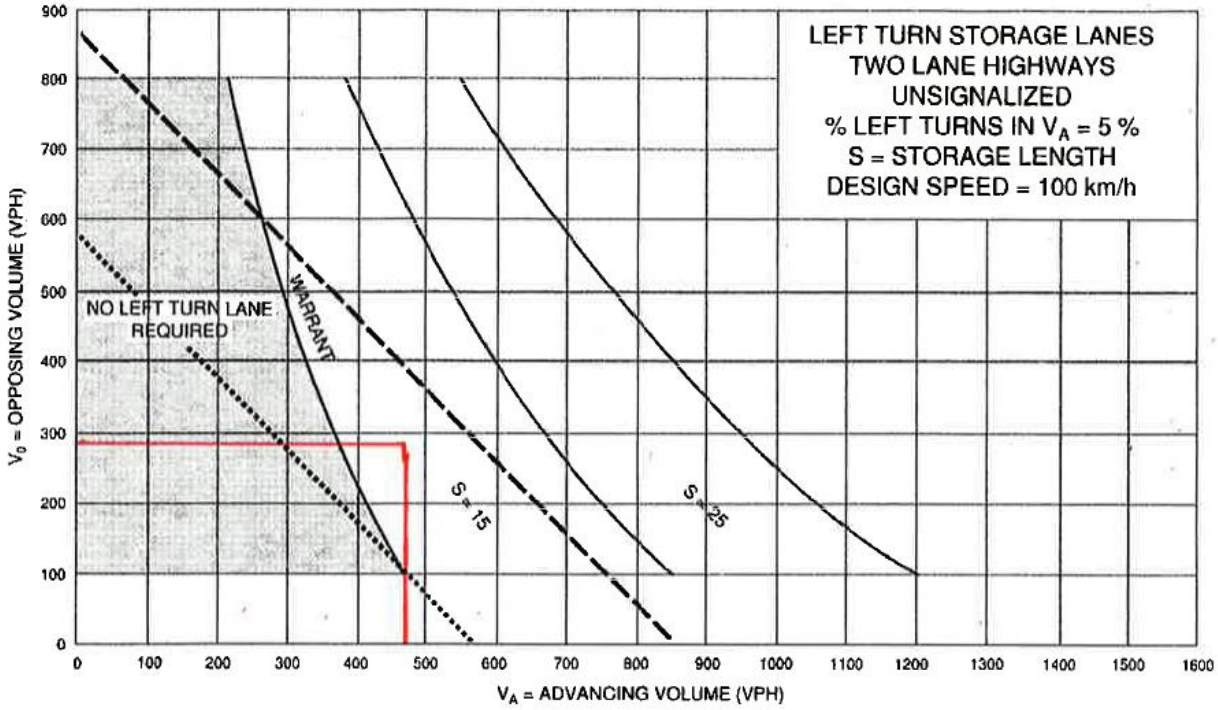
Carp Road / Site Access – Total Traffic – Sensitivity Analysis (No explicit background developments) – 2026 AM Site



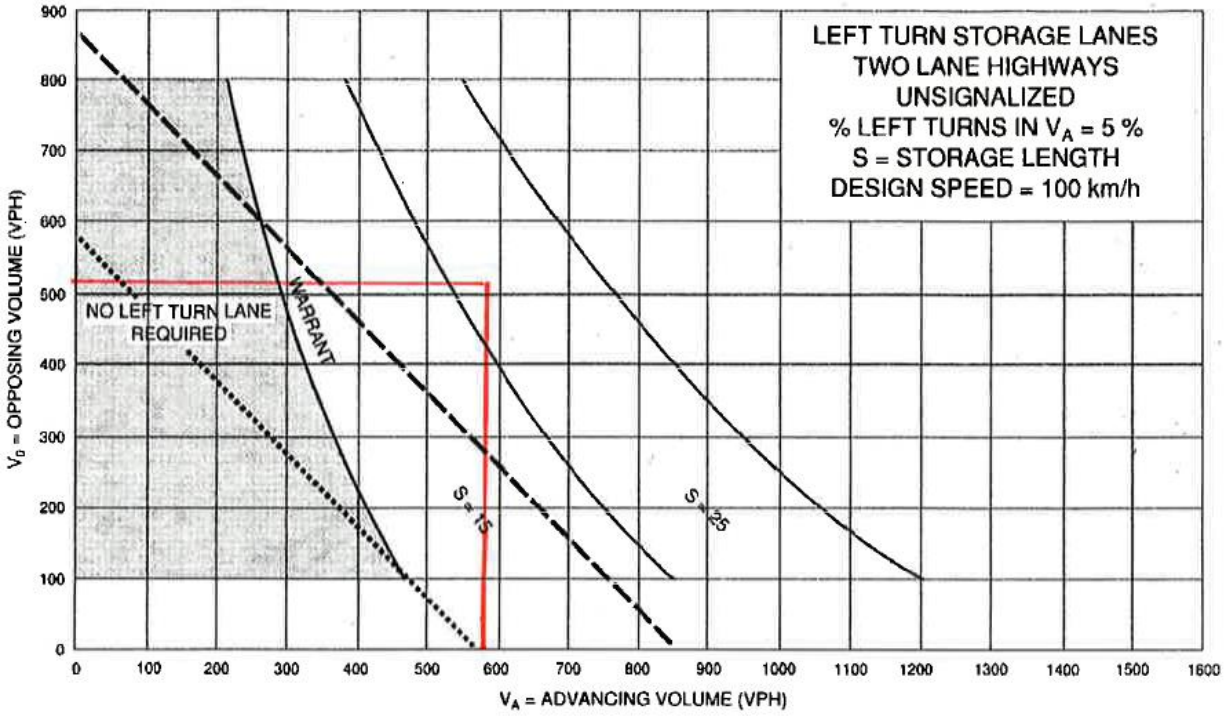
Carp Road / McGee Side Road – 2019 AM Road Peak Hour



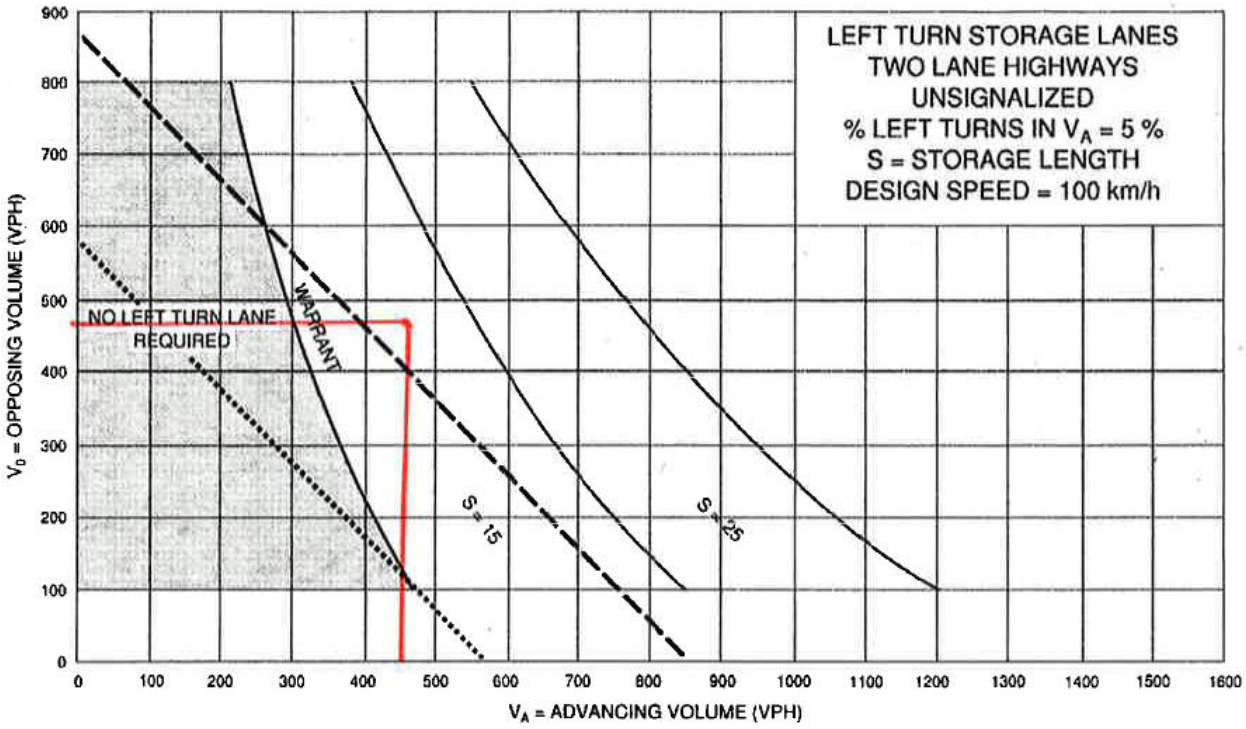
Carp Road / McGee Side Road – 2019 PM Road Peak Hour



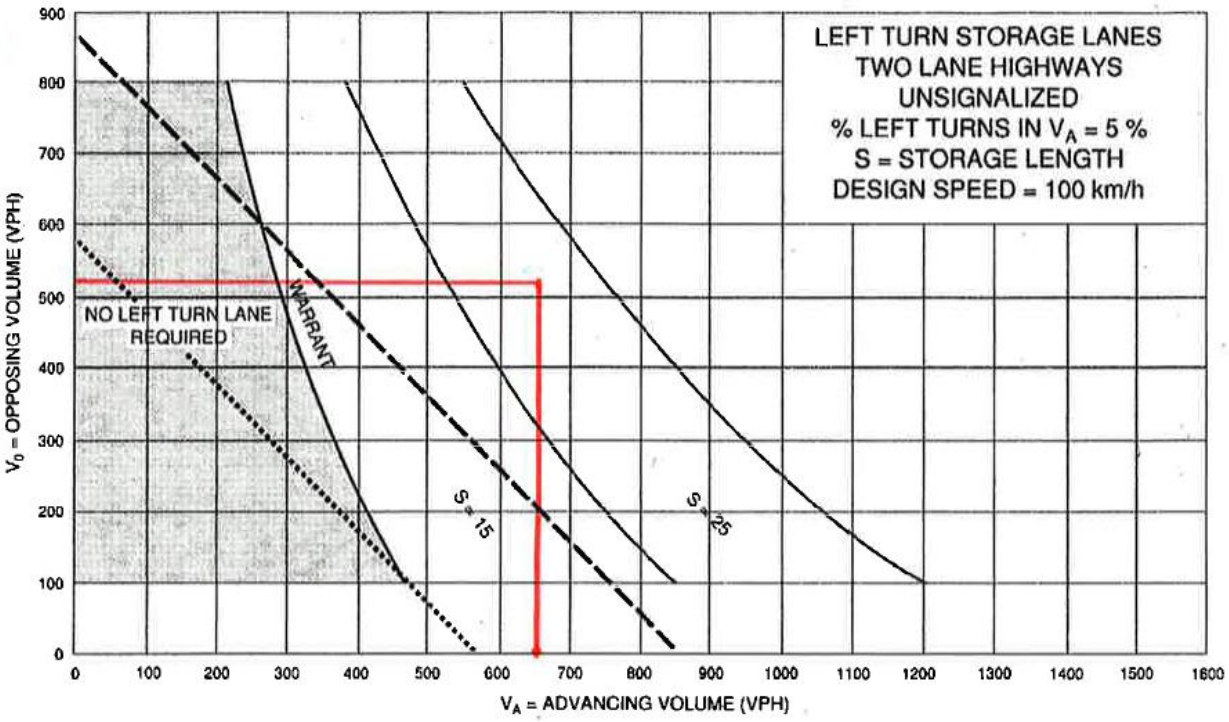
Carp Road / McGee Side Road – Background Traffic - 2021 PM Road Peak



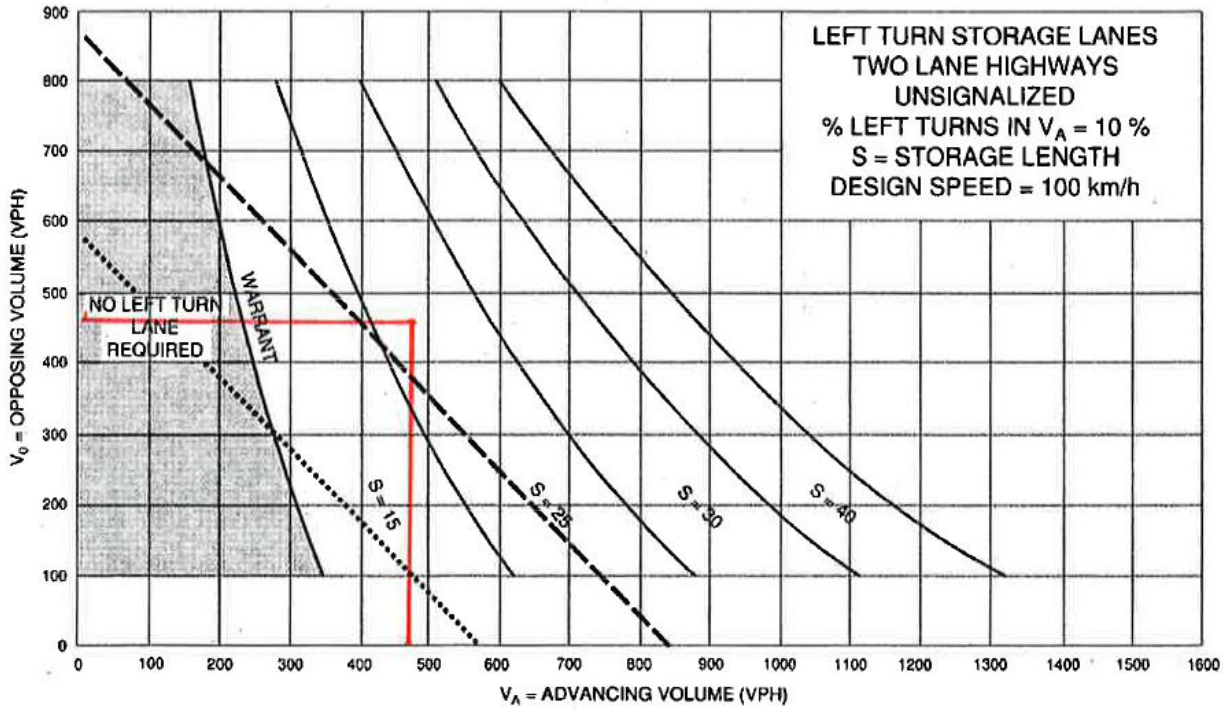
Carp Road / McGee Side Road – Background Traffic - 2026 AM Road Peak



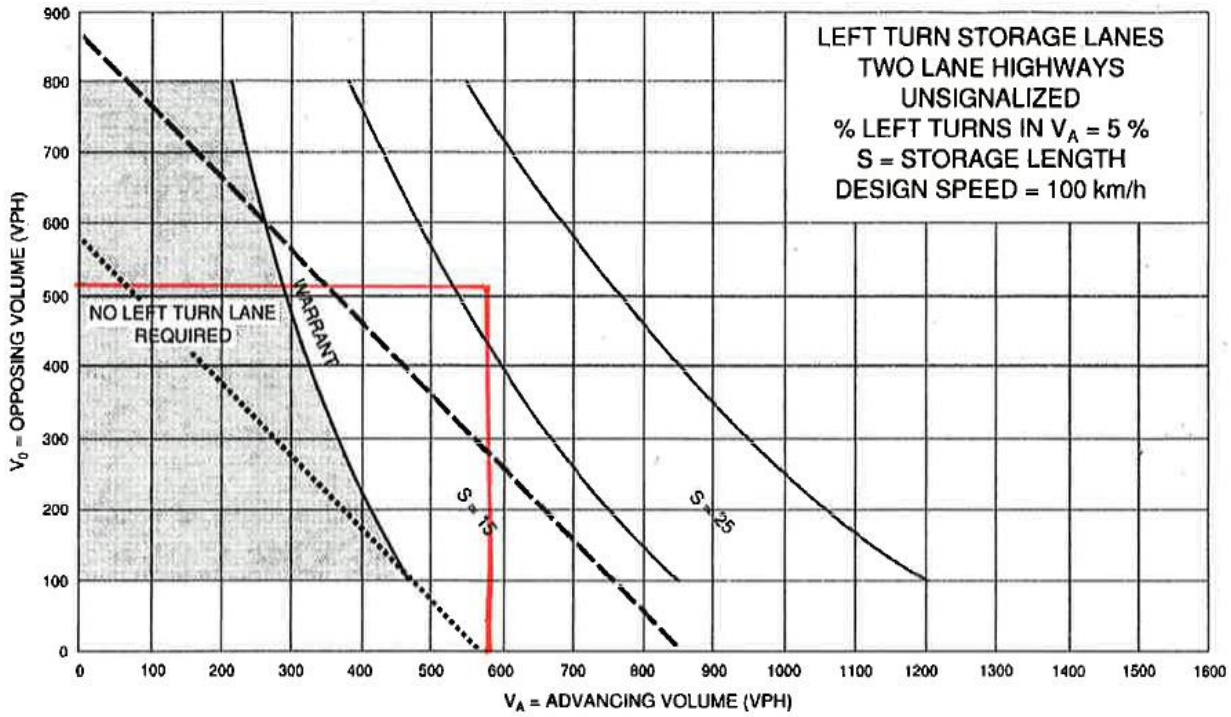
Carp Road / McGee Side Road – Background Traffic - 2026 PM Road



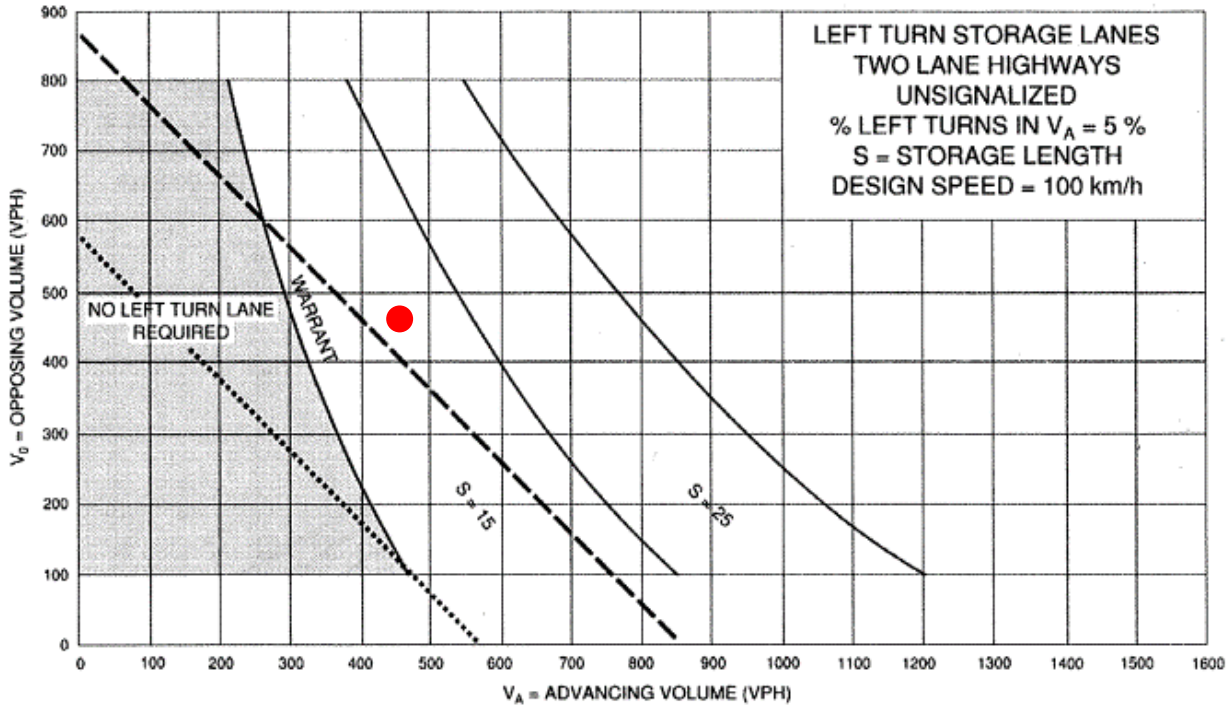
Carp Road / McGee Side Road – Total Traffic – 2021 PM Site Peak



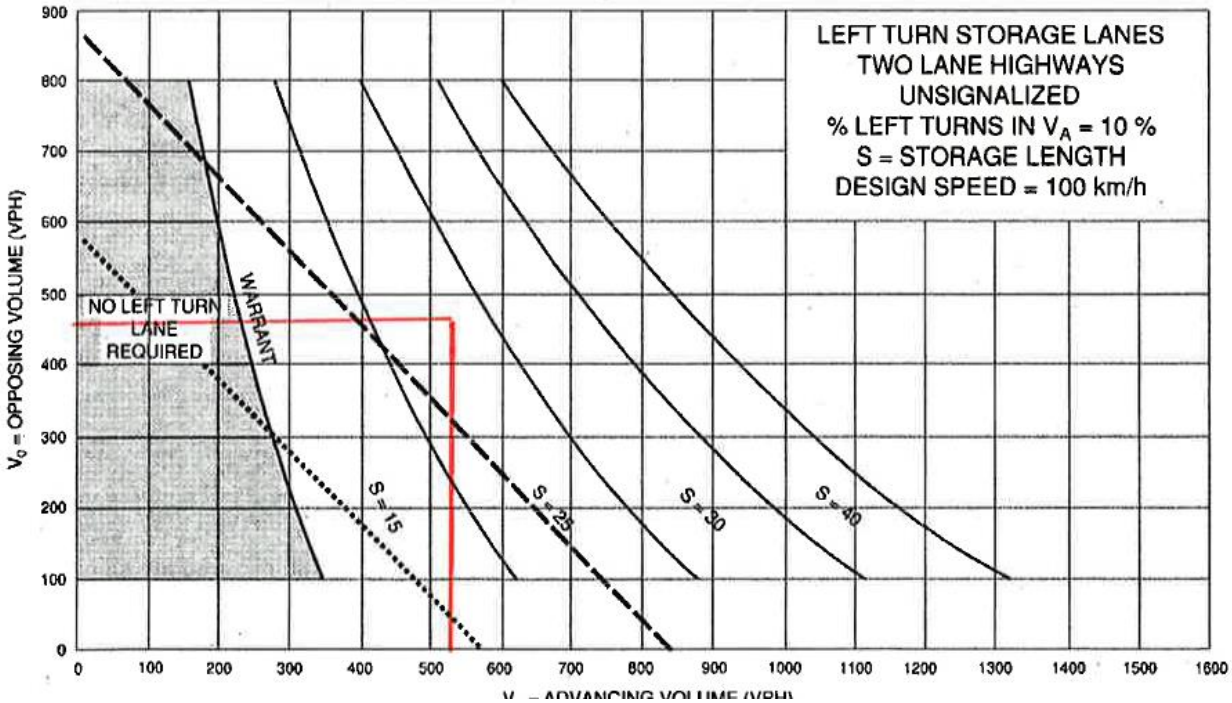
Carp Road / McGee Side Road – Total Traffic – 2021 PM Road Peak



Carp Road / McGee Side Road – Total Traffic – 2026 AM Road



Carp Road / McGee Side Road – Total Traffic – 2026 PM Site



Carp Road / McGee Side Road – Total Traffic – 2026 PM Road