359-369 Erb Street West, Waterloo, ON

Transportation Impact Study, Parking Study and Access and Circulation Review

Paradigm Transportation Solutions Limited

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Project Summary

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Executive Summary

Content

2296342 Ontario Inc. and 2699847 Ontario Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Study (TIS), Parking Study (PS), and Access and Circulation Review (ACR) for a proposed residential development at 359-369 Erb Street West in the city of Waterloo.

The purpose of this study is to identify and assess the potential transportation impact(s) of the development and determine the adequacy of the proposed parking supply.

This scope of this report includes a review of existing and future traffic conditions near the development, the identification of future roadway improvements necessary to support the development, if needed), and a review of the adequacy of the proposed parking supply. This report also includes an assessment of on-site vehicle circulation.

Site Description and Development Concept

Site Description

The subject lands are on the southwest corner of Erb Street West and Culpepper Drive. They comprise four individual land parcels each of which is occupied by a multi-storey apartment building. Vehicle access to each parcel, except 359 Erb Street West, is provided by individual all-moves driveway connections to Erb Street West. Access to 359 Erb Street West is provided by an all-moves driveway connection to Culpepper Drive. All existing land uses, and driveway connections. will be removed to facilitate redevelopment.

Development Description

Redevelopment of the site proposes two connected eight-storey residential buildings, comprising 224 units combined. Vehicle access is proposed via one all-moves driveway connection to Erb Street West and a driveway connection to Culpepper Drive supporting right-turns in and left-turns out. The site proposes 230 parking spaces (1.03 spaces per dwelling unit) comprising 207 resident spaces and 23 visitor spaces. Build-out is anticipated to be complete by 2027; however, this is subject to market conditions.

Findings

Based on the analyses contained herein, the findings of this report are as follows:

Transportation Impact Assessment

- **Existing Traffic Conditions:** The study area intersection (Erb Street and Culpepper Drive) and the associated driveways to the existing land parcels are operating at acceptable levels of service in the weekday AM peak hour and the weekday PM peak hour. There are no critical movements.
- **Background Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to existing traffic conditions with no critical movements forecast in either the weekday AM peak hour or the weekday PM peak hour.
- **Development Trip Generation:** The development is forecast to generate approximately 87 trips in the weekday AM peak hour and 88 trips in the weekday PM peak hour, respectively.
- **Total Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to background traffic conditions with no critical movements forecast in either the weekday AM peak hour or weekday PM peak hour. This analysis assumes two site driveways; one to Erb Street West and one to Culpepper Drive.

  In the PM peak hour, the southbound approach at Erb Street West and Culpepper Drive is estimated to operate within capacity, but with a delay of 55 seconds; this is just below the critical threshold of delay published in the Region of Waterloo *TIS Guidelines*. Both site driveways are forecast to operate at acceptable levels of service and within capacity.
- **Sensitivity Analysis:** With the provision of only one site connection to Culpepper Drive (rather than one connection onto both Erb Street West and Culpepper Drive) the southbound approach at Erb Street West and Culpepper Drive is forecast to operate with a delay deemed critical, operating at LOS F, with a delay of 57 seconds.
- **Left-Turn Lanes:** A westbound left-turn lane with 15 metres of storage is warranted on Erb Street West at Culpepper Drive based on forecast traffic volumes but not forecast traffic operations. This auxiliary turn lane is warranted with or without a driveway connection to Erb Street West. There is insufficient pavement width to accommodate this turning lane, and its



location may interfere with access to properties on the north side of Erb Street West, namely 360 Erb Street West.

A westbound left-turn lane is not warranted on Erb Street West at Driveway A.

- **Right Turn Lanes:** Exclusive right-turn lanes are not warranted at either site driveway, or Erb Street West and Culpepper Drive based on forecast traffic volumes or operations.
- **Traffic Control Signal Warrant:** Traffic control signals are not warranted at Erb Street West and Culpepper Drive under total traffic conditions.
- **Controlled Pedestrian Crossing Warrant:** The eight-hour vehicular and pedestrian volumes on and crossing Erb Street West at Culpepper Drive do not satisfy the warrant criteria published in OTM Book 15 for an Intersection Pedestrian Signal (IPS) or a pedestrian crossover (PXO).

Site Circulation Review

- Both a Transportation Association of Canada (TAC) Heavy Single Unit (HSU) and a Pumper Fire Truck can enter and exit the site without conflict. Neither vehicle can turn-around within the site, but can travel along the site's southern drive aisle without any conflicts to leave the site in a backwards motion via Culpepper Drive.

Parking Study

- The development proposes 230 parking spaces (1.03 spaces per dwelling unit) comprising 207 resident spaces and 23 visitor spaces.
- The proposed parking supply is non-compliant with Zoning By-law 2018-050, which requires 270 spaces (1.20 spaces per unit).
- The Region of Waterloo Parking Management Worksheet supports a parking reduction of 8% based on existing and proposed TDM measures, and up to a maximum of 11% if additional measures were implemented to support a reduced parking supply. In either case, the proposed supply is non-compliant with the TDM-supported, and maximum parking reductions.
- Auto-ownership data for apartment dwellers near the subject site, collected as part of the 2022 Transportation Tomorrow Survey (TTS) indicate an average vehicle ownership rate of 0.89 per apartment household. This suggests a peak resident

parking demand of 200 spaces, whereby the remaining the 30 parking spaces could be used to accommodate visitor parking demands, as these parking demands are not captured in the TTS data.

- Observed parking demand data collected by Paradigm at three residential sites in the city of Waterloo indicate a peak residential demand (inclusive of visitor parking) of 0.68 to 0.73 spaces per unit. This is less than the proposed residential/visitor parking rate of 1.03 spaces per unit.

Transportation Demand Management (TDM)

The site has existing and proposed measures to support alternative modes of transportation, including proximity to transit services on Erb Street West, and the provision of 152 bicycle parking spaces.

To further promote TDM, and the muti-modal transportation network near the site, the developer and/or building owner (as applicable) could consider:

- Providing subsidized transit passes for all residents;
- Providing transit and active transportation information in a welcome package to new residents and tenants, including the posting of this information in a central location; and
- Delegating or hiring a TDM coordinator.

Conclusions

Based on the findings of this study, it is concluded that:

- The provision of only one driveway connection onto Culpepper Drive, as opposed to one driveway connection onto Culpepper Drive and another connection onto Erb Street West is forecast to degrade traffic operations at Erb Street West and Culpepper Drive, by increasing the delay for traffic exiting 360 Erb Street West. Provision of two driveway connections maintains non-critical traffic operations at Erb Street and Culpepper Drive;
- While westbound left-turn lanes are warranted on Erb Street at Culpepper Drive based on forecast traffic volumes, forecast traffic operations do not indicate an operational need for an exclusive left-turn lane. Installation of an exclusive left-turn lane would necessitate a widening of Erb Street, or the removal of the existing bicycle lanes. A westbound left-turn lane on Erb Street West at Culpepper Drive may also introduce driver confusion for those entering properties on the north side of Erb

Street West, namely 360 Erb Street West, whose driveway would be within the length of the turn-lane.

- Although the proposed parking supply is non-compliant with the in-force zoning by-law (2018-050), it conforms with auto-ownership characteristics near the site, and observed parking demands at similar apartment buildings in Waterloo; and
- The reduced parking supply aligns with city policies promoting the use of non-auto travel modes and the implementation of transportation demand management (TDM) measures in new development.

Recommendations

Based on the conclusions of this study, it is recommended:

- The developer commits to the TDM initiatives listed herein to support the proposed parking rate of 1.03 spaces per unit (inclusive of visitor parking);
- The site be considered for approval with no provision for off-site transportation network improvements;
- The Region of Waterloo monitor vehicular and pedestrian volumes at Erb Street West and Culpepper Drive to determine when additional traffic control improvements may be warranted, with or without the proposed development;
- The developer place garbage collection area(s) along the site's southern drive aisle connecting to Culpepper Drive to accommodate the restricted on-site movements for a garbage collection vehicle; and
- The developer maintains two full moves accesses for the proposed development (one to Erb Street West and one to Culpepper Drive).

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1 Introduction

1.1 Overview

2296342 Ontario Inc. and 2699847 Ontario Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Study (TIS), Parking Study (PS), and Access and Circulation Review (ACR) for a proposed residential development at 359-369 Erb Street West in the city of Waterloo. **Figure 1.1** illustrates the location of the subject site on the southwest corner of Erb Street West and Culpepper Drive.

1.2 Purpose and Scope

The purpose of this study is to identify and assess the potential transportation impact(s) of the development. This study also reviews the adequacy of the proposed parking supply and includes an assessment of on-site vehicle circulation. The scope of this study, developed in consultation with the City of Waterloo (the City) and the Region of Waterloo (the Region) via email in May, June, and August 2024 includes:

- An assessment of traffic volumes and operations at Erb Street West and Culpepper Drive;
- Estimates of background traffic growth for a five-year horizon from the date of the study;
- Estimates of traffic generated by the redevelopment;
- Analyses of the impacts of the future traffic on the intersection noted above, with and without the proposed redevelopment;
- A review of the parking supply based on zoning by-law requirements, and estimates of the parking demands of the site; and
- An assessment of on-site vehicle circulation.

Appendix A contains the pre-study consultation material and responses from the City in June 2024 and the Region in August 2024. This study has been completed in general accordance with the Region of Waterloo *Transportation Impact Study Guidelines*[1] and the City of Waterloo *Terms of Reference for Parking Study*.[2]

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[1] Region of Waterloo, *Transportation Impact Study Guidelines,* (Kitchener: Region of Waterloo, 2014).

[2] City of Waterloo, *Terms of Reference: Parking Study*, (Waterloo: City of Waterloo, 2023).



Location of Subject Site

2 Existing Conditions

2.1 Road Network

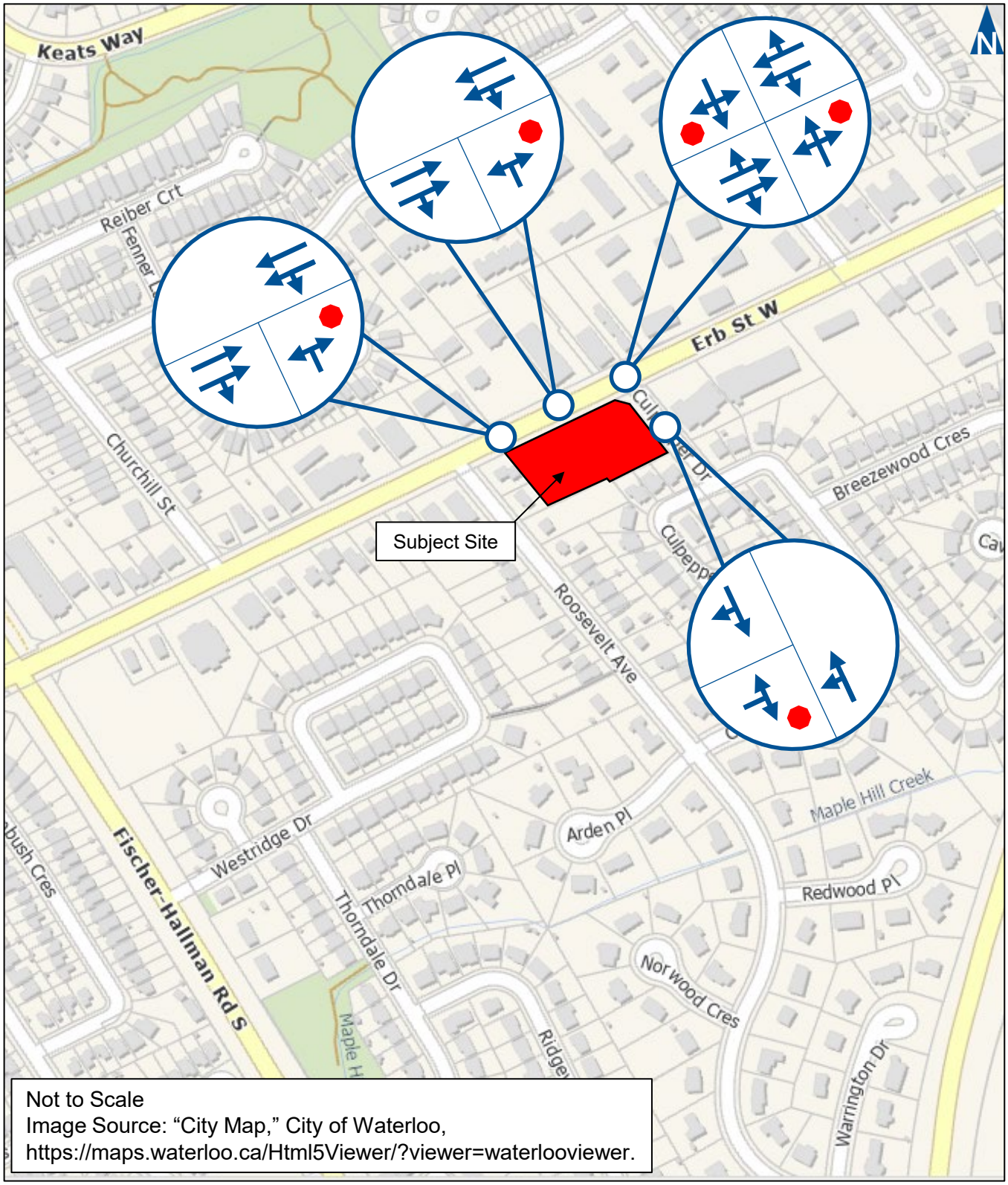
The main roads in the study area comprise Region of Waterloo governed Erb Street West and City of Waterloo governed Culpepper Drive. Each road is described as follows:

- **Erb Street West** is an east-west, four-lane, regional arterial road with an undivided urban cross-section comprising two general purpose travel lanes per direction.[3] The posted speed limit is 60 km/h. Sidewalks and on-road bicycle lanes are provided on both sides of the road east and west of Culpepper Drive. Parking is not permitted on either side of the road.
- **Culpepper Drive** is a north-south, two-lane, local road with an undivided urban cross-section comprising one general purpose travel lane per direction. The speed limit is not posted and is assumed to be 50 km/h; however, for the purposes of this study, it is assumed to be 40 km/h, because the city is planning to reduce the posted speed limit to 40 km/h before the end of 2025 as part of the city's speed management implementation plan.[4] A sidewalk is provided on the east side of the road connecting Erb Street West to Culpepper Place. Dedicated cycling facilities are not provided. Parking is permitted on either side of the road.

Figure 2.1 illustrates the existing lane configurations and traffic control at the study intersection and existing site driveways.

[3] City of Waterloo, *Official Plan, Schedule E (Road Classification System)*, (Waterloo: City of Waterloo, 2018).

[4] "Speed management: safe streets for all," Engage Waterloo, 2024, https://www.engagewr.ca/speed-management.



Existing Lane Configurations and Traffic Control

2.2 Transit Services

Grand River Transit (GRT) is the public transit operator in the Region of Waterloo and operates two surface routes near the site.[5] Route 5 (Erb) operates between The Boardwalk Station and the intersection of Bloomingdale Road North and Daniel Avenue. Route 202 (iXpress University) operates between The Boardwalk Station and Conestoga Station. Both routes operate seven days a week and Route 5 serves the following transit stops near the site:

- Stop 1996: South side of Erb Street, west of Culpepper Drive (directly in front of the development);
- Stop 1970: North side of Erb Street, west of Culpepper Drive (directly opposite the development).

Figure 2.2 illustrates the existing transit services near the site. **Table 2.1** summarizes the operating hours and headways of both transit services based on the most recently available schedules posted by GRT at the time of writing.

2.3 Active Transportation

2.3.1 Pedestrian

Sidewalks are provided on both sides of Erb Street West, and on the east side of Culpepper Drive. All sidewalks include a landscaped buffer between the road and the sidewalk.

2.3.2 Cycling

Erb Street West features conventional on-road bicycle lanes between Fisher-Hallman Road and Westmount Road South. The City of Waterloo *Active Transportation Strategy* does not identify any future cycling network improvements in the study area.[6] **Figure 2.3** illustrates the existing cycling network near the site.

[5] "GRT transit system map," region of Waterloo, 2024, https://www.grt.ca/en/schedules-maps/system-map.aspx.

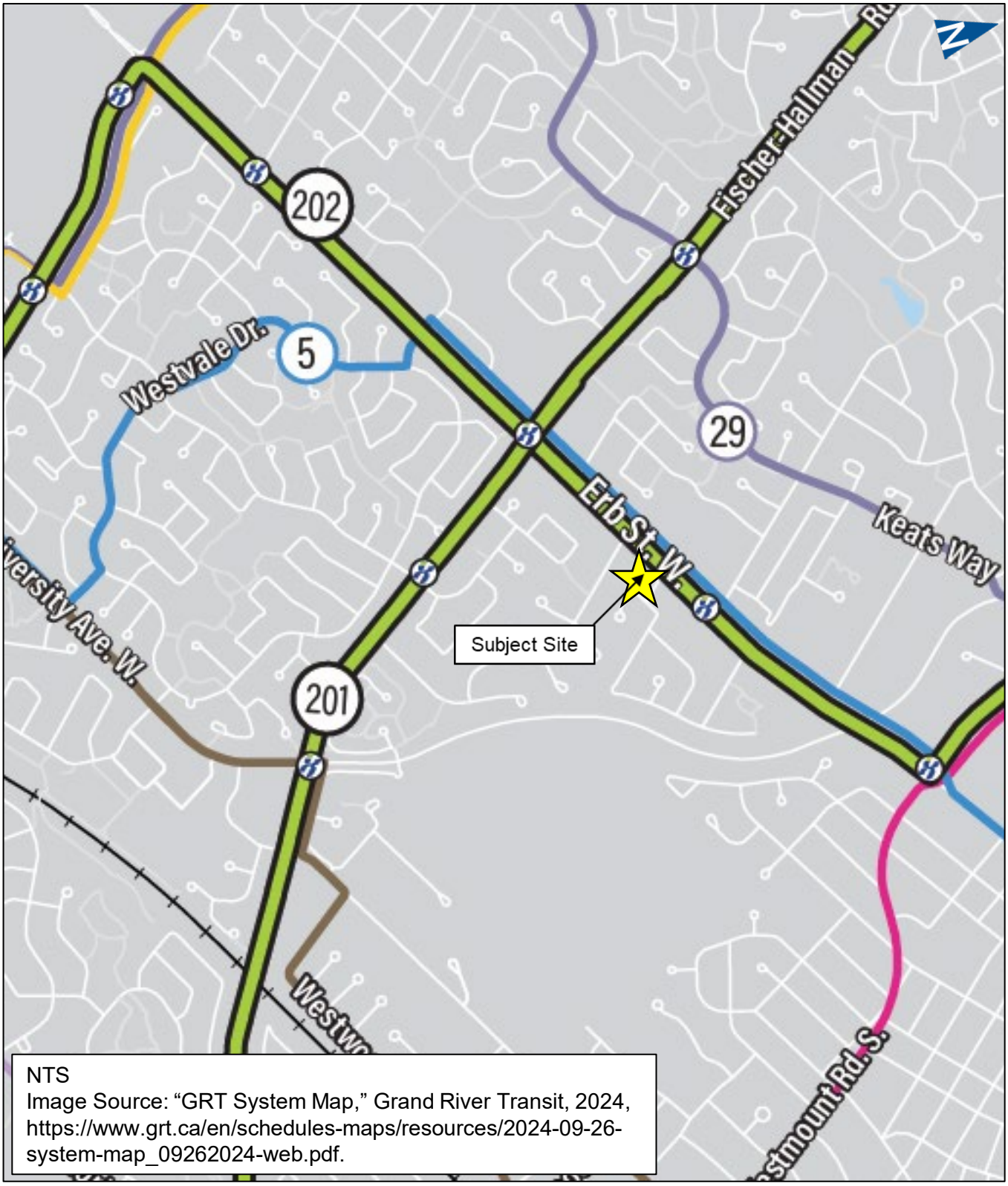
[6] City of Waterloo, *Transportation Master Plan 2020 Update, Vol. 2 Active Transportation Strategy*, (Kitchener: Region of Waterloo, 2021), 130.

TABLE 2.1: TRANSIT SERVICES IN STUDY AREA

Route	Direction	Weekday	Saturday	Sunday	Headways
Grand River Transit – Erb and Fisher-Hallman					
5 (Erb)[1]	East	05:47 – 23:47	06:48 – 23:48	09:53 – 18:08	Weekday: 30 to 40 mins Weekend: 30 to 60 mins
	West	06:03 – 00:10 (next day)	06:35 – 23:37	10:16 – 17:47	
202 (iXpress University)[2]	East	05:56 – 23:51 (next day)	06:22 – 23:52 (next day)	07:22 – 23:52 (next day)	Weekday: 10 to 30 mins Weekend: 30 mins
	West	06:31 – 00:03 (next day)	07:33 – 00:33 (next day)	08:03 – 00:33 (next day)	

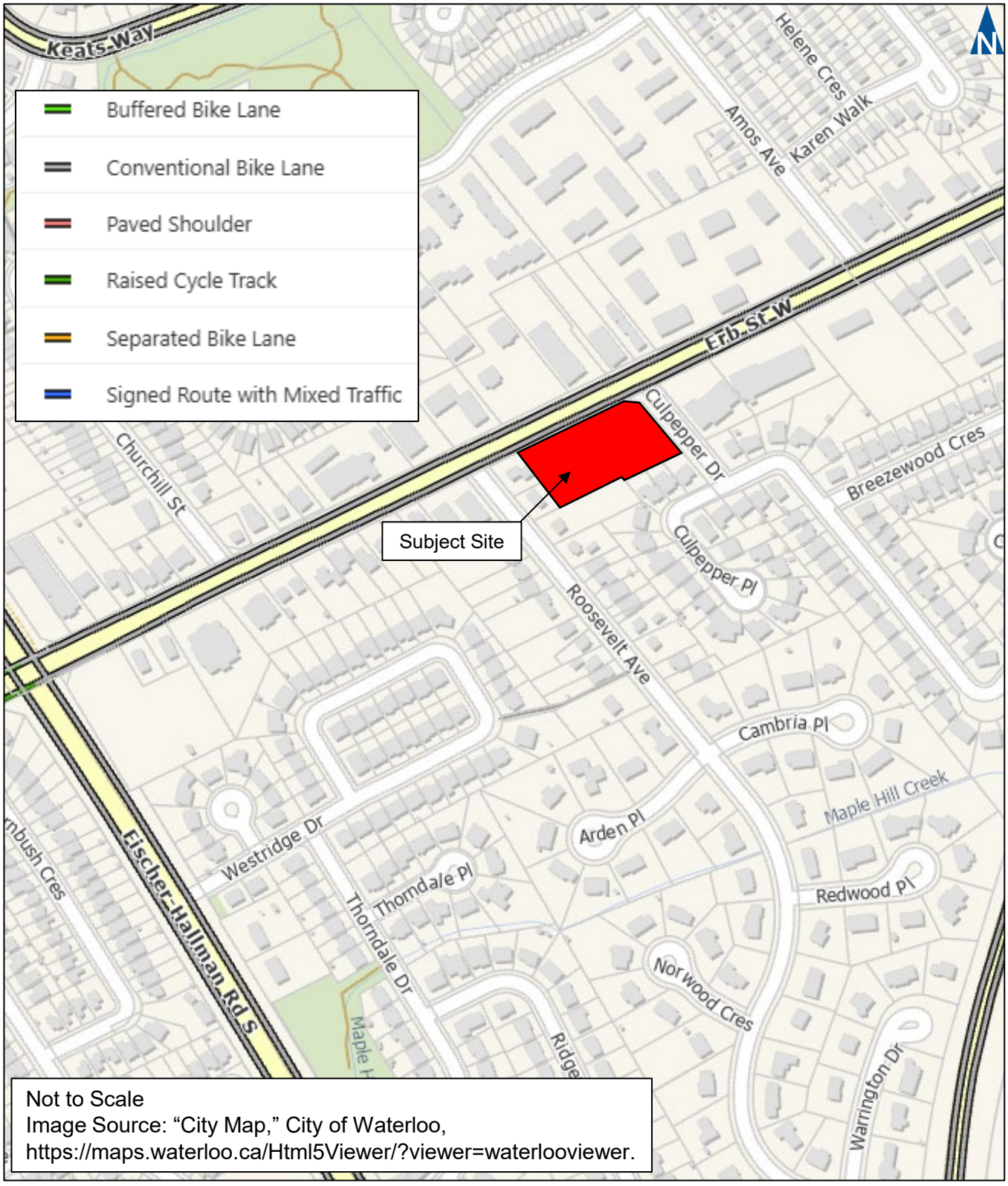
Notes

1. Based on GRT schedule effective September 2, 2024.
2. Based on GR schedule effective January 6, 2025



NTS
Image Source: "GRT System Map," Grand River Transit, 2024, https://www.grt.ca/en/schedules-maps/resources/2024-09-26-system-map_09262024-web.pdf.

Existing Transit Services



Existing Cycling Network

359-369 Erb Street West TIS PS ACR
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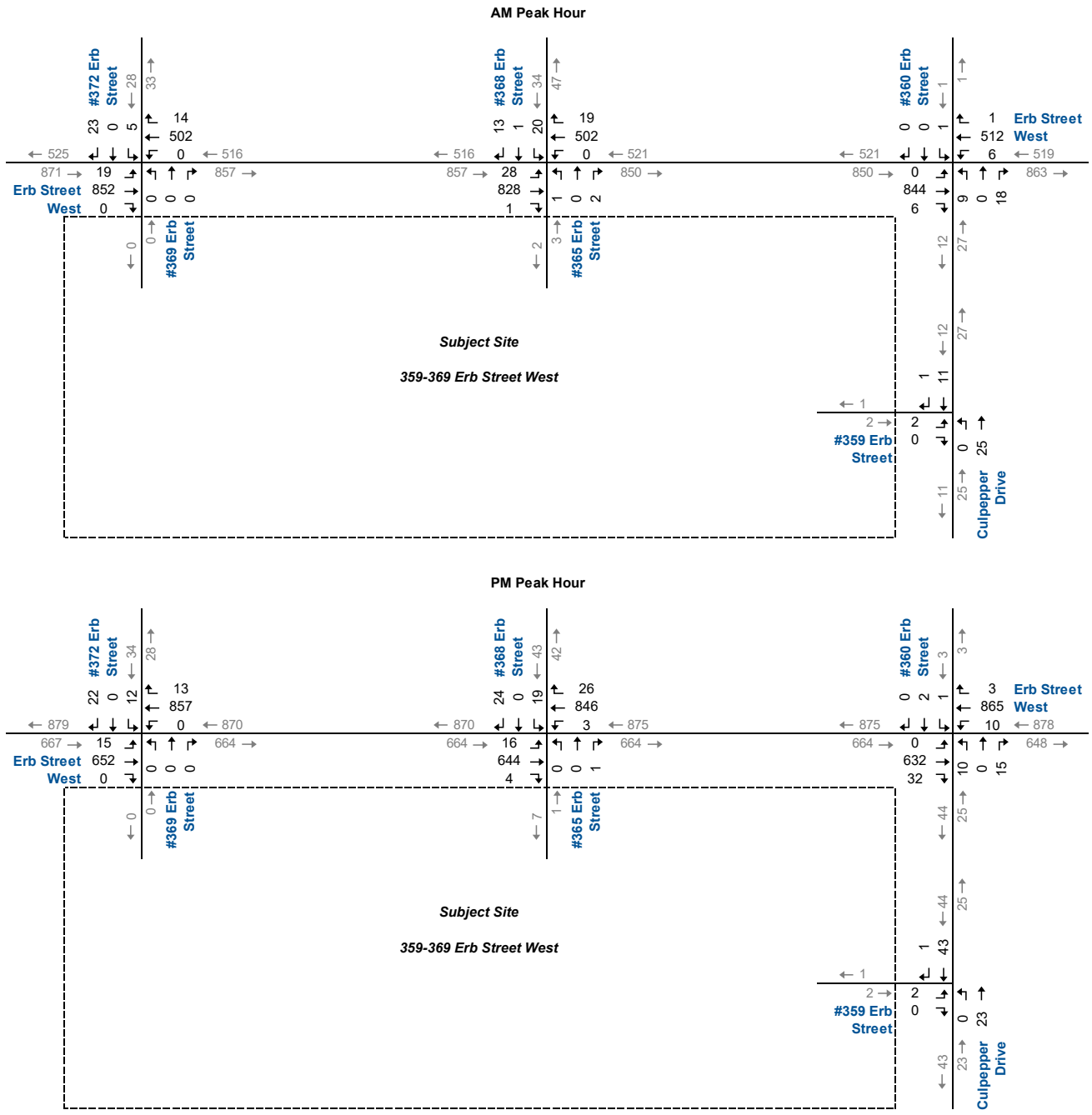
Figure 2.3

2.4 Traffic Volumes

To assess intersection operations, turning movement counts (TMCs) are used to quantify the movement of vehicles through an intersection. Existing traffic data at an intersection or on a road section forms the foundation for the operational analyses. The TMCs are usually conducted in such a manner to identify the peak periods at an intersection. This ensures the level of service analyses is conducted under an intersection's worst-case operating conditions.

Paradigm conducted turning movement counts at Erb Street West and Culpepper Drive on Wednesday, May 29, 2024, from 7:30 AM to 10:30 AM, noon to 2:00 PM, and 3:00 PM to 6:00 PM. Turning movements counts were also conducted on the same day, and over the same time periods, for the two existing driveway connections to Erb Street West, and the one existing driveway connection to Culpepper Drive. **Appendix B** contains the raw turning movement count data.

Figure 2.4 illustrates the existing traffic volumes in the weekday AM peak hour and PM peak hour. Traffic volumes between intersections have been balanced despite minor variations in the respective AM peak hour and/or PM peak hour of each intersection.



Existing Traffic Volumes

2.5 Traffic Operations

The quality of intersection operations at signalized and unsignalized intersections is evaluated in terms of level of service (LOS) and volume-to-capacity (v/c) as defined by the Highway Capacity Manual (HCM). LOS is evaluated based on the average control delay per vehicle and includes deceleration delay, queue move-up delay, stopped delay, and final acceleration delay. Volume-to-capacity is calculated as the ratio of the total vehicular demand for each movement as compared to the theoretical capacity for each movement.

For signalized intersections, LOS ranges from LOS A (less than 10 seconds of average delay) to LOS F (greater than 80 seconds of average delay). For unsignalized intersections, LOS ranges from LOS A (less than 10 seconds of average delay) to LOS F (greater than 50 seconds of average delay). Capacity is evaluated in terms of the ratio of demand flow to theoretical capacity, with an at capacity condition represented by a v/c ratio of 1.00 (that is, volume demand equals capacity).

The Region of Waterloo *Transportation Impact Study Guidelines* define critical intersections as those where the average control delay per vehicle is greater than 55 seconds for signalized intersections, or 35 seconds for unsignalized intersections. Both delays correspond to LOS E.[7]

Critical movements, regardless of intersection control type, are defined as those where:

- The average control delay for an individual movement is greater than 55 seconds;
- The estimated 95th percentile queue length for an exclusive movement exceeds the available lane storage;
- The estimated 95th percentile queue length for an individual movement blocks an existing access;
- Exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes; and/or
- Poor quality of service for non-auto modes.[8]

Operations of the study intersections have been modelled and analyzed using Synchro 11, which implements the methodologies of

[7] Region of Waterloo, *Transportation Impact Study Guidelines,* (Kitchener: Region of Waterloo, 2014), 12.

[8] Region of Waterloo, *Transportation Impact Study Guidelines,* (Kitchener: Region of Waterloo, 2014), 12.

the Highway Capacity Manual (HCM). The model reflects the following parameters:

- Existing lane geometry and traffic control;
- Saturation flow rates and peak hour factors as defined in the Region of Waterloo *Transportation Impact Study Requirements for Capacity Analysis, Roundabouts, and Signal Warrants*;[9]
- Heavy vehicle percentages, and pedestrian volumes, as extracted from the turning movement counts; and
- Synchro default values for all other inputs.

The analysis considers three separate measures of performance:

- The level of service (LOS) and average delay for each turning movement, measured in seconds (s);
- The volume to capacity (v/c) ratio for each movement; and
- The 95th percentile queue length, in metres (m).

Table 2.2 summarizes the estimated existing traffic operations and indicates the study intersections are operating at acceptable levels of service during both the weekday AM peak hour and weekday PM peak hour. There are no critical movements. **Appendix C** contains the detailed Synchro reports.

[9] Region of Waterloo, *Transportation Impact Studies (TIS), Requirements for Capacity Analysis, Roundabouts, Signal Warrants*, (Kitchener: Region of Waterloo, n.d.).

TABLE 2.2: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	369 Erb Street/372 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	A	>	**A**	<	B	>	**B**	
			Delay	8	0	0	**0**	0	0	0	**0**	<	0	>	**0**	<	13	>	**13**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.06	>		
			Q	1	0	0		0	0	0		<	0	>		<	2	>		
	365 Erb Street/368 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	C	>	**C**	<	C	>	**C**	
			Delay	9	0	0	**0**	0	0	0	**0**	<	18	>	**18**	<	21	>	**21**	
			V/C	0.03	0.00	0.00		0.00	0.00	0.00		<	0.01	>		<	0.13	>		
			Q	1	0	0		0	0	0		<	0	>		<	3	>		
	Culpepper Drive/360 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	B	A	A	**A**	<	C	>	**C**	<	C	>	**C**	
			Delay	0	0	0	**0**	10	0	0	**0**	<	18	>	**18**	<	23	>	**23**	
			V/C	0.00	0.00	0.00		0.01	0.00	0.00		<	0.09	>		<	0.01	>		
			Q	0	0	0		0	0	0		<	2	>		<	0	>		
	Culpepper Drive & 359 Erb Street	TWSC	LOS	A		>	**A**					A	A		**A**		A	A	**A**	
			Delay	9		>	**9**					0	0		**0**		0	0	**0**	
			V/C	0.00		>						0.00	0.00				0.00	0.00		
			Q	0		>						0	0				0	0		
PM Peak Hour	369 Erb Street/372 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	A	>	**A**	<	C	>	**C**	
			Delay	10	0	0	**0**	0	0	0	**0**	<	0	>	**0**	<	21	>	**21**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.13	>		
			Q	1	0	0		0	0	0		<	0	>		<	3	>		
	365 Erb Street/368 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	B	>	**B**	<	D	>	**D**	
			Delay	10	0	0	**0**	9	0	0	**0**	<	11	>	**11**	<	25	>	**25**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.19	>		
			Q	1	0	0		0	0	0		<	0	>		<	5	>		
	Culpepper Drive/360 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	C	>	**C**	<	E	>	**E**	
			Delay	0	0	0	**0**	9	0	0	**0**	<	19	>	**19**	<	40	>	**40**	
			V/C	0.00	0.00	0.00		0.01	0.00	0.00		<	0.09	>		<	0.03	>		
			Q	0	0	0		0	0	0		<	2	>		<	1	>		
	Culpepper Drive & 359 Erb Street	TWSC	LOS	A		>	**A**					A	A		**A**		A	A	**A**	
			Delay	9		>	**9**					0	0		**0**		0	0	**0**	
			V/C	0.00		>						0.00	0.00				0.00	0.00		
			Q	0		>						0	0				0	0		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

3 Site Description and Development Concept

3.1 Site Description

The subject lands are on the southwest corner of Erb Street West and Culpepper Drive. They comprise four individual land parcels each of which is occupied by a multi-storey apartment building. Vehicle access to each parcel, except 359 Erb Street West, is provided by individual all-moves driveway connections to Erb Street West. Access to 359 Erb Street West is provided by an all-moves driveway connection to Culpepper Drive. All existing land uses, and driveway connections, will be removed to facilitate redevelopment.

3.2 Redevelopment Concept

Redevelopment of the site proposes two connected eight-storey residential buildings, comprising 224 units combined. Vehicle access is proposed via one all-moves driveway connection to Erb Street West (herein referred to as Driveway A) and a driveway connection to Culpepper Drive (herein referred to as Driveway B supporting right-turns in and left-turns out. Build-out is anticipated to be complete by 2027 in one-phase; however, this is subject to market conditions. **Figure 3.1** illustrates the conceptual site plan.

3.3 Site Circulation Review

The analysis of on-site vehicle circulation reflects two design vehicles: a Transportation Association of Canada[10] (TAC) Heavy Single Unit (HSU) and a TAC Pumper Fire Truck. **Appendix D** contains the vehicle maneuvering diagrams.

The assessment indicates that both design vehicles can enter the site via the Culpepper Drive connection but cannot turn around within the site and must exit onto by Culpepper Drive by reversing out of the site.

To accommodate a garbage collection vehicle's restricted on-site movement, it is recommended the garbage collection area(s) be placed along the site's southern drive aisle connecting to Culpepper Drive. If fire services are needed, the Pumper Fire Truck also has the option of parking on street along the site's frontages facing Erb Street West and Culpepper Drive.

[10] Transportation Association of Canada, *Geometric Design Guide for Canadian Roads,* (Ottawa: TAC, 2017).



SITE DATA

SITE DATA	REQUIRED	PROPOSED
ZONING	RMU20	RMU20
LOT AREA (m²)	-	5882
LOT FRONTAGE (m)	20	102.6
LANDSCAPE AREA (%)	30	1564m2, 27%
TOTAL GFA (m²)	--	13,913
BUILDING HEIGHT (m)	+-20 (6 storeys)	+-25 (8 storeys)
AMENITY SPACE(m²)	687	3837.1
NUMBER OF RES. UNITS	--	224
NUMBER OF BEDROOMS	max.264 (450/ha)	293
NUMBER OF AFF. UNITS	--	23

PARKING DATA

SITE DATA	REQUIRED	PROPOSED
TOTAL NUMBER OF PARKING SPACES	313	RESIDENT: 207 (0.92/UNIT) VISITOR: 23 (0.1/UNIT) TOTAL: 230
BICYCLE STALS A (0.3/units) B (0.3/units)	class A 70 class B 70	152

paradigm TRANSPORTATION SOLUTIONS LIMITED

Conceptual Site Plan

4 Future Conditions

4.1 Forecast Background Traffic

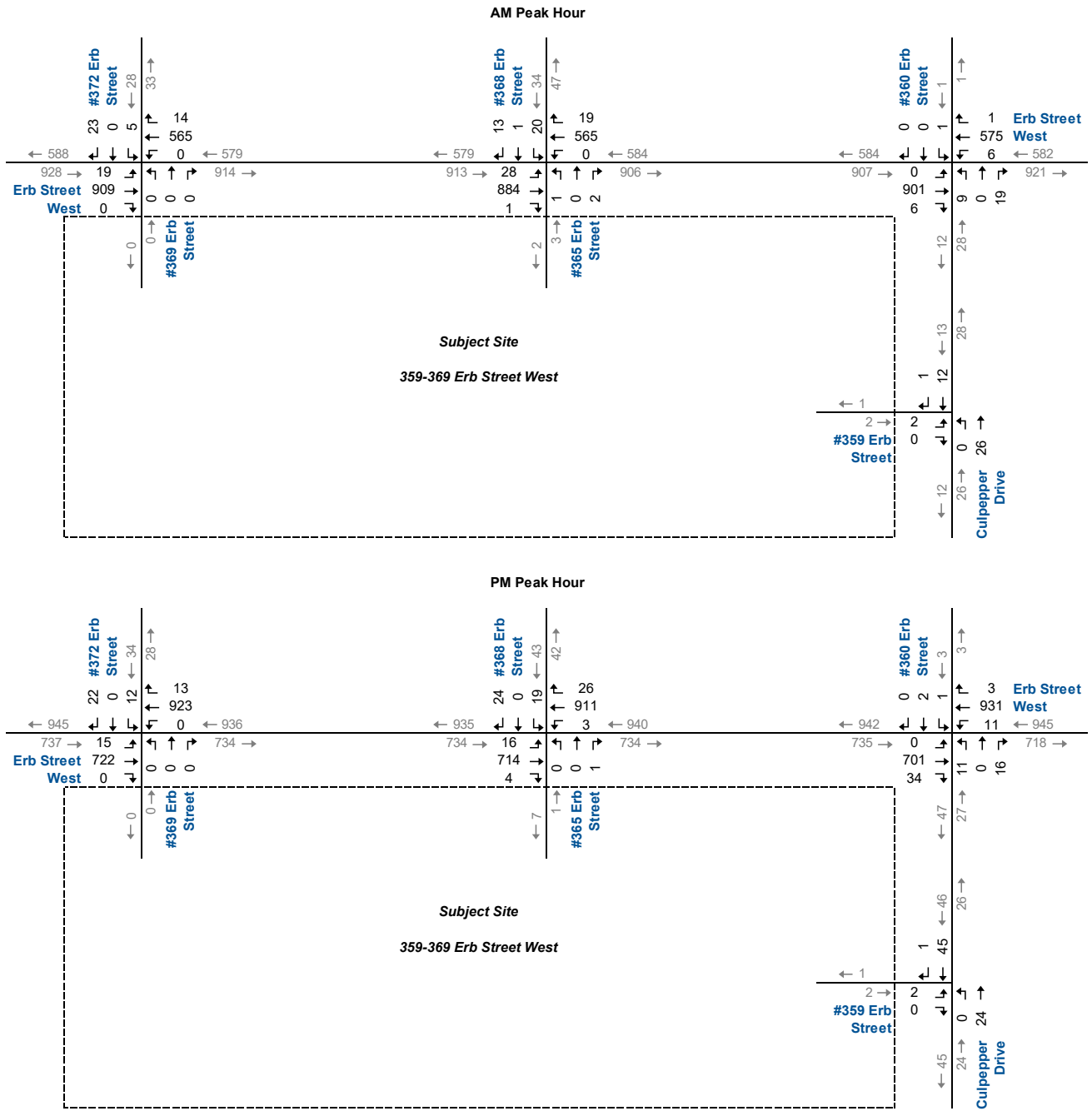
The assessment of the future traffic conditions reflects an analysis year of 2029, representative of five years from the date of this study. Future background traffic volumes reflect an annual growth rate of 1.0% per annum applied to the existing volumes on Erb Street West, as directed by region and city transportation planning staff during pre-study consultation. This growth rate has not been applied to existing traffic leaving or accessing the subject lands, or volumes on Culpepper Drive.

The background traffic volume estimates also include traffic estimated to be generated by two background developments, both of which were identified by city staff during pre-study consultation:

- 6-14 Dietz Avenue North: This residential development is east of the subject site on the east side of Dietz Avenue North, north of Erb Street West. The development is forecast to generate 37 trips in the weekday AM peak hour and 43 trips in the weekday PM peak hour;[11]
- 50 Westmount Road (Phases One and Two): This residential development is east of the subject on the east side of Westmount Road, north of Erb Street West. The development is forecast to generate 89 trips in the weekday AM peak hour and 106 trips in the weekday PM peak hour.

Appendix E contains the background development traffic volumes. **Figure 4.1** illustrates the estimated future background traffic volumes at the 2029 horizon year including the site-generated traffic volumes from the above noted background developments.

[11] Paradigm Transportation Solutions Limited, *6-14 Dietz Avenue North, Waterloo, ON – Residential Development Trip Generation Letter and Parking Study – Comment Response,* (Cambridge: PTSL, 2024).



2029 Background Traffic Volumes

4.2 Forecast Site Traffic

4.2.1 Trip Generation

The estimated site trip generation is based on trip generation data published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* for land use code (LUC) 221 (Multifamily Housing, Mid-Rise).[12] LUC 221 is described as "apartments and condominiums located in a building that has between four and ten floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways."

The estimated trip generation for the redevelopment is based on the fitted curve (regression) equations for LUC 221 following the methodology in the ITE *Trip Generation Handbook*.[13] **Appendix F** contains the ITE trip generation worksheets extracted from the *Trip Generation Manual*.

Table 4.1 summarizes the estimated trip generation based on the number of units. The site is forecast to generate 87 trips in the weekday AM peak hour and 88 trips in the weekday PM peak hour.

TABLE 4.1: ESTIMATED TRIP GENERATION

LUC	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
221	224	20	67	87	53	35	88

Notes:

1. T = 0.44(X) – 11.61, (23% entering, 77% exiting)
2. T = 0.39(X) + 0.34, (61% entering, 39% exiting)

4.2.2 Trip Distribution and Assignment

The estimated trip distribution is based on the existing travel patterns observed from the TMC data collected for this study. The use of existing traffic patterns is considered appropriate because the lands surrounding the subject site are also primarily residential. **Table 4.2** summarizes the estimated trip distribution.

[12] Institute of Transportation Engineers, *Trip Generation Manual*, 11th ed., (Washington, DC: ITE, 2021).

[13] Institute of Transportation Engineers, *Trip Generation Handbook*, 3rd ed., (Washington, DC: ITE, 2017).

TABLE 4.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
East via Erb Street West	37%	62%	57%	42%
West via Erb Street West	63%	38%	43%	58%
Total	**100%**	**100%**	**100%**	**100%**

The trip assignment does not include the assignment of any site trips to and from the south via Culpepper Drive because the use of this route only provides one additional indirect access to Erb Street West via an unsignalized intersection with Mulberry Lane. Use of Culpepper Drive south of the site does not provide connectivity to any other part of the regional road network, such as University Avenue. There is also limited incentive for site traffic to use Mulberry Lane to connect to Erb Street because that intersection is also unsignalized (just like Culpepper Drive).

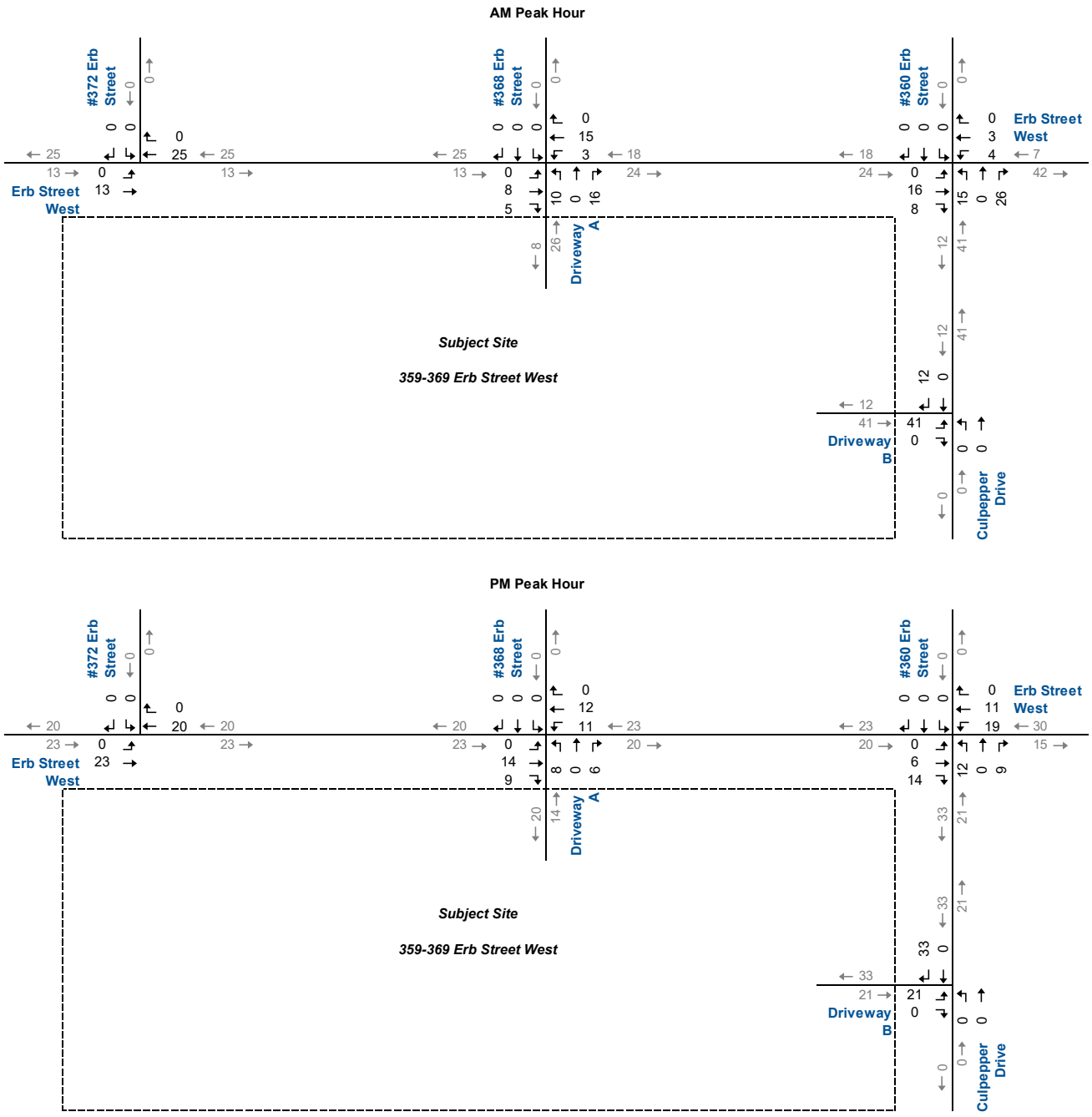
The assignment of site traffic to each driveway connection reflects the percentage of parking spaces served by each connection. **Figure 4.2** illustrates the site-generated traffic assignments for the entire site in the weekday AM peak hour, and weekday PM peak hour.

Although the trip assignment reflects the proposed right-in/left-out configuration of the Culpepper Drive driveway, it is recommended that the Culpepper Drive access support all movements by design because specialized vehicles (for example mail or delivery services) may need to enter the site from the south. These trips are expected to be infrequent in nature, and the provision of a full-moves connection would not be expected to encourage site traffic to and from the south.

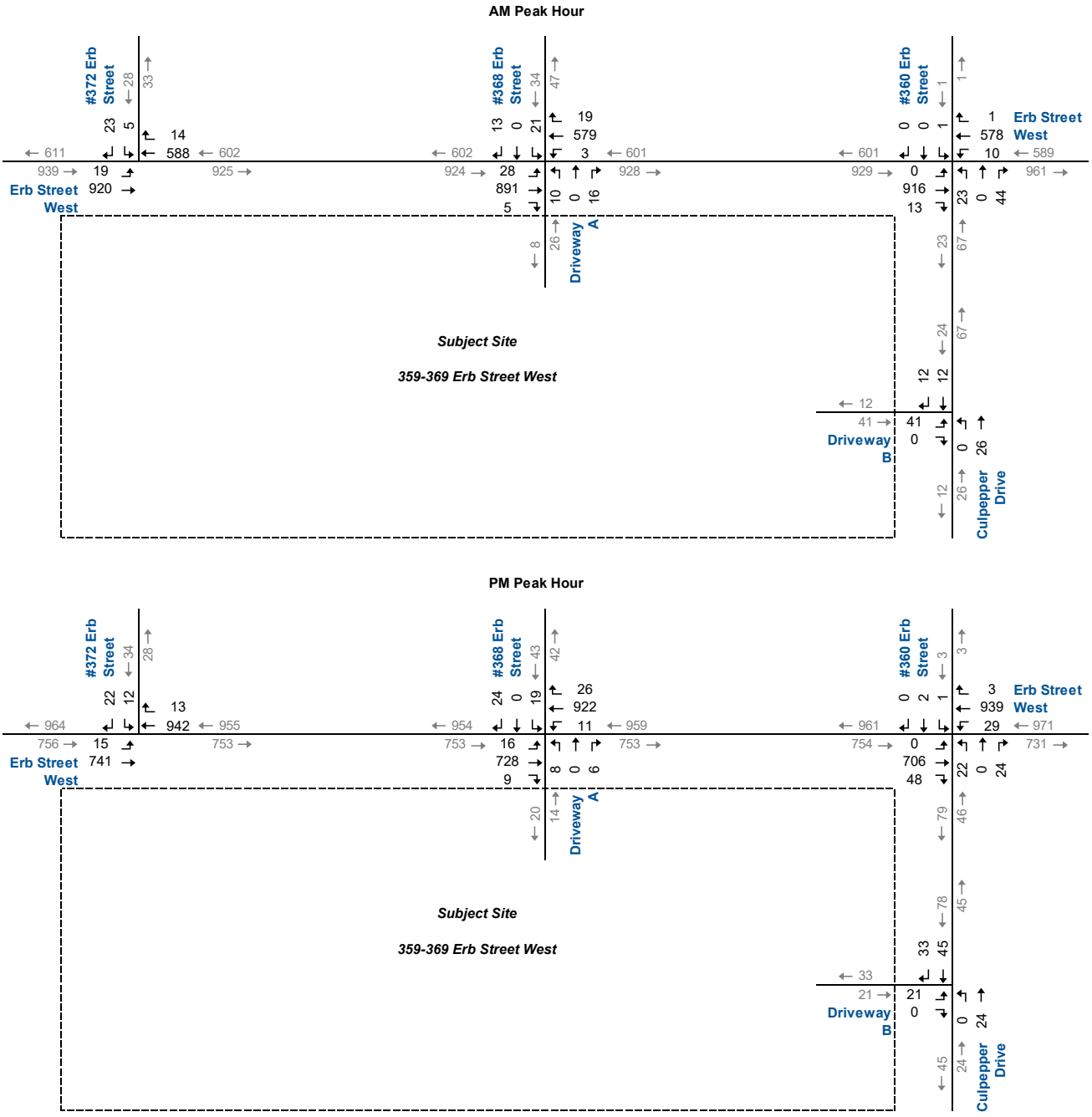
4.3 Future Total Traffic

The future total traffic volumes represent the summation of the site generated traffic volumes (illustrated in **Figure 4.2**) and the background traffic volumes (illustrated in **Figure 4.1**). The future total traffic volumes also include the removal of existing traffic accessing the subject lands. **Figure 4.3** illustrates the estimated future total traffic volumes at the 2029 horizon year.





Site-Generated Traffic Volumes



2029 Total Traffic Volumes

5 Traffic Operations Assessment

5.1 Background Traffic Operations

Analysis of background traffic conditions uses the same methodology as existing traffic conditions. **Table 5.1** summarizes the 2029 background traffic level of service conditions and indicates the study intersections are forecast to operate at acceptable levels of service, and within capacity, during the weekday AM peak hour and weekday PM peak hour. No critical movements are forecast at any of the study intersections. **Appendix G** contains the detailed Synchro reports.

5.2 Total Traffic Operations

Analysis of total traffic conditions uses the same methodology as existing and background traffic conditions. **Table 5.2** summarizes the 2029 total traffic level of service conditions and indicates the study intersections are forecast to operate at acceptable levels of service in the weekday AM peak hour and the weekday PM peak hour.

In the PM peak hour, the southbound approach at Erb Street West and Culpepper Drive is forecast to operate with a delay of 55 seconds. This is equal to the minimum delay threshold identified as critical in the Region of Waterloo *TIS Guidelines*; however, the *TIS Guidelines* only consider a movement critical where the delay is greater than 55 seconds (that is, equal to or greater than 56 seconds). While the delay is approaching the critical threshold, the v/c ratio is forecast at 0.04, indicating delays are primarily driven by the volume of traffic on Erb Street West which provide limited gaps for side-street traffic to enter Erb Street West.

With the addition of the site generated traffic volumes, the approach delays at the study area intersections (except for the driveway connection to Erb Street West) are forecast to increase by no more than 17 seconds during either of the weekday AM peak hour or the weekday PM peak hour. Both site driveway connections are forecast to operate at acceptable levels of service (LOS D or better) and within capacity. **Appendix H** contains the detailed Synchro reports.



TABLE 5.1: 2029 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	369 Erb Street/372 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	A	>	**A**	<	B	>	**B**	
			Delay	9	0	0	**0**	0	0	0	**0**	<	0	>	**0**	<	13	>	**13**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.06	>		
			Q	1	0	0		0	0	0		<	0	>		<	2	>		
	365 Erb Street/368 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	C	>	**C**	<	C	>	**C**	
			Delay	9	0	0	**0**	0	0	0	**0**	<	19	>	**19**	<	24	>	**24**	
			V/C	0.03	0.00	0.00		0.00	0.00	0.00		<	0.01	>		<	0.15	>		
			Q	1	0	0		0	0	0		<	0	>		<	4	>		
	Culpepper Drive/360 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	B	A	A	**A**	<	C	>	**C**	<	D	>	**D**	
			Delay	0	0	0	**0**	11	0	0	**0**	<	20	>	**20**	<	26	>	**26**	
			V/C	0.00	0.00	0.00		0.01	0.00	0.00		<	0.10	>		<	0.01	>		
			Q	0	0	0		0	0	0		<	2	>		<	0	>		
	Culpepper Drive & 359 Erb Street	TWSC	LOS	A		>	**A**					A	A		**A**		A	A	**A**	
			Delay	9		>	**9**					0	0		**0**		0	0	**0**	
			V/C	0.00		>						0.00	0.00				0.00	0.00		
			Q	0		>						0	0				0	0		
PM Peak Hour	369 Erb Street/372 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	A	>	**A**	<	C	>	**C**	
			Delay	10	0	0	**0**	0	0	0	**0**	<	0	>	**0**	<	23	>	**23**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.15	>		
			Q	1	0	0		0	0	0		<	0	>		<	4	>		
	365 Erb Street/368 Erb Street & Erb Street West	TWSC	LOS	B	A	A	**A**	A	A	A	**A**	<	B	>	**B**	<	D	>	**D**	
			Delay	10	0	0	**0**	9	0	0	**0**	<	11	>	**11**	<	29	>	**29**	
			V/C	0.02	0.00	0.00		0.00	0.00	0.00		<	0.00	>		<	0.23	>		
			Q	1	0	0		0	0	0		<	0	>		<	6	>		
	Culpepper Drive/360 Erb Street & Erb Street West	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	<	C	>	**C**	<	E	>	**E**	
			Delay	0	0	0	**0**	9	0	0	**0**	<	22	>	**22**	<	49	>	**49**	
			V/C	0.00	0.00	0.00		0.01	0.00	0.00		<	0.11	>		<	0.04	>		
			Q	0	0	0		0	0	0		<	3	>		<	1	>		
	Culpepper Drive & 359 Erb Street	TWSC	LOS	A		>	**A**					A	A		**A**		A	A	**A**	
			Delay	9		>	**9**					0	0		**0**		0	0	**0**	
			V/C	0.00		>						0.00	0.00				0.00	0.00		
			Q	0		>						0	0				0	0		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

TABLE 5.2: 2029 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Erb Street West & 372 Erb Street	TWSC	LOS	A	A		A		A	A	A					B		>	B	
			Delay	9	0		0		0	0	0					13		>	13	
			V/C	0.02	0.00				0.00	0.00						0.06		>		
			Q	1	0				0	0						2		>		
	Erb Street West & 368 Erb Street/Driveway A	TWSC	LOS	A	A	A	A	A	A	A	A	<	C	>	C	<	C	>	C	
			Delay	9	0	0	0	10	0	0	0	<	23	>	23	<	25	>	25	
			V/C	0.03	0.00	0.00		0.00	0.00	0.00		<	0.11	>		<	0.16	>		
			Q	1	0	0		0	0	0		<	3	>		<	4	>		
	Erb Street West & Culpepper Drive/360 Erb Street &	TWSC	LOS	A	A	A	A	B	A	A	A	<	C	>	C	<	D	>	D	
			Delay	0	0	0	0	11	0	0	0	<	25	>	25	<	28	>	28	
			V/C	0.00	0.00	0.00		0.02	0.00	0.00		<	0.27	>		<	0.01	>		
			Q	0	0	0		0	0	0		<	8	>		<	0	>		
	Culpepper Drive & Driveway B	TWSC	LOS	A		>	A					A	A		A		A	A	A	
			Delay	9		>	9					0	0		0		0	0	0	
			V/C	0.04		>						0.00	0.00				0.00	0.00		
			Q	1		>						0	0				0	0		
PM Peak Hour	Erb Street West & 372 Erb Street	TWSC	LOS	B	A		A		A	A	A					C		>	C	
			Delay	10	0		0		0	0	0					21		>	21	
			V/C	0.02	0.00				0.00	0.00						0.13		>		
			Q	1	0				0	0						3		>		
	Erb Street West & 368 Erb Street/Driveway A	TWSC	LOS	B	A	A	A	A	A	A	A	<	D	>	D	<	D	>	D	
			Delay	10	0	0	0	9	0	0	0	<	28	>	28	<	31	>	31	
			V/C	0.02	0.00	0.00		0.01	0.00	0.00		<	0.08	>		<	0.24	>		
			Q	1	0	0		0	0	0		<	2	>		<	7	>		
	Erb Street West & Culpepper Drive/360 Erb Street &	TWSC	LOS	A	A	A	A	A	A	A	A	<	D	>	D	<	F	>	F	
			Delay	0	0	0	0	10	0	0	1	<	30	>	30	<	55	>	55	
			V/C	0.00	0.00	0.00		0.04	0.00	0.00		<	0.24	>		<	0.04	>		
			Q	0	0	0		1	0	0		<	7	>		<	1	>		
	Culpepper Drive & Driveway B	TWSC	LOS	A		>	A					A	A		A		A	A	A	
			Delay	9		>	9					0	0		0		0	0	0	
			V/C	0.02		>						0.00	0.00				0.00	0.00		
			Q	1		>						0	0				0	0		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

5.3 Sensitivity Analysis

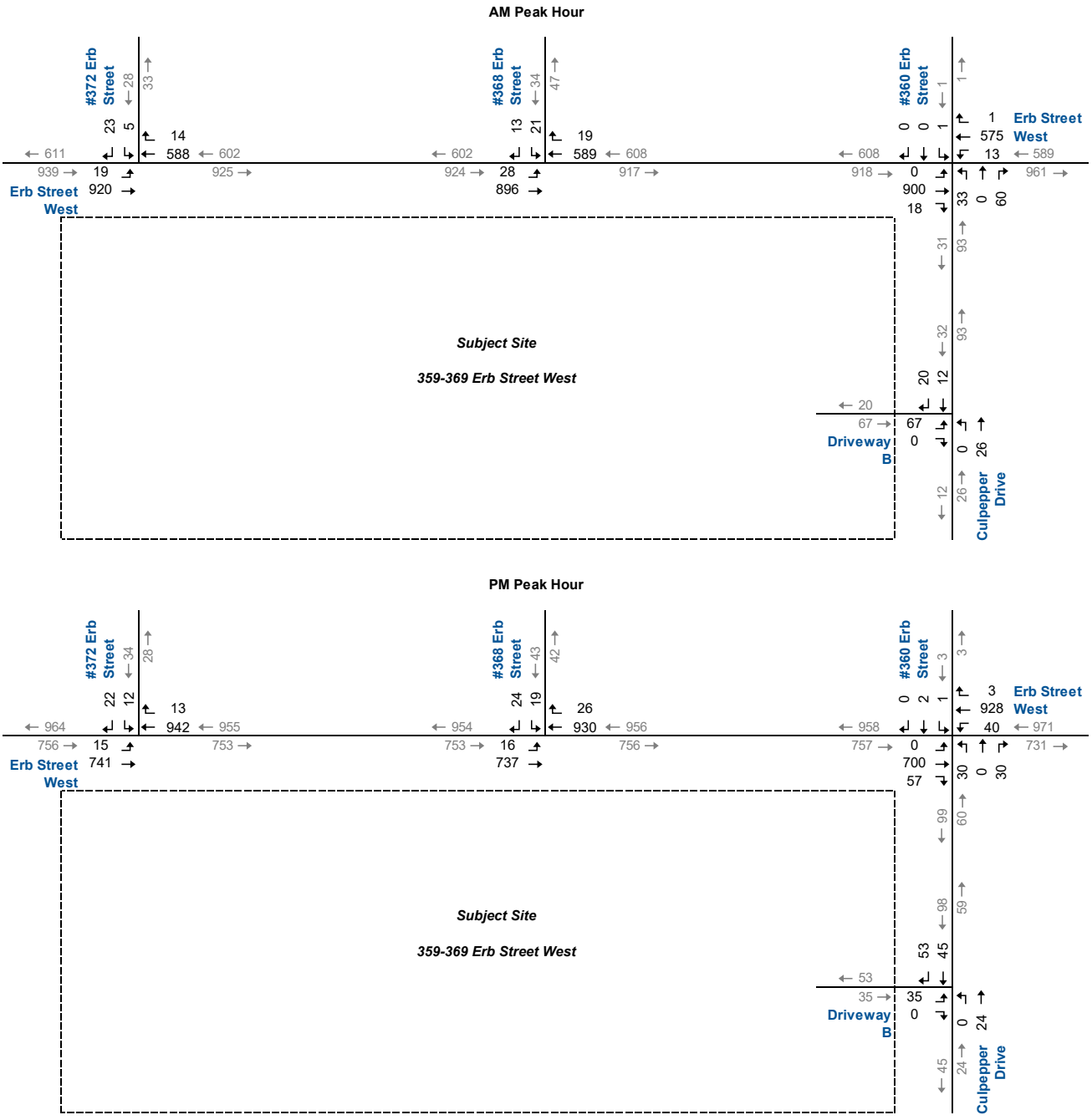
During pre-study consultation, Region of Waterloo transportation planning staff requested an analysis of future total conditions where access to the site is provided only by an all-moves driveway connection to Culpepper Drive. There would be no driveway connection onto Erb Street West.

Figure 5.1 illustrates the 2029 total traffic volumes with only one site access. **Table 5.3** summarizes the 2029 total traffic level of service conditions with only one site access to Culpepper Drive. **Appendix I** contains the detailed Synchro reports.

Providing only one site connection to Culpepper Drive, as opposed to one connection to Erb Street and one connection to Culpepper Drive, is forecast to increase delays on the northbound approach of Erb Street and Culpepper Drive. As compared to 2029 total traffic conditions with a driveway connection to Erb Street West, delays on the northbound approach are forecast to increase by three seconds in the weekday AM peak hour and five seconds in the weekday PM peak hour. All operational characteristics for the northbound approach remain within acceptable criteria based on the Region of Waterloo *TIS Guidelines*.

Despite this, the southbound approach at Erb Street West and Culpepper Drive is forecast to operate at LOS F with a delay of 57 seconds in the PM peak hour, as compared to LOS F, with a delay of 55 seconds if a connection to Erb Street West is provided. The removal of the Erb Street West driveway connection is forecast to degrade traffic operations at Erb Street West and Culpepper Drive, such that the southbound approach is considered a critical movement.

On this basis, it is recommended that site maintain two full moves accesses for the proposed development: one to Erb Street West and one to Culpepper Drive.



2029 Total Traffic Volumes (One Site Driveway)

TABLE 5.3: 2029 TOTAL TRAFFIC OPERATIONS (ONE SITE DRIVEWAY)

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Erb Street West & 372 Erb Street	TWSC	LOS	A	A		A		A	A	A					B		>	B	
			Delay	9	0		0		0	0	0					13		>	13	
			V/C	0.02	0.00				0.00	0.00						0.06		>		
			Q	1	0				0	0						2		>		
	Erb Street West & 368 Erb Street	TWSC	LOS	A	A		A		A	A	A					C		>	C	
			Delay	9	0		0		0	0	0					21		>	21	
			V/C	0.03	0.00				0.00	0.00						0.13		>		
			Q	1	0				0	0						3		>		
	Erb Street West & Culpepper Drive/360 Erb Street &	TWSC	LOS	A	A	A	A	B	A	A	A	<	D	>	D	<	D	>	D	
			Delay	0	0	0	0	11	0	0	0	<	28	>	28	<	29	>	29	
			V/C	0.00	0.00	0.00		0.02	0.00	0.00		<	0.38	>		<	0.01	>		
			Q	0	0	0		1	0	0		<	13	>		<	0	>		
	Culpepper Drive & Driveway B	TWSC	LOS	A		>	A					A	A		A		A	A	A	
			Delay	9		>	9					0	0		0		0	0	0	
			V/C	0.07		>						0.00	0.00				0.00	0.00		
			Q	2		>						0	0				0	0		
PM Peak Hour	Erb Street West & 372 Erb Street	TWSC	LOS	B	A		A		A	A	A					C		>	C	
			Delay	10	0		0		0	0	0					21		>	21	
			V/C	0.02	0.00				0.00	0.00						0.13		>		
			Q	1	0				0	0						3		>		
	Erb Street West & 368 Erb Street	TWSC	LOS	B	A		A		A	A	A					C		>	C	
			Delay	10	0		0		0	0	0					25		>	25	
			V/C	0.02	0.00				0.00	0.00						0.19		>		
			Q	1	0				0	0						5		>		
	Culpepper Drive/360 Erb Street & Erb Street West	TWSC	LOS	A	A	A	A	A	A	A	A	<	D	>	D	<	F	>	F	
			Delay	0	0	0	0	10	0	0	1	<	35	>	35	<	57	>	57	
			V/C	0.00	0.00	0.00		0.05	0.00	0.00		<	0.34	>		<	0.04	>		
			Q	0	0	0		2	0	0		<	10	>		<	1	>		
	Culpepper Drive & 359 Erb Street	TWSC	LOS	A		>	A					A	A		A		A	A	A	
			Delay	9		>	9					0	0		0		0	0	0	
			V/C	0.04		>						0.00	0.00				0.00	0.00		
			Q	1		>						0	0				0	0		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
TWSC - Two-Way Stop Control
< / > - Shared Movement

5.4 Remedial Measures

The analyses presented in **Section 5.1** through **Section 5.3** indicate the study intersections are forecast to generally operate at acceptable levels of service and within capacity with or without the proposed development. If the site operates with only one driveway connection (via Culpepper Drive), the southbound approach at Erb Street West and Culpepper Drive is forecast to operate with delays that meet critical criteria as defined in the Region of Waterloo *TIS Guidelines*.

The following subsections assess potential remedial measures to address the identified critical movements, as well as assessing the need for auxiliary turning lanes throughout the study area.

5.4.1 Left-Turn Lanes

Exclusive left-turn lanes provide a dedicated lane for left-turning vehicles to complete their movement. The Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* states that "when the number of left-turning vehicles at intersections is such that it creates a hazard and reduces capacity, consideration should be given to the provision of a separate left-turn lane."[14] TAC does not identify a specific vehicle number to constitute a volume that creates a hazard.

The Ministry of Transportation's (MTO) *Design Supplement*[15] to the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[16] contains the warrants for left-turn lanes. As noted in **Section 4.2.2** no traffic was assigned to or from the south via Culpepper Drive, therefore, the need for a northbound left-turn lane at Driveway B has not been assessed because no vehicles are assigned to this movement. The warrants reflect only the need for westbound left-turn lanes on Erb Street West at both Culpepper Drive and Driveway A.

The warrant analysis for Erb Street West reflects the nomograph for a four-lane, unsignalized intersection on an undivided road. The analyses are based on 2029 background traffic conditions and 2029 total traffic conditions (with and without the driveway connection to Erb Street West) and relies on the combination of left-turning volume and

[14] Transportation Association of Canada, "Left-Turn Lanes," chap. 9.17 in *Geometric Design Guide for Canadian Roads,* (Ottawa: TAC, 2017), 122.
[15] Ministry of Transportation, Ontario, *Design Supplement for the TAC Geometric Design Guide for Canadian Roads, Appendix 9A for Section 9.17.2.1 (Volume Warrants for Left-Turn Lanes)*, (Toronto: Queen's Printer of Ontario, 2020).
[16] Transportation Association of Canada, "Left-Turn Lanes," chap 9.17 in *Geometric Design Guide for Canadian Roads*, (Ottawa: TAC, 2017), 122-152.

opposing traffic volumes. **Appendix J** contains the left-turn lane warrants and indicates:

- A westbound left-turn lane is not warranted on Erb Street West at Driveway A under background traffic or total traffic conditions; and
- A westbound left-turn lane with 15 metres of storage is warranted on Erb Street West at Culpepper Drive under total traffic conditions, with or without a driveway connection to Erb Street West.

The provision of westbound left-turn lane on Erb Street West at Culpepper Drive within the existing road width would require either the removal of the on-road bicycle lanes, or a reallocation of lane space to fit the left-turn lane. In the absence of either of these changes, the physical distance between the curbs on Erb Street West would need to be widened to accommodate a fifth lane in the middle of the road, accommodating the left-turn lanes.

Even if a westbound left-turn lane were installed on Erb Street West, its placement is likely to affect access to properties on the north side of the road, namely 360 Erb Street West, whose driveway would be in the area of the westbound left-turn lane. This may result in driver confusion for eastbound motorists as to whether to use the westbound left-turn lane to enter this property.

As noted in **Table 5.2** and **Table 5.3** the projected volume of left-turning traffic is not forecast to reduce capacity because the four-lane cross-section on Erb Street West enables westbound through vehicles to use the adjacent curb lane to travel around a left-turning vehicle at Culpepper Drive.

While a westbound left-turn lane is warranted based on forecast traffic volumes, the operational analyses do not indicate an operational need for a left-turn lane.

5.4.2 Right-Turn Lanes

Although right-turn movements are generally made more efficiently than left-turn movements, exclusive right-turn lanes are often provided for many of the same reasons that left-turn lanes are provided.

The MTO *Geometric Design Standards for Ontario Highways* note that “right-turn lanes or tapers may be considered where right-turn volumes exceed 60 vehicles per hour (vph) and/or where right-turning vehicles

create a hazard or reduce capacity at the intersection."[17] The Transportation Association of Canada *Geometric Design Guide for Canadian Roads* suggests "the use of a right-turn auxiliary lane on urban and rural roads, when the volume of decelerating or accelerating vehicles compared to the through traffic volume causes undue hazard."[18] Again, TAC does not specify a identify a specific vehicle number that constitutes a volume that creates a hazard.

The 2029 total traffic forecasts (with or without Driveway A onto Erb Street West) do not indicate right-turn volumes greater than 60 vph for any of the following movements providing access to the site:

- Eastbound right-turn movement at Driveway A and Erb Street West;
- Southbound right-turn movement at Driveway B and Culpepper Drive; and
- Eastbound right-turn movement at the intersection of Erb Street West and Culpepper Drive.

5.4.3 Traffic Control Signal Warrant

The operational analyses in **Section 5.3** indicates the southbound approach at Erb Street West and Culpepper Drive is forecast to operate with delays equal to and greater than 55 seconds in the weekday PM peak hour. To address this critical movement and address the region's request during pre-study consultation for a review of opportunities to improve pedestrian connectivity between the transit stops on the north side of Erb Street West, Paradigm has reviewed the feasibility of traffic control signals at Erb Street West and Culpepper Drive.

The need for traffic control improvements at the intersection of Erb Street West and Culpepper Drive is based on the signal warrants published in Ontario Traffic Manual (OTM) *Book 12*.[19] To warrant the consideration for installation of traffic signal control at an existing intersection with forecast traffic volumes (average hourly volumes) at least one warrant must be fulfilled by 120%. **Appendix K** contains the signal warrant worksheets.

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[17] Ontario Ministry of Transportation, *Geometric Design Standards for Ontario Highways*, (Toronto: Queen's Printer of Ontario, 1985), E8-1.

[18] Transportation Association of Canada, "Tapers and Auxiliary Lanes," chap 9.14 in *Geometric Design Guide for Canadian Roads*, (Ottawa: TAC, 2017), 99.

[19] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals,* (Toronto: Queen's Printer for Ontario, 2012).

Table 5.4 summarizes the findings of the warrant analyses and indicates a traffic control signal is not warranted at the intersection under 2029 total traffic conditions (with or without Driveway A onto Erb Street West).

TABLE 5.4: TRAFFIC SIGNAL WARRANT SUMMARY

Horizon Year	Justification				Warranted?
	1A	1B	2A	2B	
2029 Total Conditions One Driveway	94%	23%	90%	26%	No
2029 Total Conditions Two Driveways	93%	17%	90%	20%	No

5.5 Controlled Pedestrian Crossing Warrant

Further to the analyses presented in **Section 5.4.3**, Paradigm reviewed the feasibility of dedicated pedestrian crossing facilities in lieu of a full traffic control signal at Erb Street West and Culpepper Drive. The assessment follows guidance published in OTM Book 15.[20]

OTM publishes a hierarchy of pedestrian treatment systems, ranging from full traffic signals to pedestrian signals, pedestrian crossovers (PXOs), stop and yield control intersections, and supervised school crossings. In the analysis of pedestrian crossing facilities, each treatment system is analyzed starting with full traffic signals, followed by pedestrian signals, pedestrian crossovers, and finally stop and yield control provisions.

The analysis in **Section 5.4.3** indicates that a full traffic signal is not warranted at the intersection. Therefore, Paradigm has also analyzed the feasibility of an intersection pedestrian signal (IPS) based on Justification 6 in OTM Book 12, and the feasibility of a pedestrian crossover (PXO) based on the guidance published in OTM Book 15.

Justification 6 requires a minimum eight-hour pedestrian crossing volume of 200 pedestrians. The TMC data collected in May 2024 observed 30 pedestrians crossing Erb Street West over the eight-hour count period. Even if the observed 30 pedestrians were considered assisted pedestrians (representative of 60 pedestrians), the location does not satisfy the minimum pedestrian threshold of 200

[20] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 15: Pedestrian Crossing Treatments,* (Toronto: Queen's Printer for Ontario, 2016).

pedestrians.[21] It is acknowledged that the use of existing pedestrian volumes may underestimate actual pedestrian crossing demands because of a lack of dedicated pedestrian crossing treatment (that is, pedestrian crossing volumes are low because there is no crossing facility).

The Decision Support Tool published in OTM Book 15, indicates a site may be a candidate for a pedestrian crossover (PXO) if:

- The eight-hour vehicular volume is equal to or surpasses 750 vehicles, and the eight-hour pedestrian volume crossing the major street is equal to or surpasses 100 pedestrians; or
- The four-hour vehicular volume is equal to or surpasses 395 vehicles and the four-hour pedestrian volume crossing the major street is equal to or surpasses 65 pedestrians;
- The site is less than 200 metres from another traffic control device; and
- There is a requirement for system connectivity, or the site is on a pedestrian line.

A site may also be a candidate for a PXO if there is a requirement for system connectivity and the location is more than 200 metres from another traffic control device (regardless of the vehicular or pedestrian volume). OTM Book 15 does not recommend PXOs on four-lane roads with a posted speed limit of 60 km/h where the eight-hour vehicle volume exceeds 6,000 vehicles, or the four-hour vehicle volume exceeds 3,155.

The turning movement count data collected for this study indicate:

- an eight-hour vehicular volume of approximately 9,700, and a corresponding four-hour vehicle volume of 5,475; and
- an eight-hour pedestrian crossing volume of 30 pedestrians and a four-hour pedestrian volume of 14 pedestrians.

Like the analysis for an intersection pedestrian signal, the location does not satisfy the minimum pedestrian thresholds even if all 30 eight-hour pedestrians or 14 four-hour pedestrian volumes are considered assisted pedestrians. It is acknowledged that the use of existing pedestrian volumes may underestimate actual pedestrian crossing demands because of a lack of dedicated pedestrian crossing treatment

[21] Assisted pedestrians are children under the age of 12, senior citizens, disabled pedestrians, and other persons requiring special considerations. Assisted pedestrians are counted as two pedestrians to reflect their higher vulnerability.

(that is, pedestrian crossing volumes are low because there is no crossing facility).

Despite this, the location does serve a pedestrian desire line between the transit stops on either side of Erb Street West. Because the site is approximately 200 metres from Amos Avenue, it could be considered a candidate for a PXO. However, the observed eight-hour and four-hour vehicular volumes exceed the upper bound for a PXO on a four-lane cross-section.

The existing eight-hour and four-hour vehicular volumes indicate a PXO is not recommended at this location. However, intersection pedestrian signals and full traffic control signals are also not warranted. It is recommended the Region monitor traffic and pedestrian volumes at this intersection to determine if and when an appropriate pedestrian control device, or full intersection traffic control signals may be warranted.

The reader is cautioned that the eastbound and westbound transit stops closest to the intersection of Erb Street West and Culpepper Drive only service GRT Route 5. If future residents of 359-369 Erb Street West desire access to rapid transit (GRT Route 202), the most convenient stops are at the signalized intersection of Erb Street West and Amos Avenue (approximately a three-minute walk from the subject site).

6 Transportation Demand Management Plan

Transportation Demand Management (TDM) refers to policies, programs, and initiatives that improve the efficiency of the road network and encourage the use of alternative modes of transportation. TDM programs consider how people's choices of travel mode are affected by land use patterns and composition, development design, parking availability, parking cost, and the relative cost, convenience, and availability of alternative modes of travel.

TDM strategies at a development can be divided into two basic categories: pre-occupancy and post-occupancy. Pre-occupancy strategies and initiatives are critical because they are most likely to determine how attractive, convenient, and safe alternative travel modes will be once the site is occupied. These can include such measures as secure bike parking, a lower vehicle parking supply, or safe pedestrian routes between the development and the municipal sidewalk network. In some cases, these measures affect the built form of a development and are difficult to modify after building completion.

After a development is built, incentives can be offered to encourage the use of alternative modes of transportation, but these incentives are only effective if the development and surrounding area are designed to facilitate the incentives. Post-occupancy programs and initiatives can include subsidies to use transit, the provision of rideshare programs, or disseminating information about alternative travel modes proximate to the site.

6.1 Existing Policies, Programs, and Strategies

6.1.1 Walking

Most every trip begins and ends as a walking trip. The pedestrian accessibility of a development is essential to ensure that those that can walk, have access to safe, comfortable, and well-lit pedestrian connections.

Sidewalks are provided on both sides of Erb Street West and on the east side of Culpepper Drive. The site plan (see **Figure 3.1**) also proposes a new sidewalk on the west side of Culpepper Drive connecting to the sidewalk network on Erb Street West.

The adjacent intersection of Erb Street West and Culpepper Drive is unsignalized; however, the intersection of Erb Street West and Amos Avenue is signalized and is approximately 230 metres (3-minute walk)

east of the subject site. This intersection also operates with delineated crosswalks and pedestrian signals on all approaches, providing access to the surrounding municipal sidewalk network and transit services on the north side of Erb Street West.

6.1.2 Cycling

The development is proposing 152 bicycle parking spaces, which exceeds the zoning by-law requirements for bicycle parking which requires bicycle parking at a rate of 0.6 spaces/unit (50/50 split between Type A and Type B). As noted in **Section 2.3**, Erb Street West features conventional bicycle lanes between Fisher-Hallman Road and Westmount Road South.

6.1.3 Transit

Grand River Transit (GRT) operates two surface routes near the site, both of which are accessible via existing sidewalks in the study area and the nearby signalized intersection of Erb Street West and Amos Avenue. These routes provide connectivity to the broader GRT network and key destinations within the region including shopping centres, Uptown Waterloo, and universities/colleges.

Under existing conditions, the bus stop in front of the proposed development at 359-369 Erb Street West only contains a transit pad with a sign and pole. Transit stop enhancements (such as seating and a bus stop shelter) could improve the attractiveness of transit as a mode of transportation.

As noted in **Section 5.5** traffic control improvements to support pedestrian travel may improve the attractiveness of using local transit, especially as it relates to accessing nearby transit stops. While existing pedestrian volumes and vehicular volumes do not satisfy the warrant criteria for traffic control improvements, it is recommended the Region monitor pedestrian and vehicular volumes at the intersection to determine if and when traffic control improvements are warranted.

6.2 Potential Policies, Programs, and Strategies

6.2.1 Parking Management

Parking management refers to *"various policies and programs that result in more efficient use of parking resources."*[22] They include but

[22] Victoria Transport Policy Institute, *Parking Management: Strategies, Evaluation, and Planning*, 2021.

are not limited to unbundled parking, shared parking, and parking pricing.

Unbundled parking policies separate the cost of a parking space from the lease or ownership cost of a dwelling unit. This enables those who want or need a parking space to purchase or rent the spaces they need. For residents who do not need (or do not want a parking space) unbundled parking allows them to purchase or rent a unit without the need to pay for a parking space they do not need.

The purchase or rental cost of each parking space remains unknown, however, charging for parking can help manage parking demands. By removing the provision of free parking on-site, residents can compare the cost and convenience of owning or renting a parking space(s) to that of alternative modes of transportation. Providing a “right-size” parking supply for a development can reduce the potential for unused parking spaces and the oversupply of parking spaces.

6.2.2 Car Share Program

Car sharing refers to automobile rental services intended to substitute for private vehicle ownership. It makes occasional use of a vehicle affordable while providing an incentive to minimize the use of a personal vehicle for every trip. When complemented by robust alternative transportation systems (for example, higher-order rapid transit, and safe and accessible cycling networks) car sharing programs provide travel options to households. Where car sharing services are available, some households may reduce their vehicle ownership, either shifting from two to one vehicle, or from one to zero vehicles.

By providing this type of mode share on site, lower automobile ownership rates and parking requirements can be further obtained. Residents of the building could choose to use walking, transit or cycling as their primary mode of travel and use car share as a secondary mode of travel.

Communauto[23] is offered in the city of Waterloo. Vehicles are provided at 50 Westmount Road North (Westmount Place), approximately 1.4 kilometres from the subject site. The provision of car share spaces closer to the site, or on-site would allow residents of the development and surrounding community who normally would not need a vehicle for their daily activities to be comfortable with the decision to reduce their overall vehicle ownership rate or forgo owning a vehicle altogether.

[23] “How It Works,” Communauto, 2024, https://ontario.communauto.com/how-it-works/.

6.2.3 Travel Planning/Education/Promotion

Increasing awareness of sustainable transportation opportunities for residents and visitors of the subject site can increase the use of these alternate modes. This awareness can also be in combination with public agencies such as Grand River Transit.

Providing a welcome package to new residents and tenants can help support the use of alternate modes of transportation near the site. This can include information about local transit services, car share programs, or bike parking locations.

General education of all modes of transportation, including their benefits and how to make the best use of them, are a key component to TDM success. The strategies require cooperation and coordination with several partners, including transit providers, building owners, area municipalities as well as residents.

By educating about sustainable modes of travel as well as providing travel demand management tools and incentives, TDM can be further integrated within the development to promote all modes of transportation.

6.2.4 TDM Coordinator

Delegating an interested individual or hiring an individual as part of the building's staff, to act as a coordinator for the TDM measures can support the continuity and uptake of said programs.

The TDM coordinator can provide information on nearby transit, active transportation and carshare services, and administer access to secured bicycle parking. It is expected that a representative of the City of Waterloo will be available to assist a TDM coordinator to help get the programs started during the early stages of operations, if adopted by the development

6.2.5 Subsidized Transit Passes

Providing subsidized transit passes to all residents of the development for a minimum period of two years could further encourage transit as a primary mode of transportation for trips to/from the subject development.

6.3 TDM Checklist

The Region of Waterloo's TDM Checklist is included in Appendix I of the Region's *TIS Guidelines*. It calculates a score between 0 and 65 to determine if a development if TDM supportive. The score is based on

four criteria: site access, public transportation access, parking, and trip reduction incentives. A minimum score of 24 is required to be considered a TDM Supportive development.

Appendix L contains the completed TDM Checklist, indicating that the site is considered a TDM supportive development with a score of 38.

6.4 TDM Summary

The site's location on Erb Street West places it proximate to transit services operated by GRT. Erb Street West also features on-road bicycle lanes which support the use of cycling to and from the site. Based on the existing and proposed TDM measures, the site is considered a TDM supportive development.

To further promote TDM, and the muti-modal transportation network near the site, the developer and/or building owner (as applicable) could consider:

- Providing subsidized transit passes for all residents;
- Providing transit and active transportation information in a welcome package to new residents and tenants, including the posting of this information in a central location; and
- Delegating or hiring a TDM coordinator.

7 Parking Study

7.1 Study Overview

7.1.1 Purpose and Scope

The purpose of this parking study is to review the adequacy of the proposed parking supply. The scope of this study, developed in consultation with the City of Waterloo (the City) and the Region of Waterloo (the Region) via email in May, June, and August 2024 includes:

- A description of the subject site, the property, and the proposed and required number of parking spaces;
- Estimated of the site's parking demands based on industry standard parking demand data, local auto vehicle ownership characteristics, parking demands observed at similar sites in Waterloo, and the potential for transportation demand management to alleviate overall parking demands;
- An analysis of the proposed parking supply as compared to the required parking supply; and
- The identification of remedial measures to support the proposed parking supply, if necessary.

Appendix A contains the pre-study consultation material and responses from the City in June 2024 and the Region in August 2024. This section of the report has been completed in general accordance with the City of Waterloo *Terms of Reference for Parking Study*.[24]

7.1.2 Policy Framework

The City of Waterloo *Official Plan*[25] identifies the following objectives with respect to parking:

- To plan for and/or create an appropriate amount of bicycle and vehicular parking to accommodate the intended use;
- To plan for bicycle and vehicular parking areas that are attractive and well designed and reflect consideration of safe, secure, and convenient access to all segments of the community;

[24] City of Waterloo, *Terms of Reference: Parking Study*, (Waterloo: City of Waterloo, 2023).
[25] City of Waterloo, *Official Plan Chapter 6 Transportation*, (Waterloo: City of Waterloo, 2022), 102-115.

- To ensure that parking will be efficient and environmentally sensitive in terms of design, location, and surface treatment;
- To support transit and measures relating to transportation demand management through restrictions on parking supply, where appropriate; and
- To minimize large areas of surface parking associated with higher density developments in Nodes, Corridors, and Major Transit Station Areas, where possible, and encourage the use of parking structures and/or underground parking.

Further to these objectives, subsection 5 of Section 6.6.1 identifies "encouraging walking, cycling, and transit movement as preferred modes of travel, by defining and applying through the Zoning By-law, parking standards that:

- Establish minimum and maximum vehicular parking requirements;
- Limit surface parking;
- Permit shared parking, where appropriate, as an efficient use of available parking facilities;
- Require the provision of commuter/carpool spaces to be provided in locations that provide convenient access to building entrances;
- Require the provision of bicycle parking facilities that provide for convenient access to building entrances; and/or
- Apply reduced vehicular parking requirements for development, giving consideration to access to transit, potential for shared parking, potential for small and/or micro spaces and/or other considerations that the City may deem appropriate."

7.2 Site Description and Parking Overview

7.2.1 Site Description

The subject lands are on the southwest corner of Erb Street West and Culpepper Drive. They comprise four individual land parcels each of which is occupied by a multi-storey apartment building. Vehicle access to each parcel, except 359 Erb Street West, is provided by individual all-moves driveway connections to Erb Street West. Access to 359 Erb Street West is provided by an all-moves driveway connection to Culpepper Drive. All existing land uses, and driveway connections, will be removed to facilitate redevelopment.

7.2.2 Property Description

Redevelopment of the site proposes two connected eight-storey residential buildings, comprising 224 units combined. Vehicle access is proposed via one all-moves driveway connection to Erb Street West (herein referred to as Driveway A) and a driveway connection to Culpepper Drive (herein referred to as Driveway B supporting right-turns in and left-turns out. Build-out is anticipated to be complete by 2027; however, this is subject to market conditions. **Figure 3.1** illustrates the conceptual site plan.

7.2.3 Parking Description

The site proposes 230 parking spaces (1.03 spaces per dwelling unit) comprising 207 resident spaces and 23 visitor spaces. Minimum parking requirements for off-site parking areas are defined in City of Waterloo Zoning By-law 2018-050.[26] Under zoning by-law 2018-050, the subject lands are zoned RMU-20[27] and are within Parking Area F.[28]

Under RMU-20 the following minimum parking requirements apply for Parking Area F:

- **Residential**: 1.10 parking space per dwelling unit (246.4 spaces, rounded up to 247 spaces); and
- **Visitor**: 0.10 parking spaces per dwelling unit (22.4 spaces, rounded up to 23 spaces)

A total of 270 spaces (1.20 spaces per unit) is required for the site, indicating the proposed parking supply is deficient by 40 spaces.

7.3 Estimated Parking Demand and Parking Surveys

The need for vehicular parking is directly related to the demand for vehicular parking. In locational contexts that support multi-modal transportation systems and the use of walking, cycling, or transit for some – or all – trips, vehicular parking demands are typically lower. In locational contexts where private vehicle use is a pre-requisite for travel, parking demands tend to be higher. The following sections summarize the estimated parking demand for the site based on various sources.

[26] City of Waterloo Zoning By-law 2018-050, *Section 7 – Residential Zoning Categories.*
[27] City of Waterloo Zoning By-law 2018-050, *Schedule A Zoning Map*.
[28] City of Waterloo Zoning By-law 2018-050, *Schedule A1 Parking Overlay.*

7.3.1 Auto Ownership and Mode Share

The need for parking is based in part on auto ownership rates and proximity to destinations within walking distance or access to transit. The most recent Transportation Tomorrow Survey (TTS) provides data with respect to the number of vehicles owned by private households in Waterloo Region in 2022.[29]

A review of vehicle ownership among apartment units within one kilometre of the subject site (traffic analysis zones 12024, 12025, 12030, 12031, 12035, 12038, 12098, 12100, 12101, and 12102) suggests approximately 23% of apartment household do not own a vehicle. The survey results conclude that the vehicle ownership in the surrounding area at the time of the 2022 TTS was 0.89 vehicles per apartment unit.

The use and reliance on non-auto modes is also an important consideration. A review of travel characteristics provided by the 2022 TTS for apartment dwellers living in the subject site area indicates that 38% of travel is undertaken by transit or active transportation (12% transit, 24% walk, and 4% cycle). **Appendix M** contains the TTS Data.

Applying the vehicle ownership rate to the proposed development, the potential parking demand for residents is estimated to be 200 spaces. Based on the proposed supply of 230 spaces, this would allocate 30 spaces for visitor parking demands, seven greater than required by the zoning by-law.

7.3.2 Observed Residential Parking Demands

Paradigm reviewed its internal database of residential parking surveys conducted in the city of Waterloo to identify candidate sites similar to the proposed development and estimate the on-site parking demand. **Appendix N** contains the observed proxy site parking survey data indicating all three sites achieved parking demand rates less than the parking supply of the proposed development.

<u>55 William Street East</u>

55 William Street East is an eight-storey apartment building containing 142 units. Parking is provided at a rate of 1.04 spaces per unit (147 spaces). This development has access to three ION LRT stops within 650 metres and sidewalks are provided on both sides of nearby roads.

[29] Data Management Group, *Transportation Tomorrow Survey 2022,* University of Toronto.

The site is within a more urban locational context and is intended to provide a baseline parking demand rate.

Spot counts were conducted by Paradigm on Thursday, May 30, 2024 at 6:00 AM, 7:00 AM, 8:00 AM, 8:00 PM, 9:00 PM, and 10:00 PM. The spot counts indicated a peak parking demand of 104 spaces (0.73 spaces per unit) including visitor parking.

Applying this rate to the 224 units proposed for the subject site results in a parking demand of 164 spaces.

201 Erb Street West

201 Erb Street West comprises two three-storey apartment buildings containing 47 units combined. Parking is provided at a rate of 1.09 spaces per unit (51 spaces). This development has access to three transit routes near the intersection of Westmont Road and Erb Street West (approximately 220 metres from the site) and sidewalks are provided on both sides of nearby roads. This proxy site is 1.2 kilometres east of 359-369 Erb Street West.

Spot counts were conducted by Paradigm on Tuesday, April 25, 2023 at 6:15 AM, 11:50 AM, and 9:10 PM. The spot counts indicated a peak parking demand of 32 spaces (0.68 spaces per unit), including visitor demand.

Applying this rate to the 224 units proposed for the subject site results in a parking demand of 153 spaces.

247-251 Erb Street West

247-251 Erb Street West comprises two three-storey apartment buildings containing 40 units combined. Parking is provided at a rate of 1.10 spaces per unit (44 spaces). This development has access to three transit routes near the intersection of Westmont Road and Erb Street West (approximately 190 metres from the site) and sidewalks provided on both sides of Erb Street West. This proxy site is 900 metres east of 359-369 Erb Street West.

Spot counts were conducted by Paradigm on Tuesday, April 25, 2023 at 6:15 AM, 11:50 AM, and 9:10 PM. The spot counts indicated a peak parking demand of 29 spaces (0.73 spaces per unit), including visitor demand. This demand is very similar to that at 55 William Street East, despite this site being in a more suburban context than 55 William Street East.

Applying this rate to the 224 units proposed for the subject site results in a parking demand of 164 spaces.



7.3.3 Transportation Demand Management (TDM)

The Region of Waterloo has developed a TDM Checklist to assess whether developments are planned in such a manner to support the overall objectives of the Region to increase transit use and reduce single occupant vehicle (SOV) travel. The worksheet includes calculations of potential parking reductions based on a site's context, and proposed TDM initiatives. **Chapter 6** provides a more detailed TDM Plan for the development, highlighting existing and proposed TDM policies, programs, and initiatives.

The Region of Waterloo *Parking Management Worksheet* forms part of the TDM Checklist. It calculates a maximum achievable parking reduction based on four criteria: pedestrian and cyclist orientation, public transportation access, parking, and trip reduction incentives. Depending on the site context (urban growth centre, intensification corridor, or other), the maximum achievable reduction is between 22% and 57%. The site is not within an Urban Growth Centre (UGC) or Intensification Corridor (IC).

Appendix O contains the completed Parking Management Worksheet based on information available at the time of writing. The site achieves a parking reduction of 8% based on the following TDM measures:

- Development incorporates functional building entrances that are oriented to public space (1% or 2.69 spaces);
- Continuous sidewalks (1.5 m minimum width) are provided along both sides of all adjacent public streets (1% or 2.69 spaces);
- Provision of active uses at-grade along street frontages (1% or 2.69 spaces);
- Located within 600 metres of a transit route with 15-minute headways or less (3% or 8.07 spaces); and
- The building owner/occupant agrees to charge for parking as a separate cost to occupants (2% or 5.38 spaces).

An 8% parking reduction results in a modified parking requirement of 248 spaces (1.11 spaces per unit).

If the development were to adopt the full list of TDM initiatives outlined in the Parking Management Worksheet, it could achieve a maximum reduction of 11%. In this case, 240 spaces (1.07 spaces per unit) would be required for the site.

7.4 Justification and Considerations

As noted in **Section 6.1**, the site is adjacent to two Grand River Transit (GRT) routes on Erb Street West, it is proposing an oversupply of bicycle parking spaces, and it will include pedestrian connections to the existing municipal sidewalk network. These site characteristics combined with the reduced parking supply represent an intent to provide a site that accommodates all transportation modes and balances the considerations of all users of the site.

The reduced parking supply is greater than observed parking demands at three similar sites in Waterloo, two of which are within 1.5 kilometers of 359-369 Erb Street West and comprise similar locational contexts and proximity to alternate modes of transportation. The observed peak parking demands at the proxy sites indicate the proposed parking supply of 230 spaces is sufficient to maintain a surplus of 66 spaces.

Although on-street parking is permitted on Culpepper Drive and other city streets, the city does not permit overnight parking between 2:30 AM to 6:00 AM, unless a motorist's car is registered with the city. The estimated parking demands from the proxy sites indicate a surplus of 66 spaces would be available to accommodating higher parking demands. Only after these 66 spaces are occupied, would the entire parking supply be fully utilized.

7.5 Parking Study Summary

7.5.1 Findings

The findings of this parking study are as follows:

- The development proposes 230 parking spaces (1.03 spaces per dwelling unit), comprising of 207 resident and 23 visitor spaces.
- The proposed parking supply is non-compliant with Zoning By-law 2018-050 which requires 270 spaces.
- Auto-ownership data for apartment dwellers near the subject site, collected as part of the 2022 Transportation Tomorrow Survey indicate an average vehicle ownership of 0.89 per household, suggesting a peak residential parking demand of 200 spaces (not including visitor parking demands);
- Observed parking data at three residential sites in the City of Waterloo indicate a peak residential demand (inclusive of visitor parking) of 0.68 to 0.73 spaces per unit. This is less than the proposed residential/visitor parking rate of 1.03 spaces per unit; and

- The Region's Parking Management Worksheet supports a parking reduction of 8% (based on existing and proposed TDM measures), to a maximum of 11%. In either case, the proposed supply is non-compliant with the TDM-supported, and maximum parking reductions;

7.5.2 Conclusions and Recommendations

Based on the findings of this parking study, it is concluded that although the proposed supply is non-compliant with the zoning by-law, it is generally consistent with auto-ownership characteristics among apartment stye households near the site, and is greater than proxy parking data collected and observed at similar apartment building sites in Waterloo.

The reduced parking supply aligns with city policies promoting the use of non-auto travel modes and the implementation of transportation demand management (TDM) measures in new development. Continued investment in alternate modes of transportation to supplement or replace private vehicle travel to and from the site can further reduce parking demands at the site.

8 Conclusions and Recommendations

8.1 Findings

Based on the analyses contained herein, the findings of this report are as follows:

Transportation Impact Assessment

- **Existing Traffic Conditions:** The study area intersection (Erb Street and Culpepper Drive) and the associated driveways to the existing land parcels are operating at acceptable levels of service in the weekday AM peak hour and the weekday PM peak hour. There are no critical movements.
- **Background Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to existing traffic conditions with no critical movements forecast in either the weekday AM peak hour or the weekday PM peak hour.
- **Development Trip Generation:** The development is forecast to generate approximately 87 trips in the weekday AM peak hour and 88 trips in the weekday PM peak hour, respectively.
- **Total Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to background traffic conditions with no critical movements forecast in either the weekday AM peak hour or weekday PM peak hour. This analysis assumes two site driveways; one to Erb Street West and one to Culpepper Drive.

  In the PM peak hour, the southbound approach at Erb Street West and Culpepper Drive is estimated to operate within capacity, but with a delay of 55 seconds; this is just below the critical threshold of delay published in the Region of Waterloo *TIS Guidelines*. Both site driveways are forecast to operate at acceptable levels of service and within capacity.
- **Sensitivity Analysis:** With the provision of only one site connection to Culpepper Drive (rather than one connection onto both Erb Street West and Culpepper Drive) the southbound approach at Erb Street West and Culpepper Drive is forecast to operate with a delay deemed critical, operating at LOS F, with a delay of 57 seconds.
- **Left-Turn Lanes:** A westbound left-turn lane with 15 metres of storage is warranted on Erb Street West at Culpepper Drive based on forecast traffic volumes but not forecast traffic operations. This auxiliary turn lane is warranted with or without a



driveway connection to Erb Street West. There is insufficient pavement width to accommodate this turning lane, and its location may interfere with access to properties on the north side of Erb Street West, namely 360 Erb Street West.

A westbound left-turn lane is not warranted on Erb Street West at Driveway A.

- **Right Turn Lanes:** Exclusive right-turn lanes are not warranted at either site driveway, or Erb Street West and Culpepper Drive based on forecast traffic volumes or operations.
- **Traffic Control Signal Warrant:** Traffic control signals are not warranted at Erb Street West and Culpepper Drive under total traffic conditions.
- **Controlled Pedestrian Crossing Warrant:** The eight-hour vehicular and pedestrian volumes on and crossing Erb Street West at Culpepper Drive do not satisfy the warrant criteria published in OTM Book 15 for an Intersection Pedestrian Signal (IPS) or a pedestrian crossover (PXO).

Site Circulation Review

- Both a Transportation Association of Canada (TAC) Heavy Single Unit (HSU) and a Pumper Fire Truck can enter and exit the site without conflict. Neither vehicle can turn-around within the site, but can travel along the site's southern drive aisle without any conflicts to leave the site in a backwards motion via Culpepper Drive.

Parking Study

- The development proposes 230 parking spaces (1.03 spaces per dwelling unit) comprising 207 resident spaces and 23 visitor spaces.
- The proposed parking supply is non-compliant with Zoning By-law 2018-050, which requires 270 spaces (1.20 spaces per unit).
- The Region of Waterloo Parking Management Worksheet supports a parking reduction of 8% based on existing and proposed TDM measures, and up to a maximum of 11% if additional measures were implemented to support a reduced parking supply. In either case, the proposed supply is non-compliant with the TDM-supported, and maximum parking reductions.
- Auto-ownership data for apartment dwellers near the subject site, collected as part of the 2022 Transportation Tomorrow

Survey (TTS) indicate an average vehicle ownership rate of 0.89 per apartment household. This suggests a peak resident parking demand of 200 spaces, whereby the remaining the 30 parking spaces could be used to accommodate visitor parking demands, as these parking demands are not captured in the TTS data.

- Observed parking demand data collected by Paradigm at three residential sites in the city of Waterloo indicate a peak residential demand (inclusive of visitor parking) of 0.68 to 0.73 spaces per unit. This is less than the proposed residential/visitor parking rate of 1.03 spaces per unit.

Transportation Demand Management (TDM)

The site has existing and proposed measures to support alternative modes of transportation, including proximity to transit services on Erb Street West, and the provision of 152 bicycle parking spaces.

To further promote TDM, and the muti-modal transportation network near the site, the developer and/or building owner (as applicable) could consider:

- Providing subsidized transit passes for all residents;
- Providing transit and active transportation information in a welcome package to new residents and tenants, including the posting of this information in a central location; and
- Delegating or hiring a TDM coordinator.

8.2 Conclusions

Based on the findings of this study, it is concluded that:

- The provision of only one driveway connection onto Culpepper Drive, as opposed to one driveway connection onto Culpepper Drive and another connection onto Erb Street West is forecast to degrade traffic operations at Erb Street West and Culpepper Drive, by increasing the delay for traffic exiting 360 Erb Street West. Provision of two driveway connections maintains non-critical traffic operations at Erb Street and Culpepper Drive;
- While westbound left-turn lanes are warranted on Erb Street at Culpepper Drive based on forecast traffic volumes, forecast traffic operations do not indicate an operational need for an exclusive left-turn lane. Installation of an exclusive left-turn lane would necessitate a widening of Erb Street, or the removal of the existing bicycle lanes. A westbound left-turn lane on Erb



Street West at Culpepper Drive may also introduce driver confusion for those entering properties on the north side of Erb Street West, namely 360 Erb Street West, whose driveway would be within the length of the turn-lane.

- Although the proposed parking supply is non-compliant with the in-force zoning by-law (2018-050), it conforms with auto-ownership characteristics near the site, and observed parking demands at similar apartment buildings in Waterloo; and
- The reduced parking supply aligns with city policies promoting the use of non-auto travel modes and the implementation of transportation demand management (TDM) measures in new development.

8.3 Recommendations

Based on the conclusions of this study, it is recommended:

- The developer commits to the TDM initiatives listed herein to support the proposed parking rate of 1.03 spaces per unit (inclusive of visitor parking);
- The site be considered for approval with no provision for off-site transportation network improvements;
- The Region of Waterloo monitor vehicular and pedestrian volumes at Erb Street West and Culpepper Drive to determine when additional traffic control improvements may be warranted, with or without the proposed development;
- The developer place garbage collection area(s) along the site's southern drive aisle connecting to Culpepper Drive to accommodate the restricted on-site movements for a garbage collection vehicle; and
- The developer maintains two full moves accesses for the proposed development (one to Erb Street West and one to Culpepper Drive).

Appendix A

Pre-Study Consultation Notes

Andrew Orr

From: Geoffrey Keyworth <GKeyworth@regionofwaterloo.ca>
Sent: August 8, 2024 2:11 PM
To: Andrew Steinsky
Cc: Andrew Orr; Tanikia Kinear; Ainsley Rego
Subject: RE: (240209) - 359-369 Erb St W TIS - Terms of Reference

I apologize, Andrew. This one got away from me.

- There are no planned changes to Regional roads nearby.
- A 1% growth rate per year is fine for Regional roads as well.
- The TIS will need to review needs for transit, including providing space to improve the existing bus stop and ability for people to cross Erb Street to access the stop across the street.
- An appropriate TDM program will need to be established for the site and detailed in the TIS.
- Access to Erb Street will not be accepted unless the TIS establishes need for theaccess. The TIS must evaluate a scenario of all access via Culpepper to determine if/how that could work and whether access to Erb will be required.

Regards,

Geoffrey Keyworth, P.Eng. (he/him)
Senior Transportation Planning Engineer | Region of Waterloo
Web: www.regionofwaterloo.ca

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From: Andrew Steinsky <asteinsky@ptsl.com>
Sent: Thursday, August 8, 2024 12:59 PM
To: Geoffrey Keyworth <GKeyworth@regionofwaterloo.ca>
Cc: Andrew Orr <aorr@ptsl.com>; Tanikia Kinear <TKinear@regionofwaterloo.ca>; Ainsley Rego <ainsley.rego@waterloo.ca>
Subject: RE: (240209) - 359-369 Erb St W TIS - Terms of Reference

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Hi Geoff,

Just following up from this email back in mid-June. Does the Region have any comments on the proposed work plan for this TIS.

Please let us know.

Thanks,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

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5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 416.479.9684 x507
m: 416.316.0654
e: asteinsky@ptsl.com
w: www.ptsl.com

Upcoming Vacation Alert: I will be out of the office from Monday August 12, 2024 to Friday August 16, 2024 and will not be responding to emails during this time.

Office Hours: 07:30 – 17:30 Eastern Daylight Time (EDT) Monday to Thursday. Paradigm's offices are closed on Fridays.

From: Ainsley Rego <Ainsley.Rego@waterloo.ca>
Sent: Friday, June 14, 2024 8:29 AM
To: Andrew Steinsky <asteinsky@ptsl.com>; Tanikia Kinear <TKinear@regionofwaterloo.ca>; Geoffrey Keyworth <GKeyworth@regionofwaterloo.ca>
Cc: Andrew Orr <aorr@ptsl.com>
Subject: RE: (240209) - 359-369 Erb St W TIS - Terms of Reference

Hi Andrew,

My comments below in red. Please let me know if you have any questions or concerns.

Best,

Ainsley Rego, BES, RSP1 (she/her)
Engineering Technologist – Traffic
Transportation Engineering, Integrated Planning & Public Works, City of Waterloo
265 Lexington Court PO Box 337 Station Waterloo Waterloo, ON N2J 4A8
P: 1.519.886.2310 ext. 30336 **F:** 1.519.886.5788 **TTY:** 1.866.786.3941 **E:** ainsley.rego@waterloo.ca

---

From: Andrew Steinsky <asteinsky@ptsl.com>
Sent: Thursday, June 13, 2024 4:08 PM
To: Tanikia Kinear <TKinear@regionofwaterloo.ca>; Geoffrey Keyworth <GKeyworth@regionofwaterloo.ca>
Cc: Andrew Orr <aorr@ptsl.com>; Ainsley Rego <Ainsley.Rego@waterloo.ca>
Subject: [EXTERNAL] RE: (240209) - 359-369 Erb St W TIS - Terms of Reference

Hi Tanikia and Geoff,

Following up on this email from late May. Does the City or Region have any comments on the proposed work plan, or clarification on application background growth rates and background developments?

Please let us know.

Thanks,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

5A-150 Pinebush Road, Cambridge ON N1R 8J8
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m: 416.316.0654
e: asteinsky@ptsl.com
w: www.ptsl.com

From: Tanikia Kinear <TKinear@regionofwaterloo.ca>
Sent: Friday, May 24, 2024 2:51 PM
To: 'Ainsley Rego' <Ainsley.Rego@waterloo.ca>; Geoffrey Keyworth <GKeyworth@regionofwaterloo.ca>
Cc: Andrew Steinsky <asteinsky@ptsl.com>
Subject: RE: (240209) - 359-369 Erb St W TIS - Terms of Reference

Good afternoon Ainsley,

Thank you for passing this information along.

I have copied my colleague Geoff who would be better suited to comment on the work plan provided by Paradigm.

Geoff – Can you please review the below and provide feedback?

Thanks,

Tanikia Kinear, C.E.T.
Transportation Planner (Corridor Planning)
Region of Waterloo - Planning, Development and Legislative Services
150 Frederick Street, 8th Floor, Kitchener ON N2G 4J3
519-897-5691
www.regionofwaterloo.ca

From: Ainsley Rego <Ainsley.Rego@waterloo.ca>
Sent: Friday, May 24, 2024 11:04 AM
To: Tanikia Kinear <TKinear@regionofwaterloo.ca>
Cc: Andrew Steinsky <asteinsky@ptsl.com>
Subject: FW: (240209) - 359-369 Erb St W TIS - Terms of Reference

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Hi Tanikia,

Forwarding this to you for your review and comments.

Thank you,

Ainsley Rego, BES, RSP1 (she/her)
Engineering Technologist – Traffic
Transportation Engineering, Integrated Planning & Public Works, City of Waterloo
265 Lexington Court PO Box 337 Station Waterloo Waterloo, ON N2J 4A8
P: 1.519.886.2310 ext. 30336 **F:** 1.519.886.5788 **TTY:** 1.866.786.3941 **E:** ainsley.rego@waterloo.ca

---

From: Andrew Steinsky <asteinsky@ptsl.com>
Sent: Thursday, May 23, 2024 4:47 PM
To: Ainsley Rego <Ainsley.Rego@waterloo.ca>; moviedo@regionofwaterloo.ca
Subject: [EXTERNAL] (240209) - 359-369 Erb St W TIS - Terms of Reference

Hi Ainsley and Monika,

We've been retained to prepare a Transportation Impact Study, Parking Study, and Access and Circulation Review for a proposed residential development at 359-369 Erb Street West in Waterloo. The site is on the southwest corner of Erb Street West and Culpepper Drive. The development proposes two 8-storey apartment buildings with 235 units combined. The site also proposes 183 vehicle parking spaces (159 residential and 24 visitor spaces) and 160 bicycle parking spaces. Vehicle access is proposed via two new driveway connections: one to Erb Street West and one to Culpepper Drive.

Based on our review of the comments in the Pre-Submission Consultation Meeting, dated 16 January 2024 and attached for reference, we've prepared the following work plan. Can City and Region staff please review the work plan and provide any comments or confirm if it satisfactory. **Items in bold are requests for information from the City and/or Region.**

1. **Study Area**: We will review and analyze the following intersections for the weekday AM peak hour and weekday PM peak hour:
    a. Erb Street West and Culpepper Drive;
    b. Erb Street West and Future Site Driveway; and
    c. Culpepper Drive and Future Site Driveway.

2. **Traffic Data**: We will conduct eight-hour turning movement counts at Erb Street West and Culpepper Drive on a typical weekday. We will also conduct turning movement counts at the two existing driveway connections to Erb Street West (accessing 369 Erb Street, 367 Erb Street, and 363 Erb Street) and the existing driveway connection onto Culpepper Drive.

3. **Horizon Years**: We will estimate traffic volumes at one planning horizon: five years from the estimated date of full build-out/occupancy;

4. **Background Traffic**: We will estimate future background traffic by applying a growth rate to the existing traffic volumes and including approved or in-stream developments near the site. **Can the City and Region confirm which developments should be included in the background traffic forecasts** 1) 6-14 Dietz Avenue 2) 50 Westmount Road.**, and if there is an appropriate growth rate we should use?** –1% growth rate on city streets. Region to confirm for Regional roads.

5. **Future Road Improvements**: Our review of the April 2021 TMP Update does not identify any road capacity improvements in the study area or future road improvements on Erb Street West. **Can the**

City and Region confirm the scope and timing of any planned road or intersection improvements in the study area, if applicable? – no planned improvements on city streets.

6. **Trip Generation**: We will estimate the trip generation of the site using the ITE *Trip Generation Manual (11th edition)*, including an estimate of trips by public transit. Trips will be assigned to the road network based on existing travel patterns or TTS.

7. **Operational Analyses**: We will analyze the operations of the study intersections using Synchro, summarizing level of service (LOS), volume-to-capacity (v/c) ratios, and 95th percentile queues.

8. **Parking Study**:
    a. We will calculate the required parking based on the City of Waterloo Zoning By-law;
    b. We will estimate the parked demands of the site based on data published by ITE in *Parking Generation (5th Edition)*, and proxy data collected by Paradigm at similar developments in Waterloo, and Waterloo Region. Can you identify which proxy sites will be used?
    c. We will identify parking management measures that could be implemented (e.g., transit, AT, TDM, shared parking) if the projected supply is less than the estimated demand.

9. **Access and Circulation Review**: We will review the site access and circulation design to ensure compliance with review agency requirements and applicable industry guidelines. The analysis will be completed using AutoTURN and include assessments of vehicle access and egress, clearance and swept path manoeuvres within the site based on a suitable design vehicle(s) (e.g., fire truck, garbage truck) to identify potential conflicts with the site driveways, circulation aisles, and/or parking layout (i.e., no “dead end” spaces).

We will prepare the TIS and Parking Study in accordance with the *Region of Waterloo Transportation Impact Study Guidelines* (July 2014) and the *City of Waterloo Terms of Reference for Parking Studies*.

Please let us know if you have any questions or comments on the above work plan.

Thanks,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

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Appendix B

Turning Movement Count Data and Signal Timing

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
Site Code: 240209
Start Date: 05/29/2024

Turning Movement Data

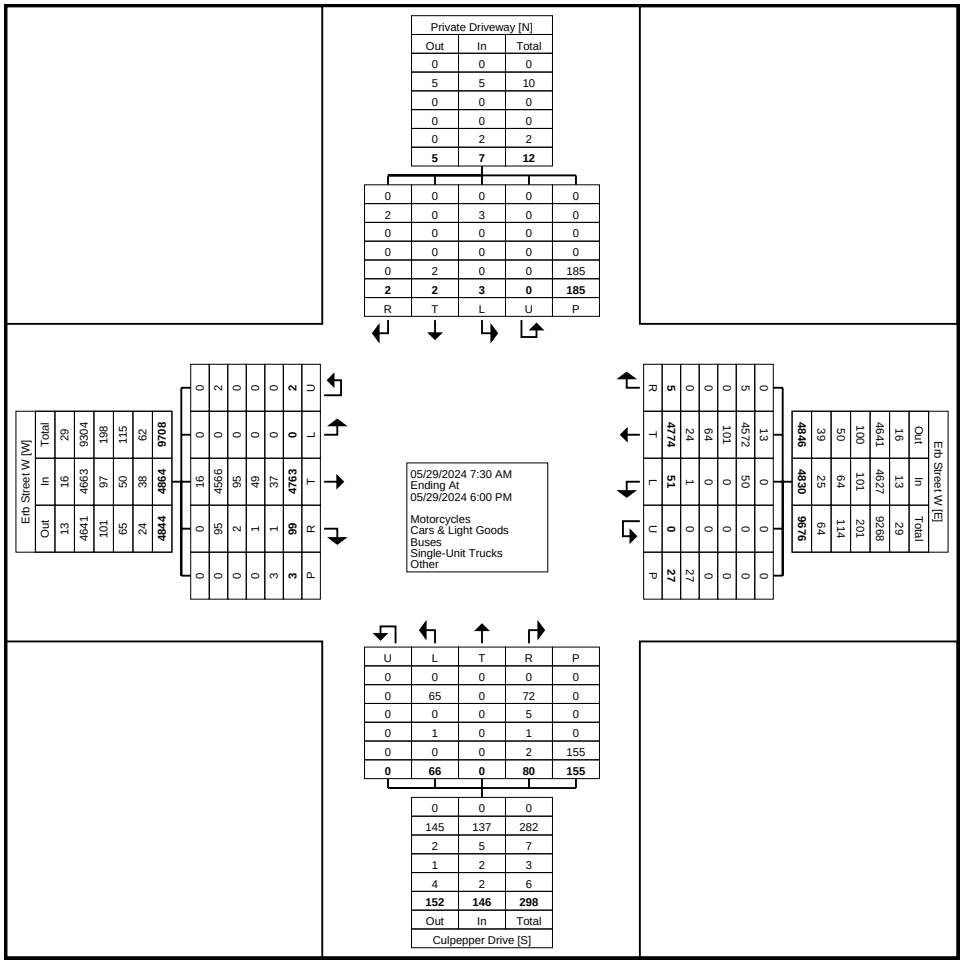
Start Time	Erb Street W Eastbound						Erb Street W Westbound						Culpepper Drive Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	0	126	3	0	0	129	2	62	0	0	1	64	3	0	2	0	5	5	0	0	0	0	6	0	198
7:45 AM	0	176	3	0	0	179	1	86	0	0	1	87	0	0	0	0	3	0	0	0	0	0	4	0	266
Hourly Total	0	302	6	0	0	308	3	148	0	0	2	151	3	0	2	0	8	5	0	0	0	0	10	0	464
8:00 AM	0	204	1	0	0	205	1	113	0	0	2	114	4	0	7	0	9	11	0	0	0	0	4	0	330
8:15 AM	0	214	2	0	0	216	1	125	0	0	2	126	0	0	4	0	4	4	0	0	0	0	6	0	346
8:30 AM	0	197	0	2	2	199	1	133	0	0	0	134	3	0	4	0	2	7	0	0	0	0	3	0	340
8:45 AM	0	196	0	0	0	196	0	133	1	0	0	134	2	0	3	0	3	5	1	0	0	0	1	1	336
Hourly Total	0	811	3	2	2	816	3	504	1	0	4	508	9	0	18	0	18	27	1	0	0	0	14	1	1352
9:00 AM	0	161	2	0	0	163	0	139	0	0	0	139	4	0	3	0	2	7	0	0	0	0	9	0	309
9:15 AM	0	129	1	0	0	130	1	113	0	0	4	114	2	0	2	0	9	4	0	0	0	0	14	0	248
9:30 AM	0	120	4	0	0	124	3	116	0	0	2	119	0	0	0	0	1	0	1	0	0	0	6	1	244
9:45 AM	0	138	0	0	0	138	0	104	0	0	0	104	1	0	2	0	4	3	0	0	0	0	3	0	245
Hourly Total	0	548	7	0	0	555	4	472	0	0	6	476	7	0	7	0	16	14	1	0	0	0	32	1	1046
10:00 AM	0	100	1	0	0	101	1	125	0	0	1	126	3	0	2	0	4	5	0	0	0	0	3	0	232
10:15 AM	0	117	1	0	0	118	0	106	0	0	0	106	1	0	0	0	1	1	0	0	0	0	12	0	225
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	217	2	0	0	219	1	231	0	0	1	232	4	0	2	0	5	6	0	0	0	0	15	0	457
12:00 PM	0	112	1	0	0	113	2	169	0	0	1	171	0	0	0	0	0	0	0	0	0	0	4	0	284
12:15 PM	0	130	2	0	0	132	1	149	0	0	2	150	4	0	2	0	5	6	0	0	0	0	4	0	288
12:30 PM	0	137	3	0	0	140	0	128	0	0	2	128	1	0	4	0	1	5	0	0	0	0	3	0	273
12:45 PM	0	156	5	0	0	161	2	147	0	0	0	149	2	0	2	0	7	4	0	0	0	0	2	0	314
Hourly Total	0	535	11	0	0	546	5	593	0	0	5	598	7	0	8	0	13	15	0	0	0	0	13	0	1159
1:00 PM	0	114	2	0	0	116	2	129	1	0	0	132	0	0	1	0	1	1	0	0	0	0	3	0	249
1:15 PM	0	123	6	0	0	129	1	127	0	0	1	128	2	0	2	0	6	4	0	0	0	0	2	0	261
1:30 PM	0	124	4	0	0	128	1	121	0	0	1	122	0	0	5	0	3	5	0	0	0	0	2	0	255
1:45 PM	0	131	1	0	1	132	2	139	0	0	0	141	2	0	1	0	9	3	0	0	0	0	4	0	276
Hourly Total	0	492	13	0	1	505	6	516	1	0	2	523	4	0	9	0	19	13	0	0	0	0	11	0	1041
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	140	4	0	0	144	1	193	0	0	0	194	4	0	2	0	3	6	0	0	0	0	5	0	344
3:15 PM	0	151	3	0	0	154	3	190	0	0	1	193	2	0	3	0	7	5	0	0	0	0	9	0	352
3:30 PM	0	166	3	0	0	169	3	166	0	0	0	169	4	0	4	0	10	8	0	0	0	0	2	0	346
3:45 PM	0	138	4	0	0	142	2	177	0	0	0	179	3	0	2	0	6	5	0	0	0	0	5	0	326
Hourly Total	0	595	14	0	0	609	9	726	0	0	1	735	13	0	11	0	26	24	0	0	0	0	21	0	1368
4:00 PM	0	137	3	0	0	140	3	185	0	0	2	188	0	0	4	0	4	4	0	0	0	0	12	0	332
4:15 PM	0	152	3	0	0	155	1	186	0	0	0	187	4	0	0	0	5	4	0	0	0	0	7	0	346

4:30 PM	0	149	9	0	0	158	3	219	2	0	1	224	3	0	4	0	6	7	1	0	0	0	8	1	390
4:45 PM	0	164	4	0	0	168	1	206	1	0	1	208	4	0	8	0	6	12	0	1	0	0	10	1	389
Hourly Total	0	602	19	0	0	621	8	796	3	0	4	807	11	0	16	0	21	27	1	1	0	0	37	2	1457
5:00 PM	0	174	12	0	0	186	5	220	0	0	2	225	0	0	2	0	6	2	0	1	0	0	13	1	414
5:15 PM	0	145	6	0	0	151	1	200	0	0	0	201	3	0	1	0	10	4	0	0	0	0	6	0	356
5:30 PM	0	169	1	0	0	170	4	202	0	0	0	206	2	0	2	0	9	4	0	0	1	0	7	1	381
5:45 PM	0	173	5	0	0	178	2	166	0	0	0	168	3	0	2	0	4	5	0	0	1	0	6	1	352
Hourly Total	0	661	24	0	0	685	12	788	0	0	2	800	8	0	7	0	29	15	0	1	2	0	32	3	1503
Grand Total	0	4763	99	2	3	4864	51	4774	5	0	27	4830	66	0	80	0	155	146	3	2	2	0	185	7	9847
Approach %	0.0	97.9	2.0	0.0	-	-	1.1	98.8	0.1	0.0	-	-	45.2	0.0	54.8	0.0	-	-	42.9	28.6	28.6	0.0	-	-	-
Total %	0.0	48.4	1.0	0.0	-	49.4	0.5	48.5	0.1	0.0	-	49.1	0.7	0.0	0.8	0.0	-	1.5	0.0	0.0	0.0	0.0	-	0.1	-
Motorcycles	0	16	0	0	-	16	0	13	0	0	-	13	0	0	0	0	-	0	0	0	0	0	-	0	29
% Motorcycles	-	0.3	0.0	0.0	-	0.3	0.0	0.3	0.0	-	-	0.3	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	0	4566	95	2	-	4663	50	4572	5	0	-	4627	65	0	72	0	-	137	3	0	2	0	-	5	9432
% Cars & Light Goods	-	95.9	96.0	100.0	-	95.9	98.0	95.8	100.0	-	-	95.8	98.5	-	90.0	-	-	93.8	100.0	0.0	100.0	-	-	71.4	95.8
Buses	0	95	2	0	-	97	0	101	0	0	-	101	0	0	5	0	-	5	0	0	0	0	-	0	203
% Buses	-	2.0	2.0	0.0	-	2.0	0.0	2.1	0.0	-	-	2.1	0.0	-	6.3	-	-	3.4	0.0	0.0	0.0	-	-	0.0	2.1
Single-Unit Trucks	0	49	1	0	-	50	0	64	0	0	-	64	1	0	1	0	-	2	0	0	0	0	-	0	116
% Single-Unit Trucks	-	1.0	1.0	0.0	-	1.0	0.0	1.3	0.0	-	-	1.3	1.5	-	1.3	-	-	1.4	0.0	0.0	0.0	-	-	0.0	1.2
Articulated Trucks	0	2	0	0	-	2	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	5
% Articulated Trucks	-	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	35	1	0	-	36	1	21	0	0	-	22	0	0	2	0	-	2	0	2	0	0	-	2	62
% Bicycles on Road	-	0.7	1.0	0.0	-	0.7	2.0	0.4	0.0	-	-	0.5	0.0	-	2.5	-	-	1.4	0.0	100.0	0.0	-	-	28.6	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	16	-	-	-	-	-	18	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	3.7	-	-	-	-	-	10.3	-	-	-	-	-	9.7	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	26	-	-	-	-	-	139	-	-	-	-	-	167	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	96.3	-	-	-	-	-	89.7	-	-	-	-	-	90.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
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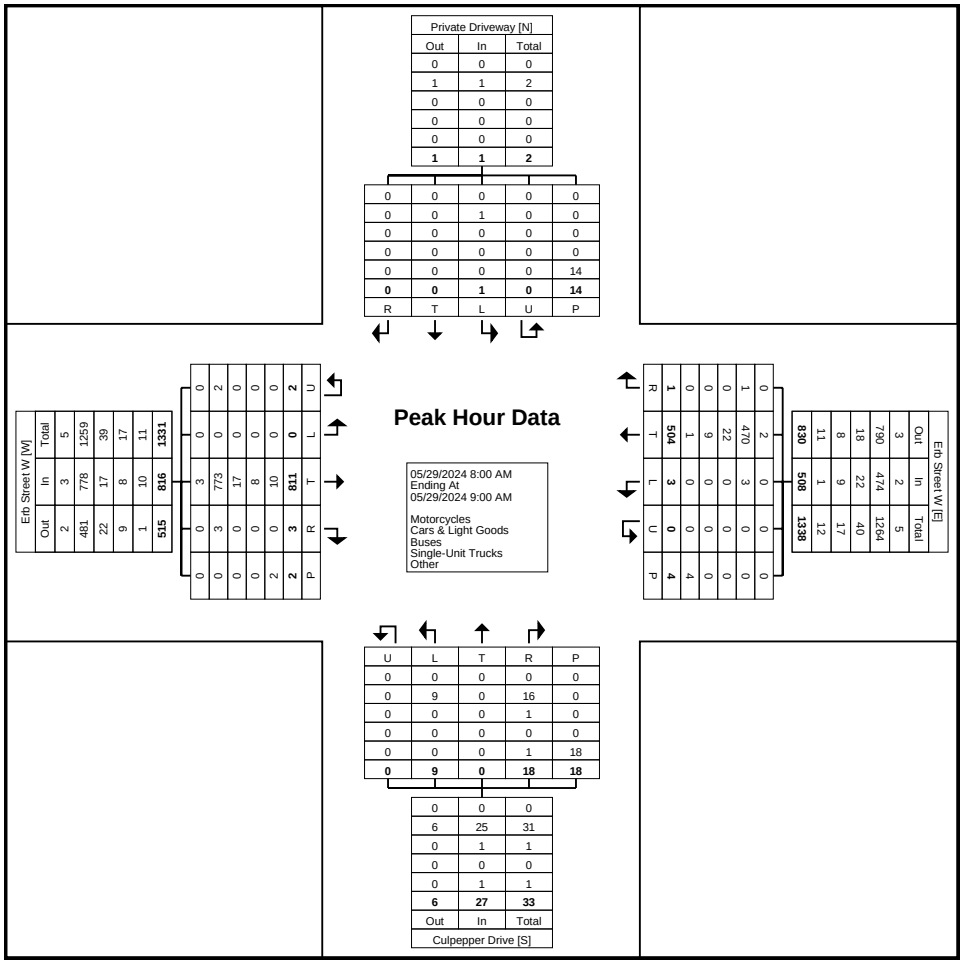
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						Culpepper Drive Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	0	204	1	0	0	205	1	113	0	0	2	114	4	0	7	0	9	11	0	0	0	0	4	0	330
8:15 AM	0	214	2	0	0	216	1	125	0	0	2	126	0	0	4	0	4	4	0	0	0	0	6	0	346
8:30 AM	0	197	0	2	2	199	1	133	0	0	0	134	3	0	4	0	2	7	0	0	0	0	3	0	340
8:45 AM	0	196	0	0	0	196	0	133	1	0	0	134	2	0	3	0	3	5	1	0	0	0	1	1	336
Total	0	811	3	2	2	816	3	504	1	0	4	508	9	0	18	0	18	27	1	0	0	0	14	1	1352
Approach %	0.0	99.4	0.4	0.2	-	-	0.6	99.2	0.2	0.0	-	-	33.3	0.0	66.7	0.0	-	-	100.0	0.0	0.0	0.0	-	-	-
Total %	0.0	60.0	0.2	0.1	-	60.4	0.2	37.3	0.1	0.0	-	37.6	0.7	0.0	1.3	0.0	-	2.0	0.1	0.0	0.0	0.0	-	0.1	-
PHF	0.000	0.947	0.375	0.250	-	0.944	0.750	0.947	0.250	0.000	-	0.948	0.563	0.000	0.643	0.000	-	0.614	0.250	0.000	0.000	0.000	-	0.250	0.977
Motorcycles	0	3	0	0	-	3	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	5
% Motorcycles	-	0.4	0.0	0.0	-	0.4	0.0	0.4	0.0	-	-	0.4	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.4
Cars & Light Goods	0	773	3	2	-	778	3	470	1	0	-	474	9	0	16	0	-	25	1	0	0	0	-	1	1278
% Cars & Light Goods	-	95.3	100.0	100.0	-	95.3	100.0	93.3	100.0	-	-	93.3	100.0	-	88.9	-	-	92.6	100.0	-	-	-	-	100.0	94.5
Buses	0	17	0	0	-	17	0	22	0	0	-	22	0	0	1	0	-	1	0	0	0	0	-	0	40
% Buses	-	2.1	0.0	0.0	-	2.1	0.0	4.4	0.0	-	-	4.3	0.0	-	5.6	-	-	3.7	0.0	-	-	-	-	0.0	3.0
Single-Unit Trucks	0	8	0	0	-	8	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	17
% Single-Unit Trucks	-	1.0	0.0	0.0	-	1.0	0.0	1.8	0.0	-	-	1.8	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.0	1.3
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0
Bicycles on Road	0	10	0	0	-	10	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	12
% Bicycles on Road	-	1.2	0.0	0.0	-	1.2	0.0	0.2	0.0	-	-	0.2	0.0	-	5.6	-	-	3.7	0.0	-	-	-	-	0.0	0.9
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-	18	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (8:00 AM)

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Count Name: Erb Street & Culpepper Drive
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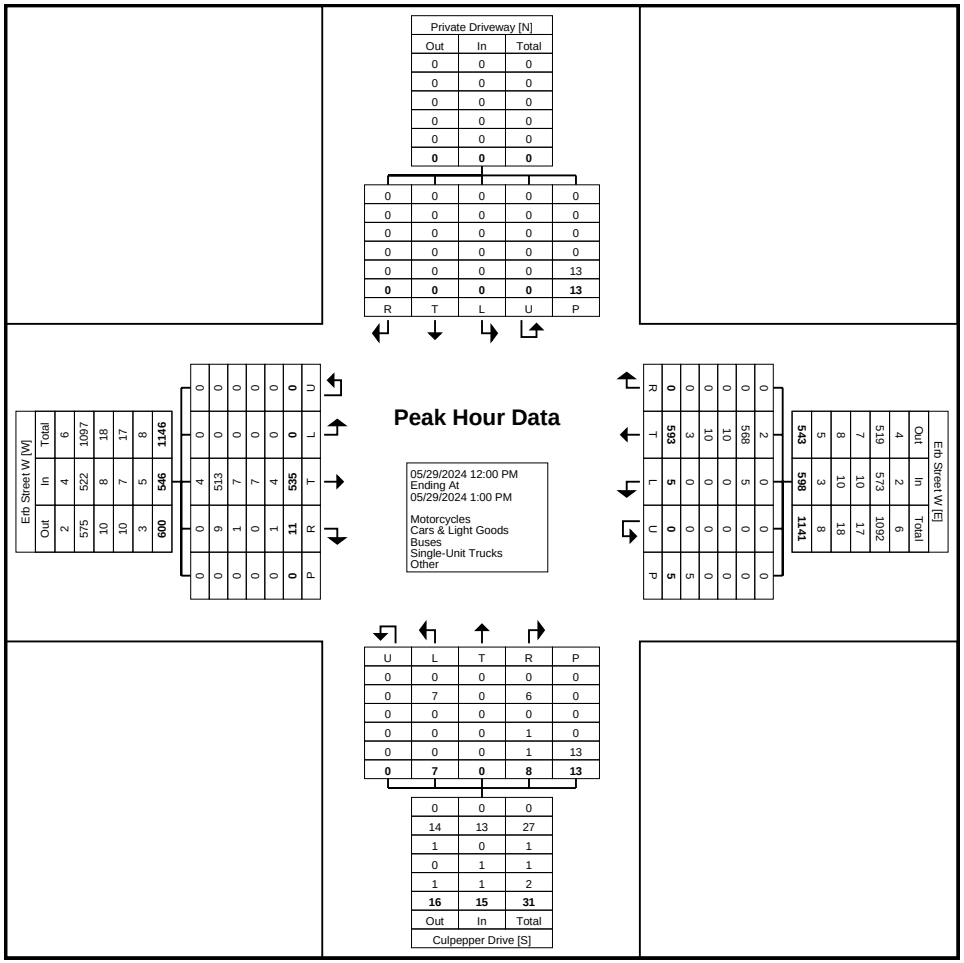
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						Culpepper Drive Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	0	112	1	0	0	113	2	169	0	0	1	171	0	0	0	0	0	0	0	0	0	0	4	0	284
12:15 PM	0	130	2	0	0	132	1	149	0	0	2	150	4	0	2	0	5	6	0	0	0	0	4	0	288
12:30 PM	0	137	3	0	0	140	0	128	0	0	2	128	1	0	4	0	1	5	0	0	0	0	3	0	273
12:45 PM	0	156	5	0	0	161	2	147	0	0	0	149	2	0	2	0	7	4	0	0	0	0	2	0	314
Total	0	535	11	0	0	546	5	593	0	0	5	598	7	0	8	0	13	15	0	0	0	0	13	0	1159
Approach %	0.0	98.0	2.0	0.0	-	-	0.8	99.2	0.0	0.0	-	-	46.7	0.0	53.3	0.0	-	-	0.0	0.0	0.0	0.0	-	-	-
Total %	0.0	46.2	0.9	0.0	-	47.1	0.4	51.2	0.0	0.0	-	51.6	0.6	0.0	0.7	0.0	-	1.3	0.0	0.0	0.0	0.0	-	0.0	-
PHF	0.000	0.857	0.550	0.000	-	0.848	0.625	0.877	0.000	0.000	-	0.874	0.438	0.000	0.500	0.000	-	0.625	0.000	0.000	0.000	0.000	-	0.000	0.923
Motorcycles	0	4	0	0	-	4	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	6
% Motorcycles	-	0.7	0.0	-	-	0.7	0.0	0.3	-	-	-	0.3	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	0.5
Cars & Light Goods	0	513	9	0	-	522	5	568	0	0	-	573	7	0	6	0	-	13	0	0	0	0	-	0	1108
% Cars & Light Goods	-	95.9	81.8	-	-	95.6	100.0	95.8	-	-	-	95.8	100.0	-	75.0	-	-	86.7	-	-	-	-	-	-	95.6
Buses	0	7	1	0	-	8	0	10	0	0	-	10	0	0	0	0	-	0	0	0	0	0	-	0	18
% Buses	-	1.3	9.1	-	-	1.5	0.0	1.7	-	-	-	1.7	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	1.6
Single-Unit Trucks	0	7	0	0	-	7	0	10	0	0	-	10	0	0	1	0	-	1	0	0	0	0	-	0	18
% Single-Unit Trucks	-	1.3	0.0	-	-	1.3	0.0	1.7	-	-	-	1.7	0.0	-	12.5	-	-	6.7	-	-	-	-	-	-	1.6
Articulated Trucks	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	-	0.2	0.0	-	-	0.2	0.0	0.3	-	-	-	0.3	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	0.3
Bicycles on Road	0	3	1	0	-	4	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	6
% Bicycles on Road	-	0.6	9.1	-	-	0.7	0.0	0.2	-	-	-	0.2	0.0	-	12.5	-	-	6.7	-	-	-	-	-	-	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	20.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	13	-	-	-	-	-	13	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	80.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
Site Code: 240209
Start Date: 05/29/2024



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

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Count Name: Erb Street & Culpepper Drive
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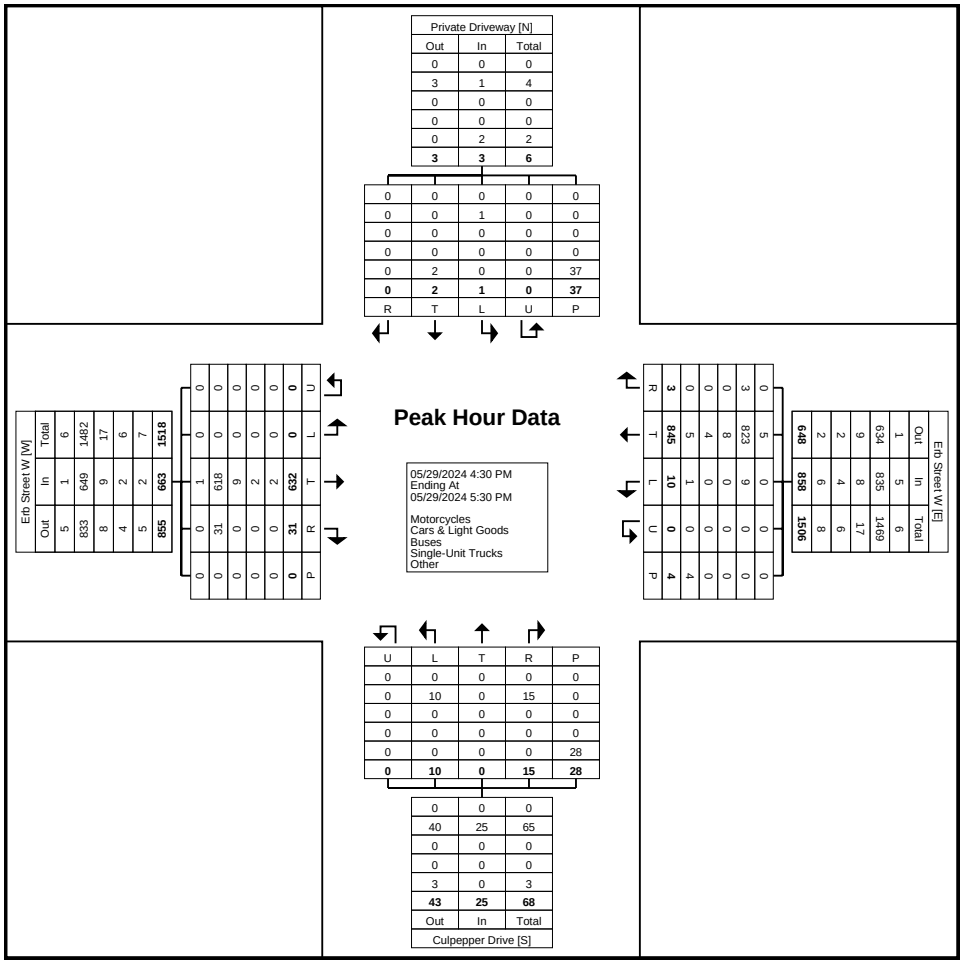
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						Culpepper Drive Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	0	149	9	0	0	158	3	219	2	0	1	224	3	0	4	0	6	7	1	0	0	0	8	1	390
4:45 PM	0	164	4	0	0	168	1	206	1	0	1	208	4	0	8	0	6	12	0	1	0	0	10	1	389
5:00 PM	0	174	12	0	0	186	5	220	0	0	2	225	0	0	2	0	6	2	0	1	0	0	13	1	414
5:15 PM	0	145	6	0	0	151	1	200	0	0	0	201	3	0	1	0	10	4	0	0	0	0	6	0	356
Total	0	632	31	0	0	663	10	845	3	0	4	858	10	0	15	0	28	25	1	2	0	0	37	3	1549
Approach %	0.0	95.3	4.7	0.0	-	-	1.2	98.5	0.3	0.0	-	-	40.0	0.0	60.0	0.0	-	-	33.3	66.7	0.0	0.0	-	-	-
Total %	0.0	40.8	2.0	0.0	-	42.8	0.6	54.6	0.2	0.0	-	55.4	0.6	0.0	1.0	0.0	-	1.6	0.1	0.1	0.0	0.0	-	0.2	-
PHF	0.000	0.908	0.646	0.000	-	0.891	0.500	0.960	0.375	0.000	-	0.953	0.625	0.000	0.469	0.000	-	0.521	0.250	0.500	0.000	0.000	-	0.750	0.935
Motorcycles	0	1	0	0	-	1	0	5	0	0	-	5	0	0	0	0	-	0	0	0	0	0	-	0	6
% Motorcycles	-	0.2	0.0	-	-	0.2	0.0	0.6	0.0	-	-	0.6	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.4
Cars & Light Goods	0	618	31	0	-	649	9	823	3	0	-	835	10	0	15	0	-	25	1	0	0	0	-	1	1510
% Cars & Light Goods	-	97.8	100.0	-	-	97.9	90.0	97.4	100.0	-	-	97.3	100.0	-	100.0	-	-	100.0	100.0	0.0	-	-	-	33.3	97.5
Buses	0	9	0	0	-	9	0	8	0	0	-	8	0	0	0	0	-	0	0	0	0	0	-	0	17
% Buses	-	1.4	0.0	-	-	1.4	0.0	0.9	0.0	-	-	0.9	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	1.1
Single-Unit Trucks	0	2	0	0	-	2	0	4	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	6
% Single-Unit Trucks	-	0.3	0.0	-	-	0.3	0.0	0.5	0.0	-	-	0.5	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0
Bicycles on Road	0	2	0	0	-	2	1	5	0	0	-	6	0	0	0	0	-	0	0	2	0	0	-	2	10
% Bicycles on Road	-	0.3	0.0	-	-	0.3	10.0	0.6	0.0	-	-	0.7	0.0	-	0.0	-	-	0.0	0.0	100.0	-	-	-	66.7	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	6	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	7.1	-	-	-	-	-	16.2	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	26	-	-	-	-	-	31	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	92.9	-	-	-	-	-	83.8	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Erb Street & Culpepper Drive
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 365 Erb Street
Site Code: 240209
Start Date: 05/29/2024

Turning Movement Data

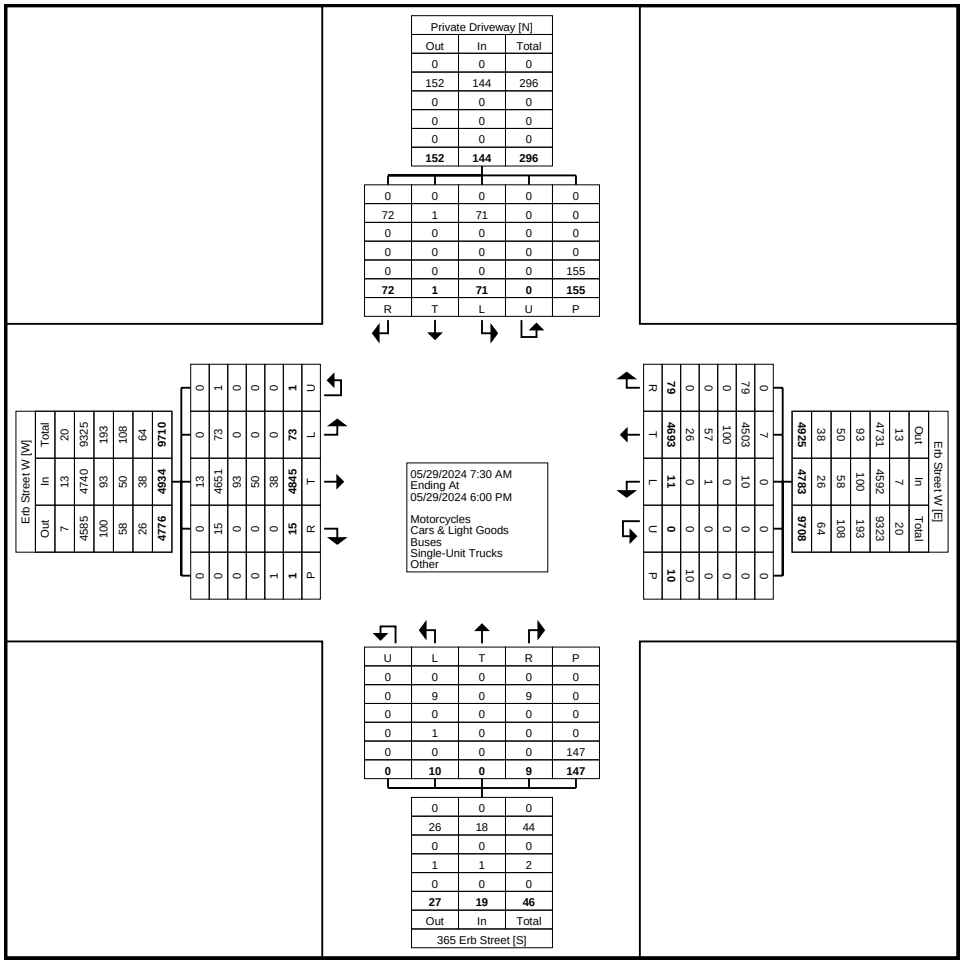
Start Time	Erb Street W Eastbound						Erb Street W Westbound						365 Erb Street Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	1	130	1	0	0	132	0	64	1	0	0	65	1	0	1	0	6	2	0	0	2	0	2	2	201
7:45 AM	5	175	0	0	0	180	0	80	4	0	0	84	0	0	1	0	5	1	4	0	1	0	3	5	270
Hourly Total	6	305	1	0	0	312	0	144	5	0	0	149	1	0	2	0	11	3	4	0	3	0	5	7	471
8:00 AM	7	205	1	0	1	213	0	111	5	0	1	116	0	0	1	0	7	1	3	0	1	0	5	4	334
8:15 AM	9	209	0	0	0	218	0	118	4	0	0	122	0	0	1	0	3	1	6	0	6	0	5	12	353
8:30 AM	7	213	0	0	0	220	0	130	8	0	0	138	1	0	0	0	1	1	8	1	1	0	4	10	369
8:45 AM	5	201	0	0	0	206	0	132	2	0	0	134	0	0	0	0	2	0	3	0	5	0	2	8	348
Hourly Total	28	828	1	0	1	857	0	491	19	0	1	510	1	0	2	0	13	3	20	1	13	0	16	34	1404
9:00 AM	2	174	0	0	0	176	1	135	5	0	1	141	0	0	0	0	1	0	1	0	0	0	11	1	318
9:15 AM	0	131	0	0	0	131	0	110	3	0	1	113	0	0	0	0	6	0	5	0	3	0	9	8	252
9:30 AM	3	125	0	0	0	128	0	114	3	0	0	117	1	0	0	0	1	1	2	0	1	0	3	3	249
9:45 AM	0	133	0	0	0	133	0	106	2	0	0	108	0	0	0	0	4	0	2	0	2	0	2	4	245
Hourly Total	5	563	0	0	0	568	1	465	13	0	2	479	1	0	0	0	12	1	10	0	6	0	25	16	1064
10:00 AM	1	102	1	0	0	104	0	131	0	0	0	131	0	0	0	0	4	0	2	0	0	0	6	2	237
10:15 AM	1	117	0	0	0	118	1	105	2	0	1	108	0	0	0	0	3	0	1	0	1	0	10	2	228
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	2	219	1	0	0	222	1	236	2	0	1	239	0	0	0	0	7	0	3	0	1	0	16	4	465
12:00 PM	0	113	1	0	0	114	0	166	0	0	0	166	0	0	1	0	1	1	1	0	0	0	3	1	282
12:15 PM	0	137	1	0	0	138	0	153	0	0	1	153	0	0	0	0	3	0	0	0	0	0	6	0	291
12:30 PM	0	142	0	0	0	142	1	132	0	0	0	133	0	0	0	0	2	0	0	0	1	0	0	1	276
12:45 PM	1	163	0	0	0	164	1	148	0	0	1	149	3	0	0	0	4	3	0	0	1	0	5	1	317
Hourly Total	1	555	2	0	0	558	2	599	0	0	2	601	3	0	1	0	10	4	1	0	2	0	14	3	1166
1:00 PM	0	122	0	0	0	122	0	125	2	0	2	127	0	0	0	0	2	0	0	0	2	0	4	2	251
1:15 PM	0	133	0	1	0	134	1	126	1	0	0	128	0	0	0	0	6	0	0	0	2	0	2	2	264
1:30 PM	1	130	0	0	0	131	0	123	0	0	0	123	0	0	0	0	3	0	0	0	0	0	9	0	254
1:45 PM	0	135	0	0	0	135	0	143	0	0	0	143	0	0	0	0	10	0	0	0	0	0	7	0	278
Hourly Total	1	520	0	1	0	522	1	517	3	0	2	521	0	0	0	0	21	0	0	0	4	0	22	4	1047
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	144	0	0	0	144	0	192	2	0	0	194	1	0	0	0	5	1	1	0	2	0	2	3	342
3:15 PM	1	153	1	0	0	155	0	192	1	0	1	193	0	0	0	0	8	0	1	0	0	0	3	1	349
3:30 PM	3	165	1	0	0	169	1	165	1	0	0	167	1	0	1	0	12	2	2	0	5	0	3	7	345
3:45 PM	2	139	1	0	0	142	0	182	0	0	0	182	0	0	1	0	5	1	2	0	2	0	3	4	329
Hourly Total	6	601	3	0	0	610	1	731	4	0	1	736	2	0	2	0	30	4	6	0	9	0	11	15	1365
4:00 PM	4	136	1	0	0	141	1	176	2	0	0	179	1	0	1	0	4	2	2	0	2	0	10	4	326
4:15 PM	4	152	0	0	0	156	1	180	5	0	1	186	1	0	0	0	6	1	3	0	3	0	5	6	349

4:30 PM	6	146	0	0	0	152	1	204	5	0	0	210	0	0	0	0	5	0	5	0	7	0	6	12	374
4:45 PM	3	164	1	0	0	168	1	180	5	0	0	186	0	0	1	0	5	1	3	0	4	0	3	7	362
Hourly Total	17	598	2	0	0	617	4	740	17	0	1	761	2	0	2	0	20	4	13	0	16	0	24	29	1411
5:00 PM	4	176	2	0	0	182	1	209	8	0	0	218	0	0	0	0	5	0	5	0	4	0	7	9	409
5:15 PM	3	142	1	0	0	146	0	194	8	0	0	202	0	0	0	0	8	0	6	0	9	0	7	15	363
5:30 PM	0	165	1	0	0	166	0	195	0	0	0	195	0	0	0	0	7	0	3	0	5	0	3	8	369
5:45 PM	0	173	1	0	0	174	0	172	0	0	0	172	0	0	0	0	3	0	0	0	0	0	5	0	346
Hourly Total	7	656	5	0	0	668	1	770	16	0	0	787	0	0	0	0	23	0	14	0	18	0	22	32	1487
Grand Total	73	4845	15	1	1	4934	11	4693	79	0	10	4783	10	0	9	0	147	19	71	1	72	0	155	144	9880
Approach %	1.5	98.2	0.3	0.0	-	-	0.2	98.1	1.7	0.0	-	-	52.6	0.0	47.4	0.0	-	-	49.3	0.7	50.0	0.0	-	-	-
Total %	0.7	49.0	0.2	0.0	-	49.9	0.1	47.5	0.8	0.0	-	48.4	0.1	0.0	0.1	0.0	-	0.2	0.7	0.0	0.7	0.0	-	1.5	-
Motorcycles	0	13	0	0	-	13	0	7	0	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	20
% Motorcycles	0.0	0.3	0.0	0.0	-	0.3	0.0	0.1	0.0	-	-	0.1	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	73	4651	15	1	-	4740	10	4503	79	0	-	4592	9	0	9	0	-	18	71	1	72	0	-	144	9494
% Cars & Light Goods	100.0	96.0	100.0	100.0	-	96.1	90.9	96.0	100.0	-	-	96.0	90.0	-	100.0	-	-	94.7	100.0	100.0	100.0	-	-	100.0	96.1
Buses	0	93	0	0	-	93	0	100	0	0	-	100	0	0	0	0	-	0	0	0	0	0	-	0	193
% Buses	0.0	1.9	0.0	0.0	-	1.9	0.0	2.1	0.0	-	-	2.1	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	2.0
Single-Unit Trucks	0	50	0	0	-	50	1	57	0	0	-	58	1	0	0	0	-	1	0	0	0	0	-	0	109
% Single-Unit Trucks	0.0	1.0	0.0	0.0	-	1.0	9.1	1.2	0.0	-	-	1.2	10.0	-	0.0	-	-	5.3	0.0	0.0	0.0	-	-	0.0	1.1
Articulated Trucks	0	3	0	0	-	3	0	6	0	0	-	6	0	0	0	0	-	0	0	0	0	0	-	0	9
% Articulated Trucks	0.0	0.1	0.0	0.0	-	0.1	0.0	0.1	0.0	-	-	0.1	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	35	0	0	-	35	0	20	0	0	-	20	0	0	0	0	-	0	0	0	0	0	-	0	55
% Bicycles on Road	0.0	0.7	0.0	0.0	-	0.7	0.0	0.4	0.0	-	-	0.4	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	18	-	-	-	-	-	13	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	12.2	-	-	-	-	-	8.4	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	10	-	-	-	-	-	129	-	-	-	-	-	142	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	87.8	-	-	-	-	-	91.6	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 365 Erb Street
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Data Plot

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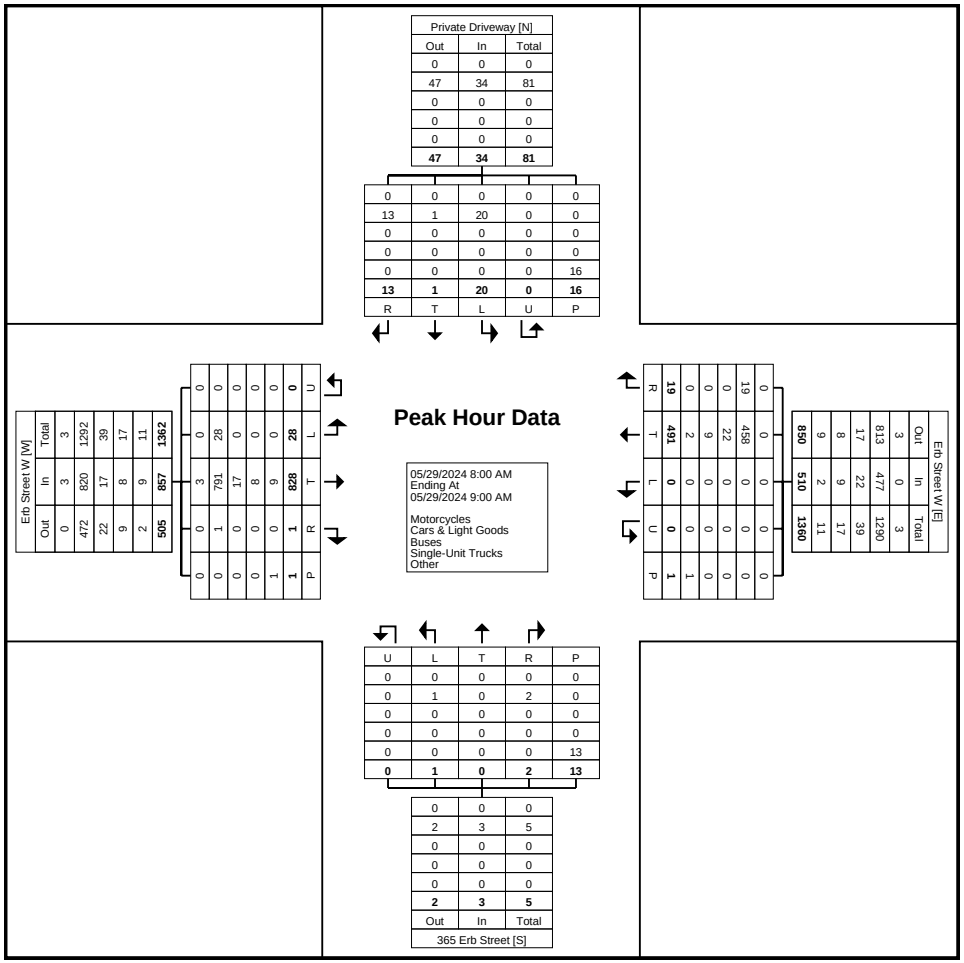
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						365 Erb Street Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	7	205	1	0	1	213	0	111	5	0	1	116	0	0	1	0	7	1	3	0	1	0	5	4	334
8:15 AM	9	209	0	0	0	218	0	118	4	0	0	122	0	0	1	0	3	1	6	0	6	0	5	12	353
8:30 AM	7	213	0	0	0	220	0	130	8	0	0	138	1	0	0	0	1	1	8	1	1	0	4	10	369
8:45 AM	5	201	0	0	0	206	0	132	2	0	0	134	0	0	0	0	2	0	3	0	5	0	2	8	348
Total	28	828	1	0	1	857	0	491	19	0	1	510	1	0	2	0	13	3	20	1	13	0	16	34	1404
Approach %	3.3	96.6	0.1	0.0	-	-	0.0	96.3	3.7	0.0	-	-	33.3	0.0	66.7	0.0	-	-	58.8	2.9	38.2	0.0	-	-	-
Total %	2.0	59.0	0.1	0.0	-	61.0	0.0	35.0	1.4	0.0	-	36.3	0.1	0.0	0.1	0.0	-	0.2	1.4	0.1	0.9	0.0	-	2.4	-
PHF	0.778	0.972	0.250	0.000	-	0.974	0.000	0.930	0.594	0.000	-	0.924	0.250	0.000	0.500	0.000	-	0.750	0.625	0.250	0.542	0.000	-	0.708	0.951
Motorcycles	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	3
% Motorcycles	0.0	0.4	0.0	-	-	0.4	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	28	791	1	0	-	820	0	458	19	0	-	477	1	0	2	0	-	3	20	1	13	0	-	34	1334
% Cars & Light Goods	100.0	95.5	100.0	-	-	95.7	-	93.3	100.0	-	-	93.5	100.0	-	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	95.0
Buses	0	17	0	0	-	17	0	22	0	0	-	22	0	0	0	0	-	0	0	0	0	0	-	0	39
% Buses	0.0	2.1	0.0	-	-	2.0	-	4.5	0.0	-	-	4.3	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	2.8
Single-Unit Trucks	0	8	0	0	-	8	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	17
% Single-Unit Trucks	0.0	1.0	0.0	-	-	0.9	-	1.8	0.0	-	-	1.8	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	9	0	0	-	9	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	11
% Bicycles on Road	0.0	1.1	0.0	-	-	1.1	-	0.4	0.0	-	-	0.4	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.8
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	12.5	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	13	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	87.5	-	-

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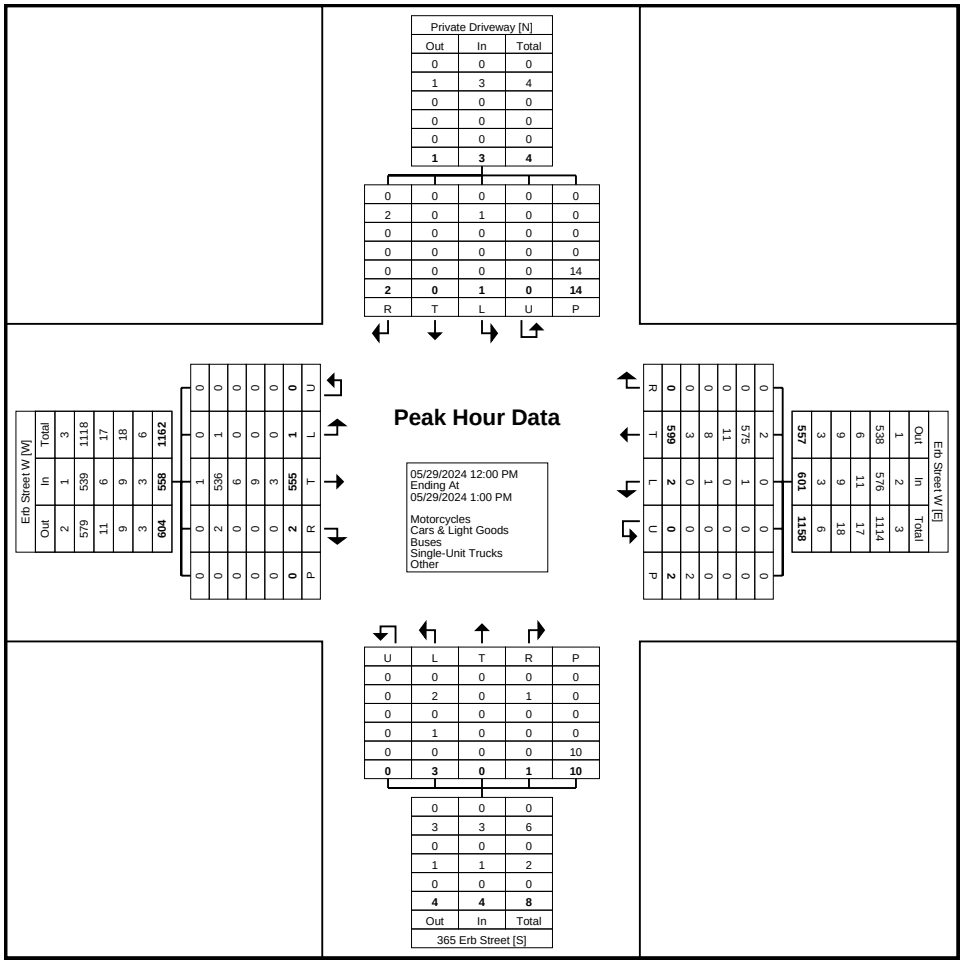
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						365 Erb Street Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	0	113	1	0	0	114	0	166	0	0	0	166	0	0	1	0	1	1	1	0	0	0	3	1	282
12:15 PM	0	137	1	0	0	138	0	153	0	0	1	153	0	0	0	0	3	0	0	0	0	0	6	0	291
12:30 PM	0	142	0	0	0	142	1	132	0	0	0	133	0	0	0	0	2	0	0	0	1	0	0	1	276
12:45 PM	1	163	0	0	0	164	1	148	0	0	1	149	3	0	0	0	4	3	0	0	1	0	5	1	317
Total	1	555	2	0	0	558	2	599	0	0	2	601	3	0	1	0	10	4	1	0	2	0	14	3	1166
Approach %	0.2	99.5	0.4	0.0	-	-	0.3	99.7	0.0	0.0	-	-	75.0	0.0	25.0	0.0	-	-	33.3	0.0	66.7	0.0	-	-	-
Total %	0.1	47.6	0.2	0.0	-	47.9	0.2	51.4	0.0	0.0	-	51.5	0.3	0.0	0.1	0.0	-	0.3	0.1	0.0	0.2	0.0	-	0.3	-
PHF	0.250	0.851	0.500	0.000	-	0.851	0.500	0.902	0.000	0.000	-	0.905	0.250	0.000	0.250	0.000	-	0.333	0.250	0.000	0.500	0.000	-	0.750	0.920
Motorcycles	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Motorcycles	0.0	0.2	0.0	-	-	0.2	0.0	0.3	-	-	-	0.3	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.3
Cars & Light Goods	1	536	2	0	-	539	1	575	0	0	-	576	2	0	1	0	-	3	1	0	2	0	-	3	1121
% Cars & Light Goods	100.0	96.6	100.0	-	-	96.6	50.0	96.0	-	-	-	95.8	66.7	-	100.0	-	-	75.0	100.0	-	100.0	-	-	100.0	96.1
Buses	0	6	0	0	-	6	0	11	0	0	-	11	0	0	0	0	-	0	0	0	0	0	-	0	17
% Buses	0.0	1.1	0.0	-	-	1.1	0.0	1.8	-	-	-	1.8	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	1.5
Single-Unit Trucks	0	9	0	0	-	9	1	8	0	0	-	9	1	0	0	0	-	1	0	0	0	0	-	0	19
% Single-Unit Trucks	0.0	1.6	0.0	-	-	1.6	50.0	1.3	-	-	-	1.5	33.3	-	0.0	-	-	25.0	0.0	-	0.0	-	-	0.0	1.6
Articulated Trucks	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.5	-	-	-	0.5	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.3
Bicycles on Road	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	3
% Bicycles on Road	0.0	0.5	0.0	-	-	0.5	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	7.1	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	10	-	-	-	-	-	13	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	92.9	-	-

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Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 365 Erb Street
Site Code: 240209
Start Date: 05/29/2024

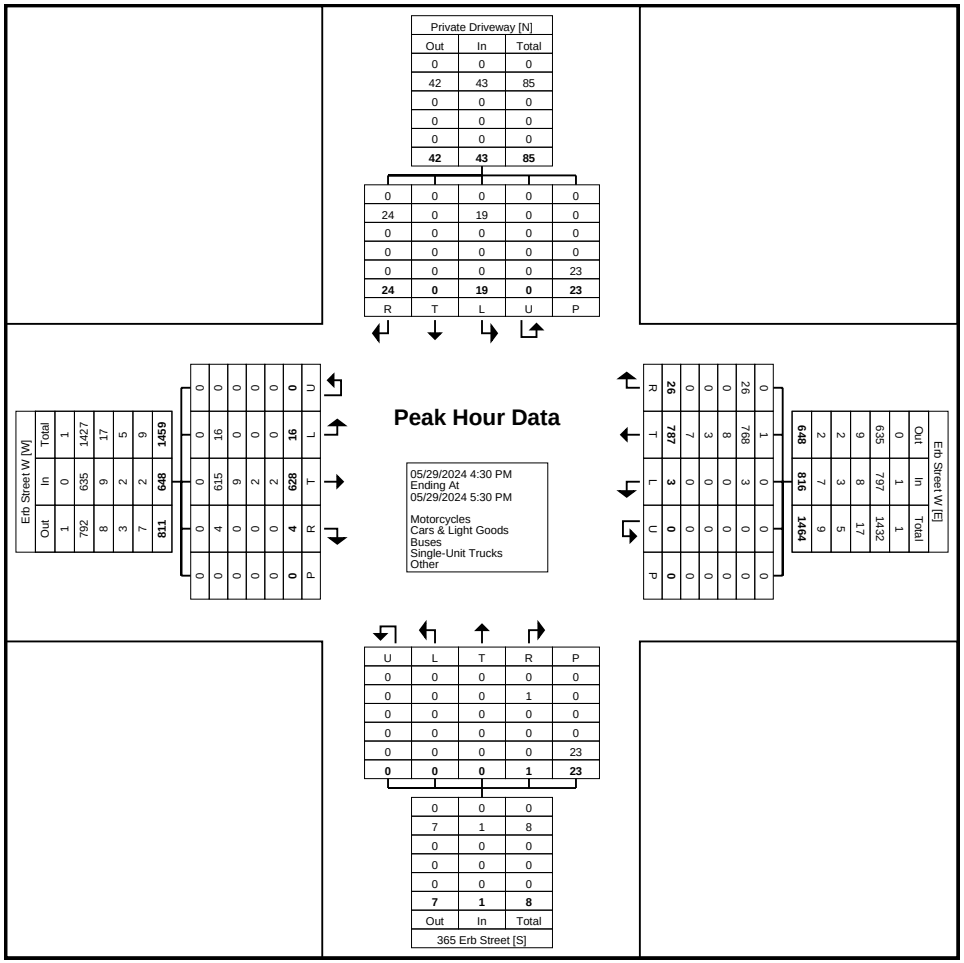
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						365 Erb Street Northbound						Private Driveway Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:30 PM	6	146	0	0	0	152	1	204	5	0	0	210	0	0	0	0	5	0	5	0	7	0	6	12	374
4:45 PM	3	164	1	0	0	168	1	180	5	0	0	186	0	0	1	0	5	1	3	0	4	0	3	7	362
5:00 PM	4	176	2	0	0	182	1	209	8	0	0	218	0	0	0	0	5	0	5	0	4	0	7	9	409
5:15 PM	3	142	1	0	0	146	0	194	8	0	0	202	0	0	0	0	8	0	6	0	9	0	7	15	363
Total	16	628	4	0	0	648	3	787	26	0	0	816	0	0	1	0	23	1	19	0	24	0	23	43	1508
Approach %	2.5	96.9	0.6	0.0	-	-	0.4	96.4	3.2	0.0	-	-	0.0	0.0	100.0	0.0	-	-	44.2	0.0	55.8	0.0	-	-	-
Total %	1.1	41.6	0.3	0.0	-	43.0	0.2	52.2	1.7	0.0	-	54.1	0.0	0.0	0.1	0.0	-	0.1	1.3	0.0	1.6	0.0	-	2.9	-
PHF	0.667	0.892	0.500	0.000	-	0.890	0.750	0.941	0.813	0.000	-	0.936	0.000	0.000	0.250	0.000	-	0.250	0.792	0.000	0.667	0.000	-	0.717	0.922
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.0	-	-	0.1	-	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.1
Cars & Light Goods	16	615	4	0	-	635	3	768	26	0	-	797	0	0	1	0	-	1	19	0	24	0	-	43	1476
% Cars & Light Goods	100.0	97.9	100.0	-	-	98.0	100.0	97.6	100.0	-	-	97.7	-	-	100.0	-	-	100.0	100.0	-	100.0	-	-	100.0	97.9
Buses	0	9	0	0	-	9	0	8	0	0	-	8	0	0	0	0	-	0	0	0	0	0	-	0	17
% Buses	0.0	1.4	0.0	-	-	1.4	0.0	1.0	0.0	-	-	1.0	-	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	1.1
Single-Unit Trucks	0	2	0	0	-	2	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	5
% Single-Unit Trucks	0.0	0.3	0.0	-	-	0.3	0.0	0.4	0.0	-	-	0.4	-	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.3
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	-	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	0	2	0	0	-	2	0	7	0	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	9
% Bicycles on Road	0.0	0.3	0.0	-	-	0.3	0.0	0.9	0.0	-	-	0.9	-	-	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.7	-	-	-	-	-	8.7	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	21	-	-	-	-	-	21	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91.3	-	-	-	-	-	91.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 365 Erb Street
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 369 Erb Street
Site Code: 240209
Start Date: 05/29/2024

Turning Movement Data

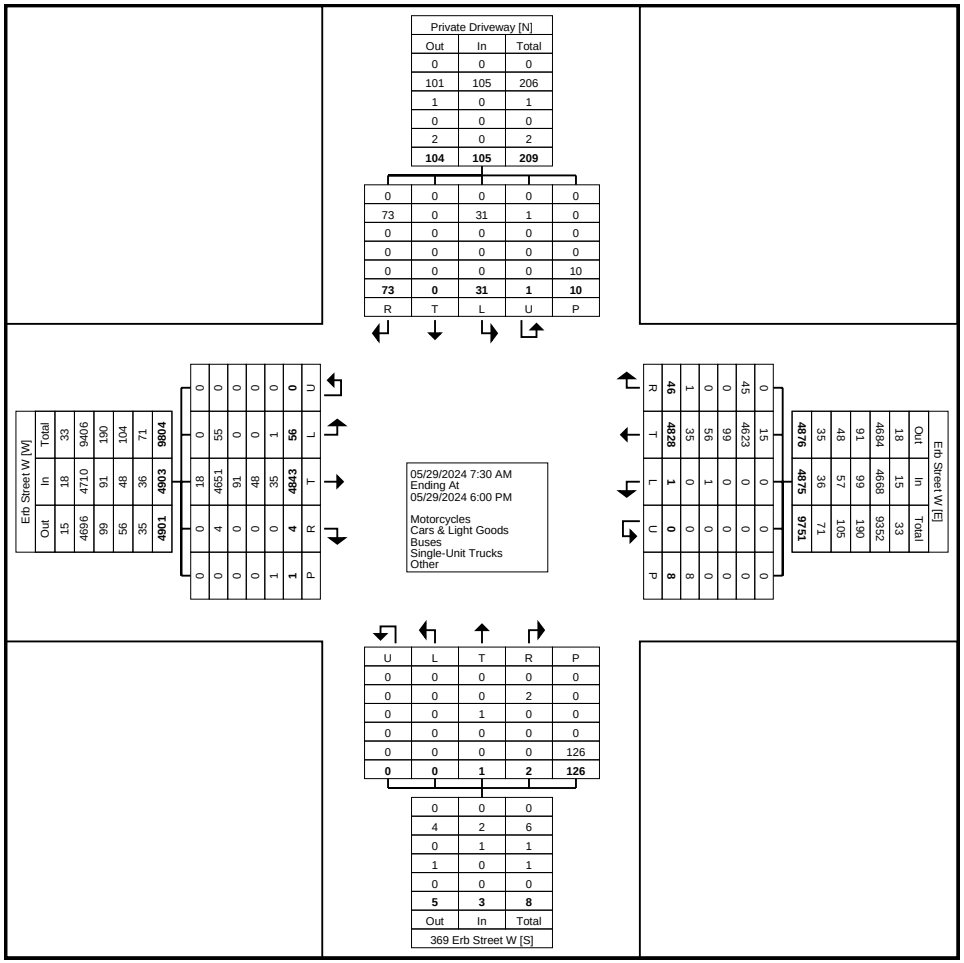
Start Time	Erb Street W Eastbound						Erb Street W Westbound						369 Erb Street W Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	1	127	0	0	0	128	0	65	2	0	0	67	0	0	0	0	5	0	2	0	0	0	0	2	197
7:45 AM	3	177	0	0	0	180	0	84	1	0	0	85	0	0	1	0	3	1	0	0	3	0	0	3	269
Hourly Total	4	304	0	0	0	308	0	149	3	0	0	152	0	0	1	0	8	1	2	0	3	0	0	5	466
8:00 AM	4	212	0	0	1	216	0	106	4	0	1	110	0	0	0	0	7	0	1	0	5	0	0	6	332
8:15 AM	6	217	0	0	0	223	0	124	3	0	0	127	0	0	0	0	2	0	1	0	6	0	0	7	357
8:30 AM	7	197	0	0	0	204	0	137	3	0	0	140	0	0	0	0	0	0	0	0	7	0	0	7	351
8:45 AM	2	193	0	0	0	195	0	135	4	0	0	139	0	0	0	0	1	0	3	0	5	0	0	8	342
Hourly Total	19	819	0	0	1	838	0	502	14	0	1	516	0	0	0	0	10	0	5	0	23	0	0	28	1382
9:00 AM	3	159	0	0	0	162	0	138	2	0	1	140	0	0	0	0	1	0	3	0	2	0	1	5	307
9:15 AM	3	121	0	0	0	124	0	115	3	0	2	118	0	0	0	0	5	0	3	0	3	0	0	6	248
9:30 AM	0	127	0	0	0	127	0	116	0	0	0	116	0	0	0	0	1	0	1	0	1	0	0	2	245
9:45 AM	0	132	0	0	0	132	0	115	0	0	0	115	0	0	1	0	4	1	0	0	0	0	0	0	248
Hourly Total	6	539	0	0	0	545	0	484	5	0	3	489	0	0	1	0	11	1	7	0	6	0	1	13	1048
10:00 AM	0	105	0	0	0	105	0	134	0	0	0	134	0	0	0	0	4	0	0	0	0	0	1	0	239
10:15 AM	1	118	0	0	0	119	0	117	0	0	0	117	0	0	0	0	2	0	0	0	0	0	2	0	236
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	1	223	0	0	0	224	0	251	0	0	0	251	0	0	0	0	6	0	0	0	0	0	3	0	475
12:00 PM	0	114	1	0	0	115	0	164	1	0	0	165	0	0	0	0	1	0	0	0	0	0	0	0	280
12:15 PM	0	139	0	0	0	139	0	156	0	0	0	156	0	0	0	0	4	0	0	0	2	0	0	2	297
12:30 PM	0	141	0	0	0	141	0	134	0	0	0	134	0	0	0	0	2	0	0	0	1	0	0	1	276
12:45 PM	0	162	0	0	0	162	1	151	0	0	0	152	0	0	0	0	5	0	0	0	0	0	0	0	314
Hourly Total	0	556	1	0	0	557	1	605	1	0	0	607	0	0	0	0	12	0	0	0	3	0	0	3	1167
1:00 PM	0	121	0	0	0	121	0	125	1	0	0	126	0	0	0	0	2	0	1	0	1	0	0	2	249
1:15 PM	0	134	0	0	0	134	0	126	0	0	0	126	0	0	0	0	5	0	0	0	0	0	0	0	260
1:30 PM	1	131	0	0	0	132	0	121	0	0	0	121	0	0	0	0	3	0	0	0	0	0	0	0	253
1:45 PM	1	135	0	0	0	136	0	140	0	0	0	140	0	0	0	0	6	0	0	0	1	1	0	2	278
Hourly Total	2	521	0	0	0	523	0	512	1	0	0	513	0	0	0	0	16	0	1	0	2	1	0	4	1040
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	147	1	0	0	148	0	187	1	0	0	188	0	0	0	0	6	0	1	0	0	0	0	1	337
3:15 PM	0	153	0	0	0	153	0	182	0	0	0	182	0	0	0	0	9	0	1	0	0	0	0	1	336
3:30 PM	1	171	1	0	0	173	0	158	0	0	0	158	0	0	0	0	9	0	0	0	1	0	0	1	332
3:45 PM	0	140	0	0	0	140	0	178	2	0	0	180	0	0	0	0	6	0	0	0	0	0	0	0	320
Hourly Total	1	611	2	0	0	614	0	705	3	0	0	708	0	0	0	0	30	0	2	0	1	0	0	3	1325
4:00 PM	1	140	1	0	0	142	0	191	1	0	2	192	0	1	0	0	5	1	0	0	1	0	0	1	336
4:15 PM	6	151	0	0	0	157	0	192	4	0	2	196	0	0	0	0	4	0	1	0	7	0	0	8	361

4:30 PM	1	149	0	0	0	150	0	226	1	0	0	227	0	0	0	0	7	0	1	0	4	0	1	5	382
4:45 PM	4	163	0	0	0	167	0	210	1	0	0	211	0	0	0	0	1	0	3	0	5	0	2	8	386
Hourly Total	12	603	1	0	0	616	0	819	7	0	4	826	0	1	0	0	17	1	5	0	17	0	3	22	1465
5:00 PM	8	185	0	0	0	193	0	209	6	0	0	215	0	0	0	0	2	0	3	0	5	0	0	8	416
5:15 PM	2	138	0	0	0	140	0	212	5	0	0	217	0	0	0	0	5	0	5	0	8	0	1	13	370
5:30 PM	1	165	0	0	0	166	0	202	1	0	0	203	0	0	0	0	6	0	1	0	5	0	2	6	375
5:45 PM	0	179	0	0	0	179	0	178	0	0	0	178	0	0	0	0	3	0	0	0	0	0	0	0	357
Hourly Total	11	667	0	0	0	678	0	801	12	0	0	813	0	0	0	0	16	0	9	0	18	0	3	27	1518
Grand Total	56	4843	4	0	1	4903	1	4828	46	0	8	4875	0	1	2	0	126	3	31	0	73	1	10	105	9886
Approach %	1.1	98.8	0.1	0.0	-	-	0.0	99.0	0.9	0.0	-	-	0.0	33.3	66.7	0.0	-	-	29.5	0.0	69.5	1.0	-	-	-
Total %	0.6	49.0	0.0	0.0	-	49.6	0.0	48.8	0.5	0.0	-	49.3	0.0	0.0	0.0	0.0	-	0.0	0.3	0.0	0.7	0.0	-	1.1	-
Motorcycles	0	18	0	0	-	18	0	15	0	0	-	15	0	0	0	0	-	0	0	0	0	0	-	0	33
% Motorcycles	0.0	0.4	0.0	-	-	0.4	0.0	0.3	0.0	-	-	0.3	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.3
Cars & Light Goods	55	4651	4	0	-	4710	0	4623	45	0	-	4668	0	0	2	0	-	2	31	0	73	1	-	105	9485
% Cars & Light Goods	98.2	96.0	100.0	-	-	96.1	0.0	95.8	97.8	-	-	95.8	-	0.0	100.0	-	-	66.7	100.0	-	100.0	100.0	-	100.0	95.9
Buses	0	91	0	0	-	91	0	99	0	0	-	99	0	1	0	0	-	1	0	0	0	0	-	0	191
% Buses	0.0	1.9	0.0	-	-	1.9	0.0	2.1	0.0	-	-	2.0	-	100.0	0.0	-	-	33.3	0.0	-	0.0	0.0	-	0.0	1.9
Single-Unit Trucks	0	48	0	0	-	48	1	56	0	0	-	57	0	0	0	0	-	0	0	0	0	0	-	0	105
% Single-Unit Trucks	0.0	1.0	0.0	-	-	1.0	100.0	1.2	0.0	-	-	1.2	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.0	1.1
Articulated Trucks	0	7	0	0	-	7	0	10	0	0	-	10	0	0	0	0	-	0	0	0	0	0	-	0	17
% Articulated Trucks	0.0	0.1	0.0	-	-	0.1	0.0	0.2	0.0	-	-	0.2	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.2
Bicycles on Road	1	28	0	0	-	29	0	25	1	0	-	26	0	0	0	0	-	0	0	0	0	0	-	0	55
% Bicycles on Road	1.8	0.6	0.0	-	-	0.6	0.0	0.5	2.2	-	-	0.5	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	13	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	12.5	-	-	-	-	-	10.3	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	7	-	-	-	-	-	113	-	-	-	-	-	10	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	87.5	-	-	-	-	-	89.7	-	-	-	-	-	100.0	-	-

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Turning Movement Data Plot

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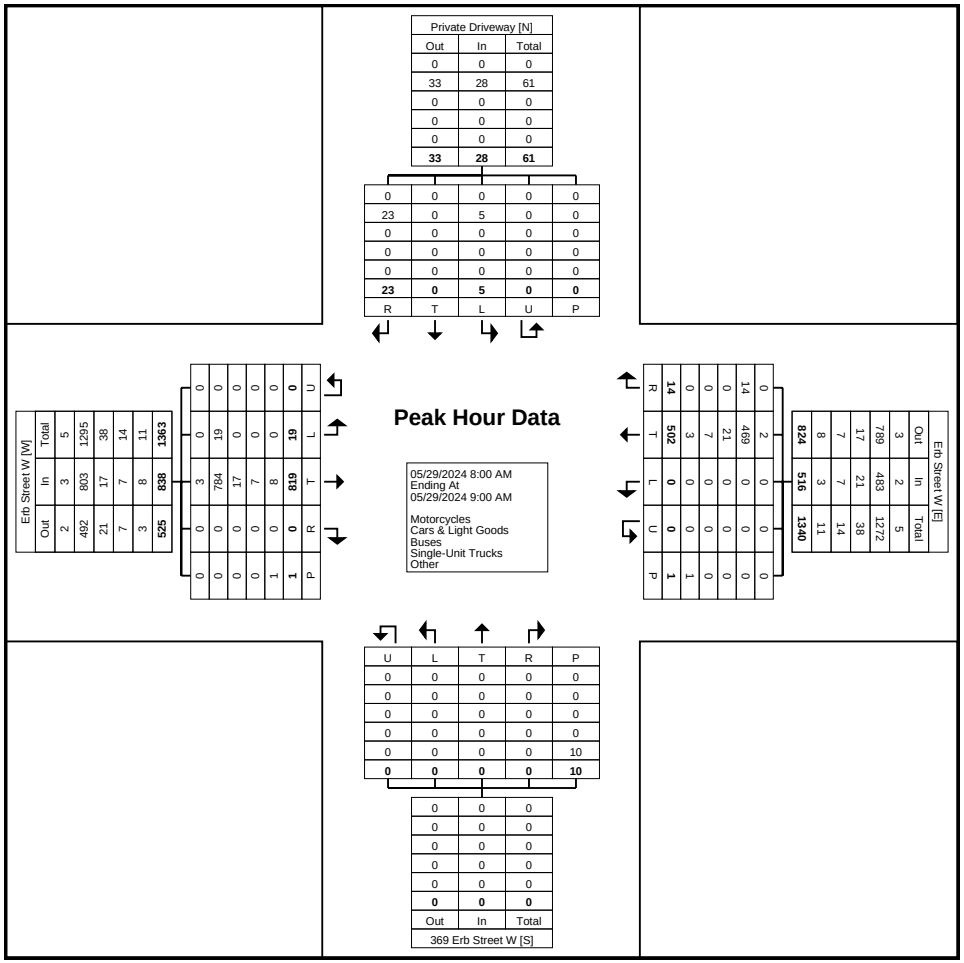
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						369 Erb Street W Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	4	212	0	0	1	216	0	106	4	0	1	110	0	0	0	0	7	0	1	0	5	0	0	6	332
8:15 AM	6	217	0	0	0	223	0	124	3	0	0	127	0	0	0	0	2	0	1	0	6	0	0	7	357
8:30 AM	7	197	0	0	0	204	0	137	3	0	0	140	0	0	0	0	0	0	0	0	7	0	0	7	351
8:45 AM	2	193	0	0	0	195	0	135	4	0	0	139	0	0	0	0	1	0	3	0	5	0	0	8	342
Total	19	819	0	0	1	838	0	502	14	0	1	516	0	0	0	0	10	0	5	0	23	0	0	28	1382
Approach %	2.3	97.7	0.0	0.0	-	-	0.0	97.3	2.7	0.0	-	-	0.0	0.0	0.0	0.0	-	-	17.9	0.0	82.1	0.0	-	-	-
Total %	1.4	59.3	0.0	0.0	-	60.6	0.0	36.3	1.0	0.0	-	37.3	0.0	0.0	0.0	0.0	-	0.0	0.4	0.0	1.7	0.0	-	2.0	-
PHF	0.679	0.944	0.000	0.000	-	0.939	0.000	0.916	0.875	0.000	-	0.921	0.000	0.000	0.000	0.000	-	0.000	0.417	0.000	0.821	0.000	-	0.875	0.968
Motorcycles	0	3	0	0	-	3	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	5
% Motorcycles	0.0	0.4	-	-	-	0.4	-	0.4	0.0	-	-	0.4	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.4
Cars & Light Goods	19	784	0	0	-	803	0	469	14	0	-	483	0	0	0	0	-	0	5	0	23	0	-	28	1314
% Cars & Light Goods	100.0	95.7	-	-	-	95.8	-	93.4	100.0	-	-	93.6	-	-	-	-	-	-	100.0	-	100.0	-	-	100.0	95.1
Buses	0	17	0	0	-	17	0	21	0	0	-	21	0	0	0	0	-	0	0	0	0	0	-	0	38
% Buses	0.0	2.1	-	-	-	2.0	-	4.2	0.0	-	-	4.1	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	2.7
Single-Unit Trucks	0	7	0	0	-	7	0	7	0	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	14
% Single-Unit Trucks	0.0	0.9	-	-	-	0.8	-	1.4	0.0	-	-	1.4	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	1.0
Articulated Trucks	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	0.0	0.1	-	-	-	0.1	-	0.4	0.0	-	-	0.4	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.2
Bicycles on Road	0	7	0	0	-	7	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	8
% Bicycles on Road	0.0	0.9	-	-	-	0.8	-	0.2	0.0	-	-	0.2	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	10	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 369 Erb Street
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: 369 Erb Street
Site Code: 240209
Start Date: 05/29/2024

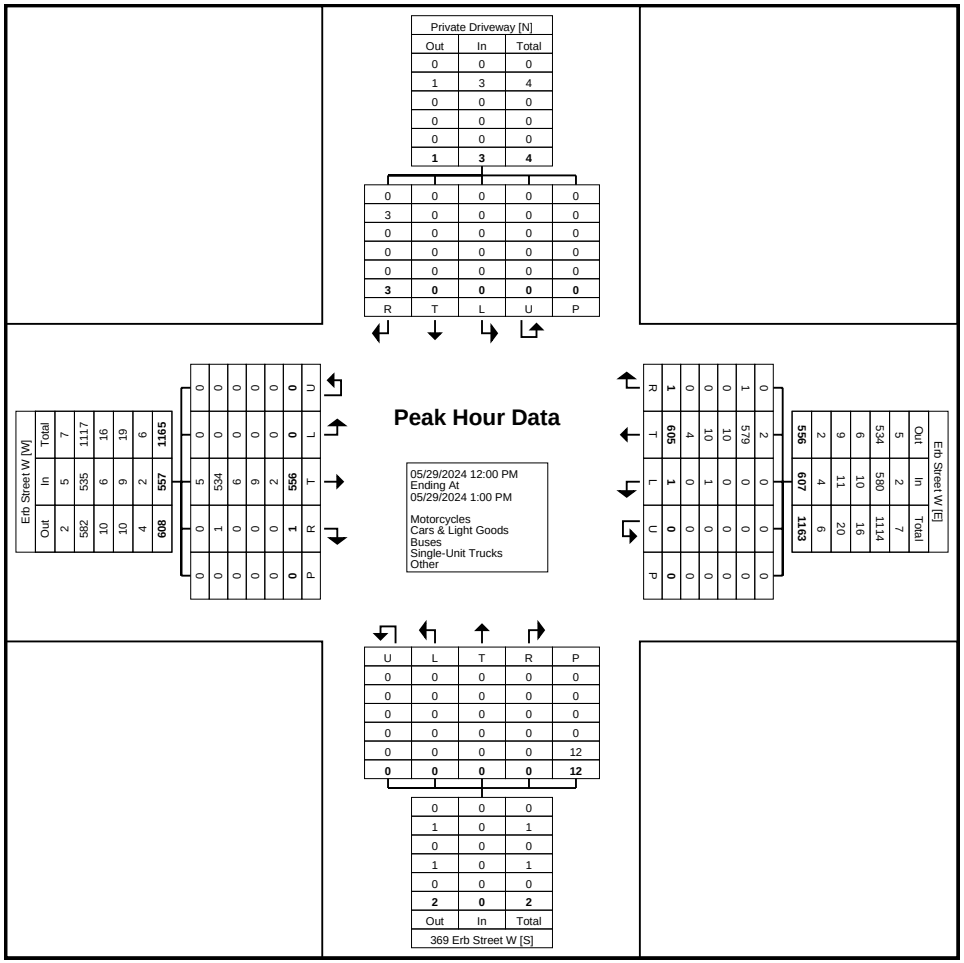
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						369 Erb Street W Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	0	114	1	0	0	115	0	164	1	0	0	165	0	0	0	0	1	0	0	0	0	0	0	0	280
12:15 PM	0	139	0	0	0	139	0	156	0	0	0	156	0	0	0	0	4	0	0	0	2	0	0	2	297
12:30 PM	0	141	0	0	0	141	0	134	0	0	0	134	0	0	0	0	2	0	0	0	1	0	0	1	276
12:45 PM	0	162	0	0	0	162	1	151	0	0	0	152	0	0	0	0	5	0	0	0	0	0	0	0	314
Total	0	556	1	0	0	557	1	605	1	0	0	607	0	0	0	0	12	0	0	0	3	0	0	3	1167
Approach %	0.0	99.8	0.2	0.0	-	-	0.2	99.7	0.2	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	100.0	0.0	-	-	-
Total %	0.0	47.6	0.1	0.0	-	47.7	0.1	51.8	0.1	0.0	-	52.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.3	0.0	-	0.3	-
PHF	0.000	0.858	0.250	0.000	-	0.860	0.250	0.922	0.250	0.000	-	0.920	0.000	0.000	0.000	0.000	-	0.000	0.000	0.000	0.375	0.000	-	0.375	0.929
Motorcycles	0	5	0	0	-	5	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	7
% Motorcycles	-	0.9	0.0	-	-	0.9	0.0	0.3	0.0	-	-	0.3	-	-	-	-	-	-	-	-	0.0	-	-	0.0	0.6
Cars & Light Goods	0	534	1	0	-	535	0	579	1	0	-	580	0	0	0	0	-	0	0	0	3	0	-	3	1118
% Cars & Light Goods	-	96.0	100.0	-	-	96.1	0.0	95.7	100.0	-	-	95.6	-	-	-	-	-	-	-	-	100.0	-	-	100.0	95.8
Buses	0	6	0	0	-	6	0	10	0	0	-	10	0	0	0	0	-	0	0	0	0	0	-	0	16
% Buses	-	1.1	0.0	-	-	1.1	0.0	1.7	0.0	-	-	1.6	-	-	-	-	-	-	-	-	0.0	-	-	0.0	1.4
Single-Unit Trucks	0	9	0	0	-	9	1	10	0	0	-	11	0	0	0	0	-	0	0	0	0	0	-	0	20
% Single-Unit Trucks	-	1.6	0.0	-	-	1.6	100.0	1.7	0.0	-	-	1.8	-	-	-	-	-	-	-	-	0.0	-	-	0.0	1.7
Articulated Trucks	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	-	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.5	-	-	-	-	-	-	-	-	0.0	-	-	0.0	0.3
Bicycles on Road	0	2	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	3
% Bicycles on Road	-	0.4	0.0	-	-	0.4	0.0	0.2	0.0	-	-	0.2	-	-	-	-	-	-	-	-	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	12	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

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

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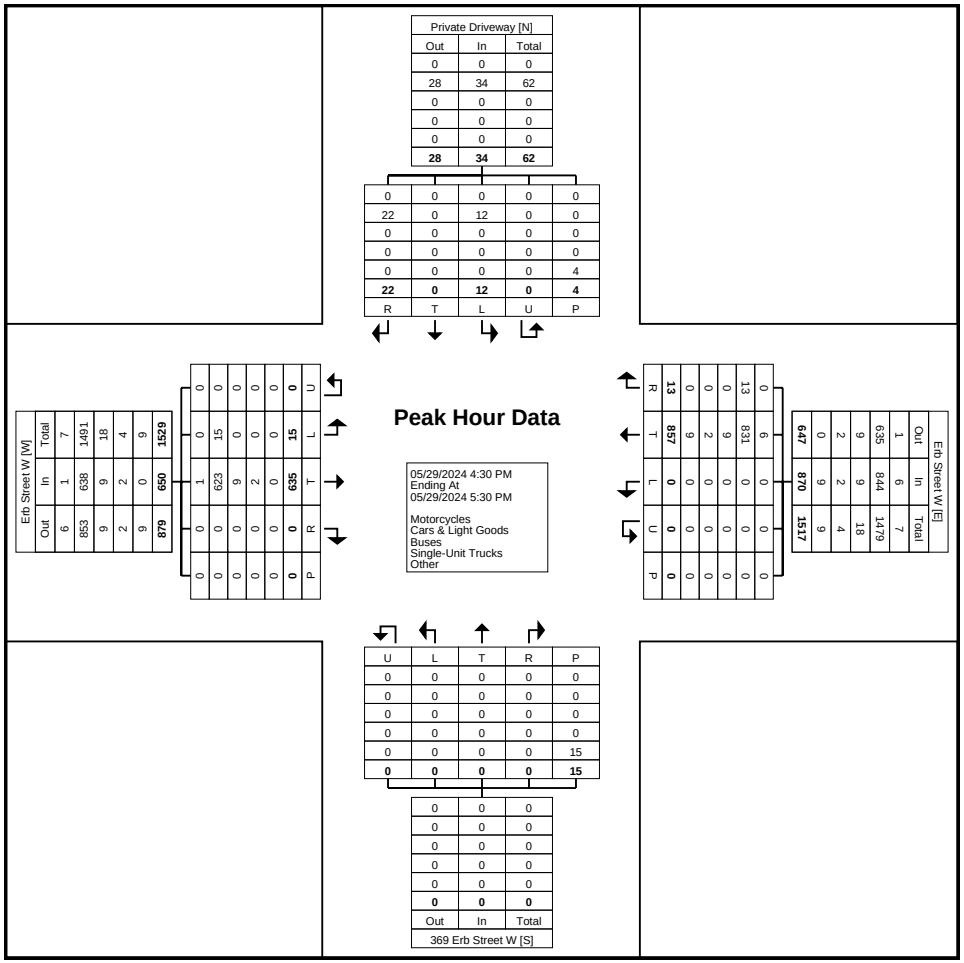
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Erb Street W Eastbound						Erb Street W Westbound						369 Erb Street W Northbound						Private Driveway Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	1	149	0	0	0	150	0	226	1	0	0	227	0	0	0	0	7	0	1	0	4	0	1	5	382
4:45 PM	4	163	0	0	0	167	0	210	1	0	0	211	0	0	0	0	1	0	3	0	5	0	2	8	386
5:00 PM	8	185	0	0	0	193	0	209	6	0	0	215	0	0	0	0	2	0	3	0	5	0	0	8	416
5:15 PM	2	138	0	0	0	140	0	212	5	0	0	217	0	0	0	0	5	0	5	0	8	0	1	13	370
Total	15	635	0	0	0	650	0	857	13	0	0	870	0	0	0	0	15	0	12	0	22	0	4	34	1554
Approach %	2.3	97.7	0.0	0.0	-	-	0.0	98.5	1.5	0.0	-	-	0.0	0.0	0.0	0.0	-	-	35.3	0.0	64.7	0.0	-	-	-
Total %	1.0	40.9	0.0	0.0	-	41.8	0.0	55.1	0.8	0.0	-	56.0	0.0	0.0	0.0	0.0	-	0.0	0.8	0.0	1.4	0.0	-	2.2	-
PHF	0.469	0.858	0.000	0.000	-	0.842	0.000	0.948	0.542	0.000	-	0.958	0.000	0.000	0.000	0.000	-	0.000	0.600	0.000	0.688	0.000	-	0.654	0.934
Motorcycles	0	1	0	0	-	1	0	6	0	0	-	6	0	0	0	0	-	0	0	0	0	0	-	0	7
% Motorcycles	0.0	0.2	-	-	-	0.2	-	0.7	0.0	-	-	0.7	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.5
Cars & Light Goods	15	623	0	0	-	638	0	831	13	0	-	844	0	0	0	0	-	0	12	0	22	0	-	34	1516
% Cars & Light Goods	100.0	98.1	-	-	-	98.2	-	97.0	100.0	-	-	97.0	-	-	-	-	-	-	100.0	-	100.0	-	-	100.0	97.6
Buses	0	9	0	0	-	9	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	18
% Buses	0.0	1.4	-	-	-	1.4	-	1.1	0.0	-	-	1.0	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	1.2
Single-Unit Trucks	0	2	0	0	-	2	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	4
% Single-Unit Trucks	0.0	0.3	-	-	-	0.3	-	0.2	0.0	-	-	0.2	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.3
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	-	-	-	0.0	-	0.1	0.0	-	-	0.1	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	8	0	0	-	8	0	0	0	0	-	0	0	0	0	0	-	0	8
% Bicycles on Road	0.0	0.0	-	-	-	0.0	-	0.9	0.0	-	-	0.9	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.3	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	13	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86.7	-	-	-	-	-	100.0	-	-

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Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Culpepper Drive & 359 Erb Street
Site Code: 240209
Start Date: 05/29/2024

Turning Movement Data

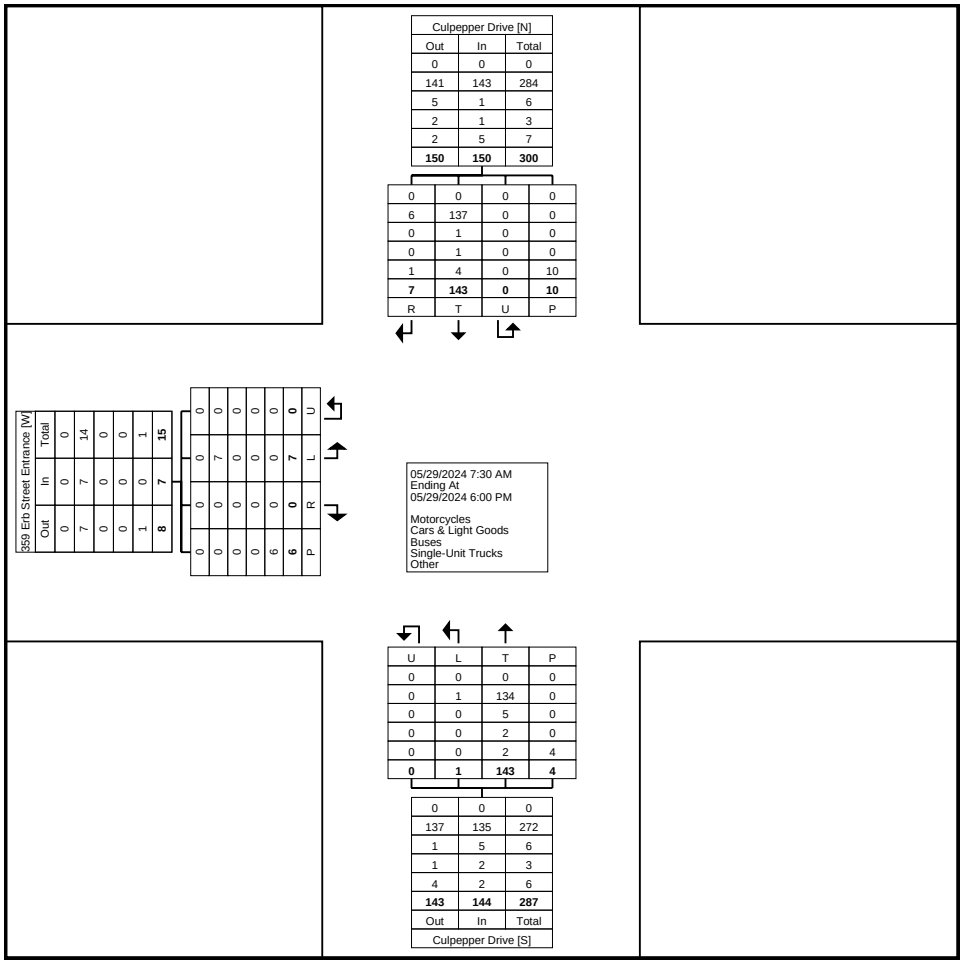
Start Time	359 Erb Street Entrance Eastbound					Culpepper Drive Northbound					Culpepper Drive Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	1	0	0	0	1	0	4	0	0	4	2	1	0	2	3	8
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	1	4	4
Hourly Total	1	0	0	0	1	0	4	0	0	4	6	1	0	3	7	12
8:00 AM	0	0	0	0	0	0	11	0	0	11	2	0	0	0	2	13
8:15 AM	1	0	0	0	1	0	3	0	0	3	3	0	0	0	3	7
8:30 AM	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	7
8:45 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
Hourly Total	1	0	0	0	1	0	25	0	0	25	6	0	0	0	6	32
9:00 AM	0	0	0	0	0	0	7	0	0	7	2	0	0	0	2	9
9:15 AM	0	0	0	0	0	0	4	0	2	4	2	0	0	0	2	6
9:30 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	6
9:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	2	0	3
Hourly Total	0	0	0	0	0	0	14	0	2	14	10	0	0	2	10	24
10:00 AM	0	0	0	0	0	0	5	0	0	5	2	0	0	0	2	7
10:15 AM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	3
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	7	0	0	7	3	0	0	0	3	10
12:00 PM	0	0	0	1	0	0	0	0	0	0	4	0	0	0	4	4
12:15 PM	0	0	0	0	0	0	6	0	0	6	3	0	0	0	3	9
12:30 PM	0	0	0	0	0	0	5	0	0	5	3	0	0	0	3	8
12:45 PM	0	0	0	1	0	0	4	0	0	4	6	0	0	0	6	10
Hourly Total	0	0	0	2	0	0	15	0	0	15	16	0	0	0	16	31
1:00 PM	0	0	0	0	0	0	3	0	0	3	5	0	0	0	5	8
1:15 PM	0	0	0	0	0	0	4	0	0	4	7	0	0	1	7	11
1:30 PM	1	0	0	0	1	0	6	0	0	6	4	1	0	0	5	12
1:45 PM	1	0	0	0	1	1	3	0	0	4	3	0	0	0	3	8
Hourly Total	2	0	0	0	2	1	16	0	0	17	19	1	0	1	20	39
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	0	0	0	0	0	0	6	0	0	6	5	0	0	1	5	11
3:15 PM	0	0	0	0	0	0	6	0	0	6	6	0	0	0	6	12
3:30 PM	1	0	0	1	1	0	4	0	1	4	3	2	0	0	5	10
3:45 PM	0	0	0	0	0	0	5	0	1	5	5	1	0	0	6	11
Hourly Total	1	0	0	1	1	0	21	0	2	21	19	3	0	1	22	44
4:00 PM	0	0	0	0	0	0	4	0	0	4	5	1	0	2	6	10
4:15 PM	0	0	0	0	0	0	5	0	0	5	4	0	0	0	4	9
4:30 PM	0	0	0	0	0	0	9	0	0	9	12	0	0	0	12	21

4:45 PM	1	0	0	0	1	0	9	0	0	9	6	0	0	0	6	16
Hourly Total	1	0	0	0	1	0	27	0	0	27	27	1	0	2	28	56
5:00 PM	1	0	0	1	1	0	2	0	0	2	18	0	0	0	18	21
5:15 PM	0	0	0	2	0	0	3	0	0	3	7	1	0	1	8	11
5:30 PM	0	0	0	0	0	0	5	0	0	5	5	0	0	0	5	10
5:45 PM	0	0	0	0	0	0	4	0	0	4	7	0	0	0	7	11
Hourly Total	1	0	0	3	1	0	14	0	0	14	37	1	0	1	38	53
Grand Total	7	0	0	6	7	1	143	0	4	144	143	7	0	10	150	301
Approach %	100.0	0.0	0.0	-	-	0.7	99.3	0.0	-	-	95.3	4.7	0.0	-	-	-
Total %	2.3	0.0	0.0	-	2.3	0.3	47.5	0.0	-	47.8	47.5	2.3	0.0	-	49.8	-
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	7	0	0	-	7	1	134	0	-	135	137	6	0	-	143	285
% Cars & Light Goods	100.0	-	-	-	100.0	100.0	93.7	-	-	93.8	95.8	85.7	-	-	95.3	94.7
Buses	0	0	0	-	0	0	5	0	-	5	1	0	0	-	1	6
% Buses	0.0	-	-	-	0.0	0.0	3.5	-	-	3.5	0.7	0.0	-	-	0.7	2.0
Single-Unit Trucks	0	0	0	-	0	0	2	0	-	2	1	0	0	-	1	3
% Single-Unit Trucks	0.0	-	-	-	0.0	0.0	1.4	-	-	1.4	0.7	0.0	-	-	0.7	1.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	-	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	2	0	-	2	4	1	0	-	5	7
% Bicycles on Road	0.0	-	-	-	0.0	0.0	1.4	-	-	1.4	2.8	14.3	-	-	3.3	2.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	6	-	-	-	-	4	-	-	-	-	10	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

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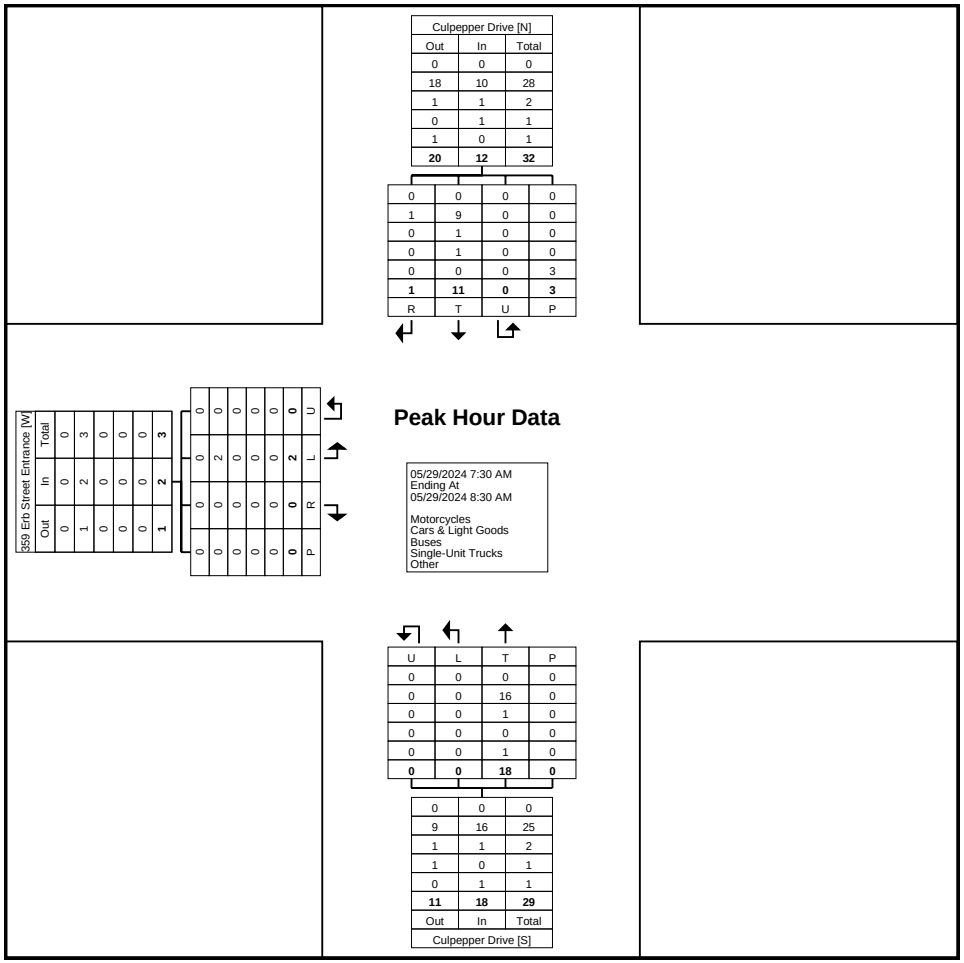
Turning Movement Peak Hour Data (7:30 AM)

Start Time	359 Erb Street Entrance Eastbound					Culpepper Drive Northbound					Culpepper Drive Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	1	0	0	0	1	0	4	0	0	4	2	1	0	2	3	8
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	1	4	4
8:00 AM	0	0	0	0	0	0	11	0	0	11	2	0	0	0	2	13
8:15 AM	1	0	0	0	1	0	3	0	0	3	3	0	0	0	3	7
Total	2	0	0	0	2	0	18	0	0	18	11	1	0	3	12	32
Approach %	100.0	0.0	0.0	-	-	0.0	100.0	0.0	-	-	91.7	8.3	0.0	-	-	-
Total %	6.3	0.0	0.0	-	6.3	0.0	56.3	0.0	-	56.3	34.4	3.1	0.0	-	37.5	-
PHF	0.500	0.000	0.000	-	0.500	0.000	0.409	0.000	-	0.409	0.688	0.250	0.000	-	0.750	0.615
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	2	0	0	-	2	0	16	0	-	16	9	1	0	-	10	28
% Cars & Light Goods	100.0	-	-	-	100.0	-	88.9	-	-	88.9	81.8	100.0	-	-	83.3	87.5
Buses	0	0	0	-	0	0	1	0	-	1	1	0	0	-	1	2
% Buses	0.0	-	-	-	0.0	-	5.6	-	-	5.6	9.1	0.0	-	-	8.3	6.3
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Single-Unit Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	9.1	0.0	-	-	8.3	3.1
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	-	-	-	0.0	-	5.6	-	-	5.6	0.0	0.0	-	-	0.0	3.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Culpepper Drive & 359 Erb Street
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Culpepper Drive & 359 Erb Street
Site Code: 240209
Start Date: 05/29/2024

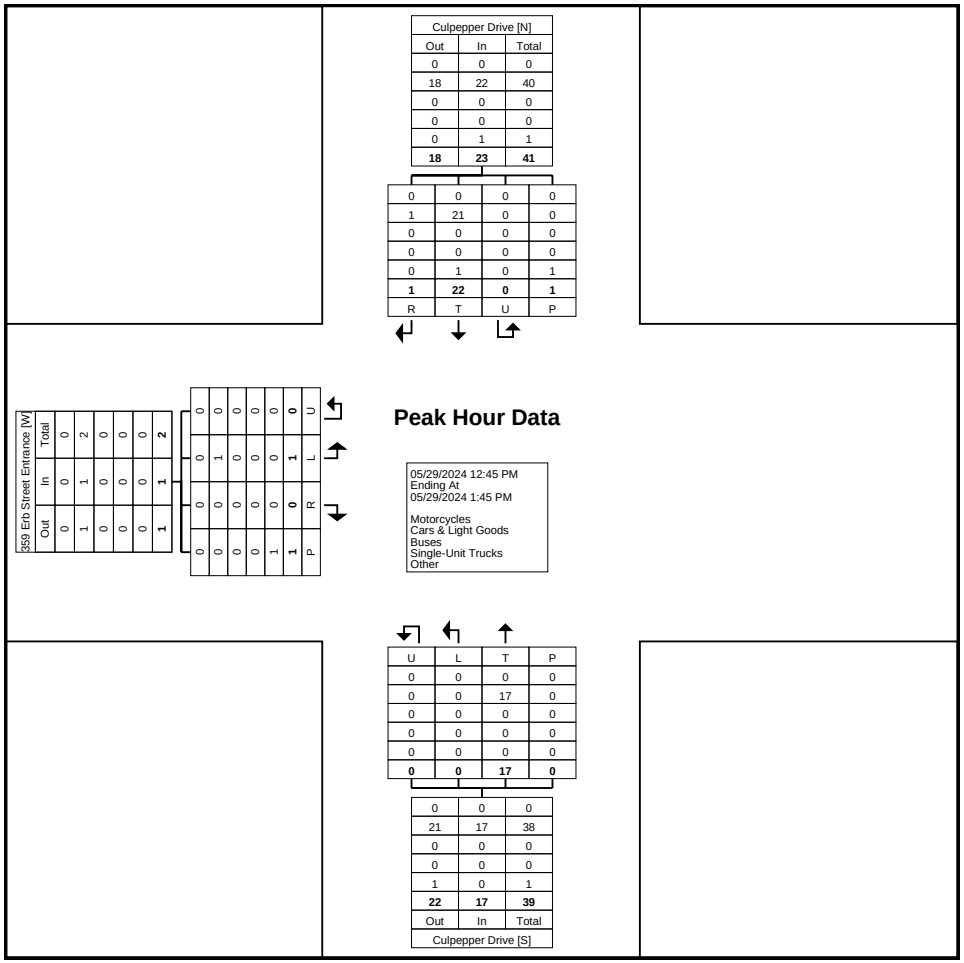
Turning Movement Peak Hour Data (12:45 PM)

Start Time	359 Erb Street Entrance Eastbound					Culpepper Drive Northbound					Culpepper Drive Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
12:45 PM	0	0	0	1	0	0	4	0	0	4	6	0	0	0	6	10
1:00 PM	0	0	0	0	0	0	3	0	0	3	5	0	0	0	5	8
1:15 PM	0	0	0	0	0	0	4	0	0	4	7	0	0	1	7	11
1:30 PM	1	0	0	0	1	0	6	0	0	6	4	1	0	0	5	12
Total	1	0	0	1	1	0	17	0	0	17	22	1	0	1	23	41
Approach %	100.0	0.0	0.0	-	-	0.0	100.0	0.0	-	-	95.7	4.3	0.0	-	-	-
Total %	2.4	0.0	0.0	-	2.4	0.0	41.5	0.0	-	41.5	53.7	2.4	0.0	-	56.1	-
PHF	0.250	0.000	0.000	-	0.250	0.000	0.708	0.000	-	0.708	0.786	0.250	0.000	-	0.821	0.854
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	1	0	0	-	1	0	17	0	-	17	21	1	0	-	22	40
% Cars & Light Goods	100.0	-	-	-	100.0	-	100.0	-	-	100.0	95.5	100.0	-	-	95.7	97.6
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Bicycles on Road	0.0	-	-	-	0.0	-	0.0	-	-	0.0	4.5	0.0	-	-	4.3	2.4
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Culpepper Drive & 359 Erb Street
Site Code: 240209
Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (12:45 PM)

Paradigm Transportation Solutions Limited
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519-896-3163 cbowness@ptsl.com

Count Name: Culpepper Drive & 359 Erb Street
Site Code: 240209
Start Date: 05/29/2024

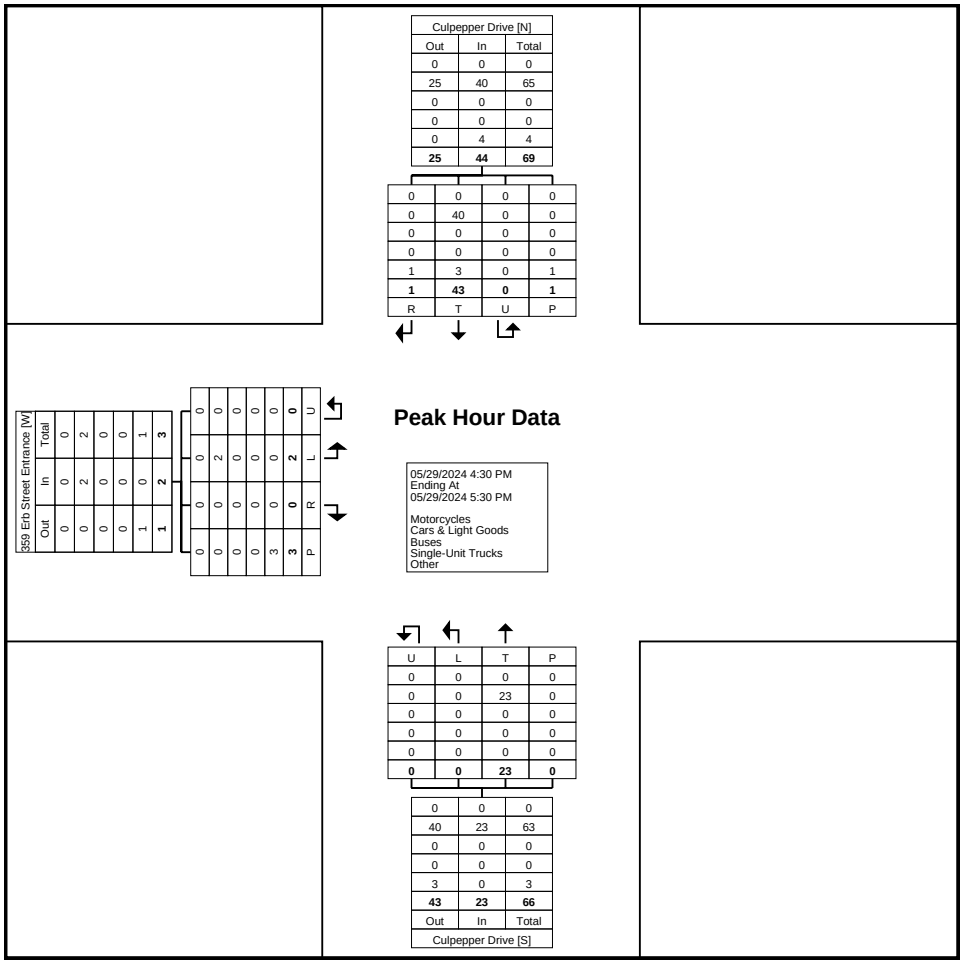
Turning Movement Peak Hour Data (4:30 PM)

Start Time	359 Erb Street Entrance Eastbound					Culpepper Drive Northbound					Culpepper Drive Southbound					
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:30 PM	0	0	0	0	0	0	9	0	0	9	12	0	0	0	12	21
4:45 PM	1	0	0	0	1	0	9	0	0	9	6	0	0	0	6	16
5:00 PM	1	0	0	1	1	0	2	0	0	2	18	0	0	0	18	21
5:15 PM	0	0	0	2	0	0	3	0	0	3	7	1	0	1	8	11
Total	2	0	0	3	2	0	23	0	0	23	43	1	0	1	44	69
Approach %	100.0	0.0	0.0	-	-	0.0	100.0	0.0	-	-	97.7	2.3	0.0	-	-	-
Total %	2.9	0.0	0.0	-	2.9	0.0	33.3	0.0	-	33.3	62.3	1.4	0.0	-	63.8	-
PHF	0.500	0.000	0.000	-	0.500	0.000	0.639	0.000	-	0.639	0.597	0.250	0.000	-	0.611	0.821
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	2	0	0	-	2	0	23	0	-	23	40	0	0	-	40	65
% Cars & Light Goods	100.0	-	-	-	100.0	-	100.0	-	-	100.0	93.0	0.0	-	-	90.9	94.2
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	3	1	0	-	4	4
% Bicycles on Road	0.0	-	-	-	0.0	-	0.0	-	-	0.0	7.0	100.0	-	-	9.1	5.8
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	3	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

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Start Date: 05/29/2024



Turning Movement Peak Hour Data Plot (4:30 PM)

Appendix C

Base Year Traffic Operations Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	852	0	0	502	14	0	0	0	5	0	23
Future Volume (vph)	19	852	0	0	502	14	0	0	0	5	0	23
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996						0.889	
Flt Protected		0.999									0.991	
Satd. Flow (prot)	0	3009	0	0	2917	0	0	1533	0	0	1350	0
Flt Permitted		0.999									0.991	
Satd. Flow (perm)	0	3009	0	0	2917	0	0	1533	0	0	1350	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		248.5			47.3			37.1			40.1	
Travel Time (s)		14.9			2.8			3.3			3.6	
Confl. Peds. (#/hr)			10	10			1		1	1		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	19	852	0	0	502	14	0	0	0	5	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	871	0	0	516	0	0	0	0	0	28	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	852	0	0	502	14	0	0	0	5	0	23
Future Vol, veh/h	19	852	0	0	502	14	0	0	0	5	0	23
Conflicting Peds, #/hr	0	0	10	10	0	0	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	19	852	0	0	502	14	0	0	0	5	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	516	0	0	862	0	0	1152	1416	437	974	1409	259
Stage 1	-	-	-	-	-	-	900	900	-	509	509	-
Stage 2	-	-	-	-	-	-	252	516	-	465	900	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1060	-	-	789	-	-	155	139	573	209	140	746
Stage 1	-	-	-	-	-	-	304	360	-	520	541	-
Stage 2	-	-	-	-	-	-	736	538	-	552	360	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1060	-	-	783	-	-	145	133	568	203	134	745
Mov Cap-2 Maneuver	-	-	-	-	-	-	145	133	-	203	134	-
Stage 1	-	-	-	-	-	-	292	345	-	502	541	-
Stage 2	-	-	-	-	-	-	713	538	-	533	345	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	0	12.6
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1060	-	-	783	-	-	504
HCM Lane V/C Ratio	-	0.018	-	-	-	-	-	0.056
HCM Control Delay (s)	0	8.5	0.1	-	0	-	-	12.6
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	828	1	0	502	19	1	0	2	20	1	13
Future Volume (vph)	28	828	1	0	502	19	1	0	2	20	1	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.995			0.910			0.948	
Flt Protected		0.998						0.984			0.971	
Satd. Flow (prot)	0	3007	0	0	2916	0	0	1373	0	0	1411	0
Flt Permitted		0.998						0.984			0.971	
Satd. Flow (perm)	0	3007	0	0	2916	0	0	1373	0	0	1411	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	16		13	13		16	1		1	1		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	28	828	1	0	502	19	1	0	2	20	1	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	857	0	0	521	0	0	3	0	0	34	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	828	1	0	502	19	1	0	2	20	1	13
Future Vol, veh/h	28	828	1	0	502	19	1	0	2	20	1	13
Conflicting Peds, #/hr	16	0	13	13	0	16	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	28	828	1	0	502	19	1	0	2	20	1	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	537	0	0	842	0	0	1151	1435	429	999	1426	278
Stage 1	-	-	-	-	-	-	898	898	-	528	528	-
Stage 2	-	-	-	-	-	-	253	537	-	471	898	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1041	-	-	802	-	-	155	135	580	201	137	725
Stage 1	-	-	-	-	-	-	305	361	-	507	531	-
Stage 2	-	-	-	-	-	-	735	526	-	548	361	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1028	-	-	794	-	-	144	125	574	190	127	715
Mov Cap-2 Maneuver	-	-	-	-	-	-	144	125	-	190	127	-
Stage 1	-	-	-	-	-	-	286	339	-	475	525	-
Stage 2	-	-	-	-	-	-	720	520	-	518	339	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	17.6	21
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	288	1028	-	-	794	-	-	259
HCM Lane V/C Ratio	0.01	0.027	-	-	-	-	-	0.131
HCM Control Delay (s)	17.6	8.6	0.2	-	0	-	-	21
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	844	6	6	512	1	9	0	18	1	0	0
Future Volume (vph)	0	844	6	6	512	1	9	0	18	1	0	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999						0.910				
Flt Protected					0.999			0.984			0.950	
Satd. Flow (prot)	0	3004	0	0	2919	0	0	1320	0	0	1456	0
Flt Permitted					0.999			0.984			0.950	
Satd. Flow (perm)	0	3004	0	0	2919	0	0	1320	0	0	1456	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	14		18	18		14	2		4	4		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	17%	17%	6%	0%	0%	0%	6%	0%	0%	0%
Adj. Flow (vph)	0	844	6	6	512	1	9	0	18	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	850	0	0	519	0	0	27	0	0	1	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	844	6	6	512	1	9	0	18	1	0	0
Future Vol, veh/h	0	844	6	6	512	1	9	0	18	1	0	0
Conflicting Peds, #/hr	14	0	18	18	0	14	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	17	17	6	0	0	0	6	0	0	0
Mvmt Flow	0	844	6	6	512	1	9	0	18	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	527	0	0	868	0	0	1135	1404	447	965	1407	273
Stage 1	-	-	-	-	-	-	865	865	-	539	539	-
Stage 2	-	-	-	-	-	-	270	539	-	426	868	-
Critical Hdwy	4.1	-	-	4.44	-	-	7.5	6.5	7.02	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.37	-	-	3.5	4	3.36	3.5	4	3.3
Pot Cap-1 Maneuver	1050	-	-	684	-	-	160	141	548	212	140	731
Stage 1	-	-	-	-	-	-	319	374	-	499	525	-
Stage 2	-	-	-	-	-	-	718	525	-	582	372	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1039	-	-	674	-	-	156	136	539	200	135	722
Mov Cap-2 Maneuver	-	-	-	-	-	-	156	136	-	200	135	-
Stage 1	-	-	-	-	-	-	315	369	-	494	513	-
Stage 2	-	-	-	-	-	-	708	513	-	561	367	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.4	23.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	296	1039	-	-	674	-	-	200
HCM Lane V/C Ratio	0.091	-	-	-	0.009	-	-	0.005
HCM Control Delay (s)	18.4	0	-	-	10.4	0.1	-	23.1
HCM Lane LOS	C	A	-	-	B	A	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	0	0	25	11	1
Future Volume (vph)	2	0	0	25	11	1
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.989	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1539	1385	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1539	1385	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	3					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	6%	18%	0%
Adj. Flow (vph)	2	0	0	25	11	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	25	12	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	25	11	1
Future Vol, veh/h	2	0	0	25	11	1
Conflicting Peds, #/hr	3	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	6	18	0
Mvmt Flow	2	0	0	25	11	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	40	12	12	0	-	0
Stage 1	12	-	-	-	-	-
Stage 2	28	-	-	-	-	-
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	977	1074	1620	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	1000	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	977	1074	1620	-	-	-
Mov Cap-2 Maneuver	977	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	1000	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1620	-	977	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	8.7	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	652	0	0	857	13	0	0	0	12	0	22
Future Volume (vph)	15	652	0	0	857	13	0	0	0	12	0	22
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.913	
Flt Protected		0.999									0.983	
Satd. Flow (prot)	0	3038	0	0	3064	0	0	1533	0	0	1376	0
Flt Permitted		0.999									0.983	
Satd. Flow (perm)	0	3038	0	0	3064	0	0	1533	0	0	1376	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		248.5			47.3			37.1			40.1	
Travel Time (s)		14.9			2.8			3.3			3.6	
Confl. Peds. (#/hr)	4		15	15		4						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	15	652	0	0	857	13	0	0	0	12	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	667	0	0	870	0	0	0	0	0	34	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	652	0	0	857	13	0	0	0	12	0	22
Future Vol, veh/h	15	652	0	0	857	13	0	0	0	12	0	22
Conflicting Peds, #/hr	4	0	15	15	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	15	652	0	0	857	13	0	0	0	12	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	874	0	0	667	0	0	1126	1571	341	1224	1565	439
Stage 1	-	-	-	-	-	-	697	697	-	868	868	-
Stage 2	-	-	-	-	-	-	429	874	-	356	697	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	781	-	-	932	-	-	162	112	661	137	113	571
Stage 1	-	-	-	-	-	-	402	446	-	318	372	-
Stage 2	-	-	-	-	-	-	580	370	-	640	446	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	779	-	-	921	-	-	150	107	653	133	108	569
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	107	-	133	108	-
Stage 1	-	-	-	-	-	-	386	427	-	308	371	-
Stage 2	-	-	-	-	-	-	558	369	-	621	427	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	0	20.6
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	779	-	-	921	-	-	264
HCM Lane V/C Ratio	-	0.019	-	-	-	-	-	0.129
HCM Control Delay (s)	0	9.7	0.1	-	0	-	-	20.6
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	644	4	3	846	26	0	0	1	19	0	24
Future Volume (vph)	16	644	4	3	846	26	0	0	1	19	0	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.996			0.865			0.925	
Flt Protected		0.999									0.978	
Satd. Flow (prot)	0	3035	0	0	3058	0	0	1326	0	0	1387	0
Flt Permitted		0.999									0.978	
Satd. Flow (perm)	0	3035	0	0	3058	0	0	1326	0	0	1387	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	23		23	23		23						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	16	644	4	3	846	26	0	0	1	19	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	664	0	0	875	0	0	1	0	0	43	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	644	4	3	846	26	0	0	1	19	0	24
Future Vol, veh/h	16	644	4	3	846	26	0	0	1	19	0	24
Conflicting Peds, #/hr	23	0	23	23	0	23	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	16	644	4	3	846	26	0	0	1	19	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	895	0	0	671	0	0	1130	1602	347	1242	1591	459
Stage 1	-	-	-	-	-	-	701	701	-	888	888	-
Stage 2	-	-	-	-	-	-	429	901	-	354	703	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	767	-	-	929	-	-	161	107	655	133	108	554
Stage 1	-	-	-	-	-	-	400	444	-	309	365	-
Stage 2	-	-	-	-	-	-	580	360	-	642	443	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	753	-	-	912	-	-	147	99	643	127	100	544
Mov Cap-2 Maneuver	-	-	-	-	-	-	147	99	-	127	100	-
Stage 1	-	-	-	-	-	-	380	422	-	294	356	-
Stage 2	-	-	-	-	-	-	551	351	-	620	421	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	10.6	25.1
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	643	753	-	-	912	-	-	222
HCM Lane V/C Ratio	0.002	0.021	-	-	0.003	-	-	0.194
HCM Control Delay (s)	10.6	9.9	0.2	-	9	0	-	25.1
HCM Lane LOS	B	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	632	32	10	865	3	10	0	15	1	2	0
Future Volume (vph)	0	632	32	10	865	3	10	0	15	1	2	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.993			0.999			0.919				
Flt Protected					0.999			0.980			0.984	
Satd. Flow (prot)	0	3021	0	0	3064	0	0	1380	0	0	1508	0
Flt Permitted					0.999			0.980			0.984	
Satd. Flow (perm)	0	3021	0	0	3064	0	0	1380	0	0	1508	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	37		28	28		37			4	4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	632	32	10	865	3	10	0	15	1	2	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	664	0	0	878	0	0	25	0	0	3	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	632	32	10	865	3	10	0	15	1	2	0
Future Vol, veh/h	0	632	32	10	865	3	10	0	15	1	2	0
Conflicting Peds, #/hr	37	0	28	28	0	37	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	632	32	10	865	3	10	0	15	1	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	905	0	0	692	0	0	1130	1601	364	1244	1616	471
Stage 1	-	-	-	-	-	-	676	676	-	924	924	-
Stage 2	-	-	-	-	-	-	454	925	-	320	692	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	760	-	-	912	-	-	161	107	639	133	105	545
Stage 1	-	-	-	-	-	-	414	456	-	294	351	-
Stage 2	-	-	-	-	-	-	560	351	-	672	448	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	738	-	-	892	-	-	152	99	623	124	98	529
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	99	-	124	98	-
Stage 1	-	-	-	-	-	-	405	446	-	285	333	-
Stage 2	-	-	-	-	-	-	544	333	-	654	438	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	19.2	40.3
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	278	738	-	-	892	-	-	105
HCM Lane V/C Ratio	0.09	-	-	-	0.011	-	-	0.029
HCM Control Delay (s)	19.2	0	-	-	9.1	0.1	-	40.3
HCM Lane LOS	C	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	0	0	23	43	1
Future Volume (vph)	2	0	0	23	43	1
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.997	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1632	1627	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1632	1627	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	1		3			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	2	0	0	23	43	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	23	44	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	14.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	23	43	1
Future Vol, veh/h	2	0	0	23	43	1
Conflicting Peds, #/hr	1	0	3	0	0	3
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	2	0	0	23	43	1

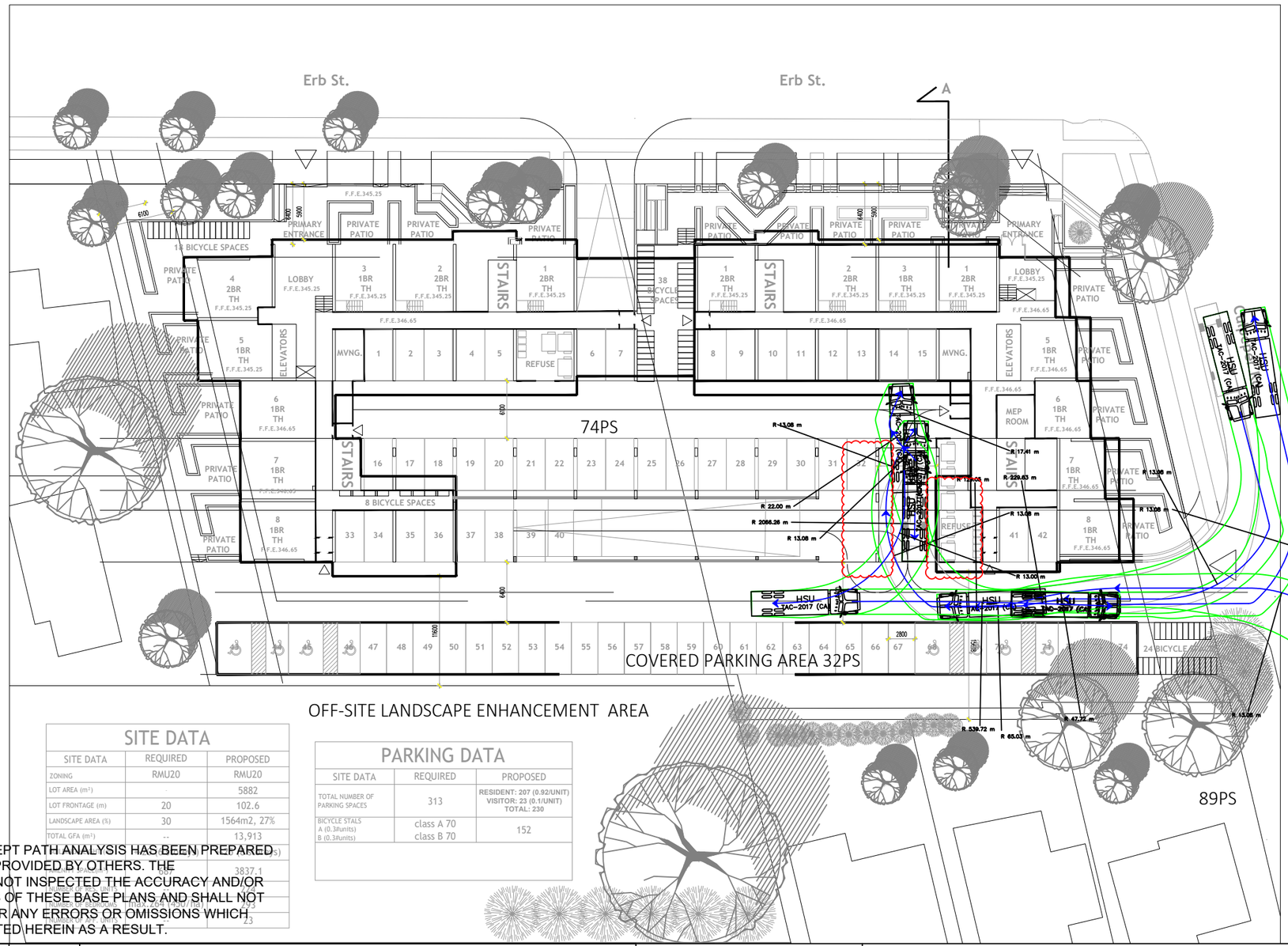
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	71	47	47	0	-	0
Stage 1	47	-	-	-	-	-
Stage 2	24	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	938	1028	1573	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	1004	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	934	1026	1569	-	-	-
Mov Cap-2 Maneuver	934	-	-	-	-	-
Stage 1	979	-	-	-	-	-
Stage 2	1002	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1569	-	934	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	8.9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Appendix D

AutoTURN Analysis



SITE DATA

SITE DATA	REQUIRED	PROPOSED
ZONING	RMU20	RMU20
LOT AREA (m²)	-	5882
LOT FRONTAGE (m)	20	102.6
LANDSCAPE AREA (%)	30	1564m2, 27%
TOTAL GFA (m²)	--	13,913
[illegible]	[illegible]	3837.1
[illegible]	[illegible]	73
[illegible]	[illegible]	43

PARKING DATA

SITE DATA	REQUIRED	PROPOSED
TOTAL NUMBER OF PARKING SPACES	313	RESIDENT: 207 (0.92/UNIT) VISITOR: 23 (0.1/UNIT) TOTAL: 230
BICYCLE STALS A (0.3#units) B (0.3#units)	class A 70 class B 70	152

THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

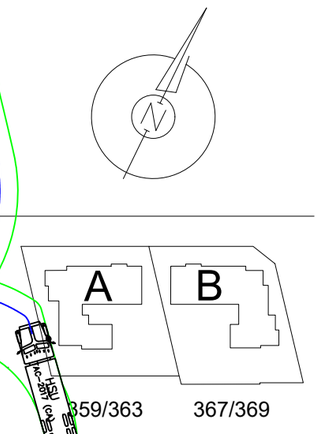
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REVISIONS

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2022.10.25. Issued for Pre-submission follow up
2022.12.14. Issued for Pre-submission follow up
2023.01.10. Issued for Owner's and Planer's review
2023.02.06. Issued for Pre-submission follow up
2023.09.21. Issued for Pre-submission consultation
2023.11.17. Issued for Pre-submission consultation
2024.04.25. Issued for Pre-submission consultation
2024.05.14. Issued for Pre-submission consultation
2024.12.11. Issued for OPA-ZBA submission

2296342 ONT INC.



building location

359-369 Erb St. Waterloo, ON

project

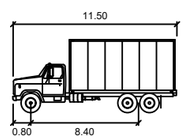
Erb MURB

drawing

Site Plan

NO.	DATE	INITIAL	REVISION DETAIL
3	2025-01-06	LC	UPDATED SITE PLAN
2	2024-10-17	LC	UPDATED SITE PLAN
1	2024-09-17	LC	UPDATED SITE PLAN

DESIGN VEHICLE:



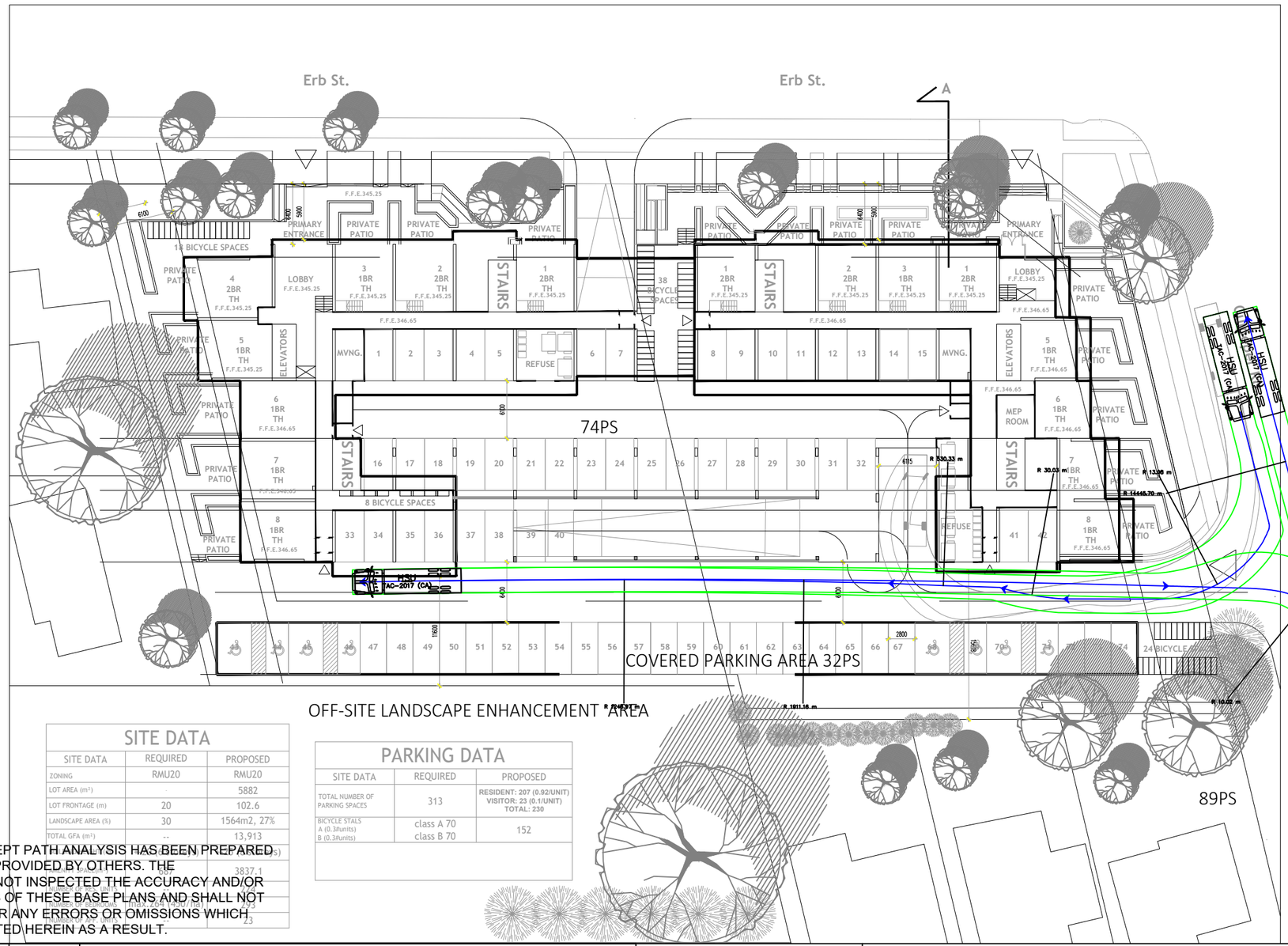
HSU

	meters
Width	2.60
Track	2.60
Lock to Lock Time	6.0
Steering Angle	40.0

AUTOTURN ASSESSMENT
359-369 ERB STREET WEST
WATERLOO, ON

paradigm

PROJECT NO.: 240209	DATE: AUGUST 2024	SCALE: 1:500	DRAWING NO.: 01
DRAWN: LC	DESIGN: LC	CHECK: AS	



SITE DATA

SITE DATA	REQUIRED	PROPOSED
ZONING	RMU20	RMU20
LOT AREA (m²)	-	5882
LOT FRONTAGE (m)	20	102.6
LANDSCAPE AREA (%)	30	1564m2, 27%
TOTAL GFA (m²)	--	13,913
RESIDENTIAL GFA (m²)	--	13,060
NON-RESIDENTIAL GFA (m²)	--	853
AMENITY AREA (m²)	3837.1	4145
AMENITY AREA (m²)	1918.55	1973
AMENITY AREA (m²)	43	43

PARKING DATA

SITE DATA	REQUIRED	PROPOSED
TOTAL NUMBER OF PARKING SPACES	313	RESIDENT: 207 (0.92/UNIT) VISITOR: 23 (0.1/UNIT) TOTAL: 230
BICYCLE STALS A (0.3#units) B (0.3#units)	class A 70 class B 70	152

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2024.05.14. Issued for Pre-submission consultation
2024.12.11. Issued for OPA-ZBA submission

2296342 ONT INC.

building location

359-369 Erb St. Waterloo, ON

project

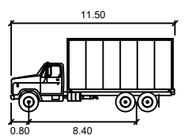
Erb MURB

drawing

Site Plan

NO.	DATE	INITIAL	REVISION DETAIL
3	2025-01-06	LC	UPDATED SITE PLAN
2	2024-10-17	LC	UPDATED SITE PLAN
1	2024-09-17	LC	UPDATED SITE PLAN

DESIGN VEHICLE:



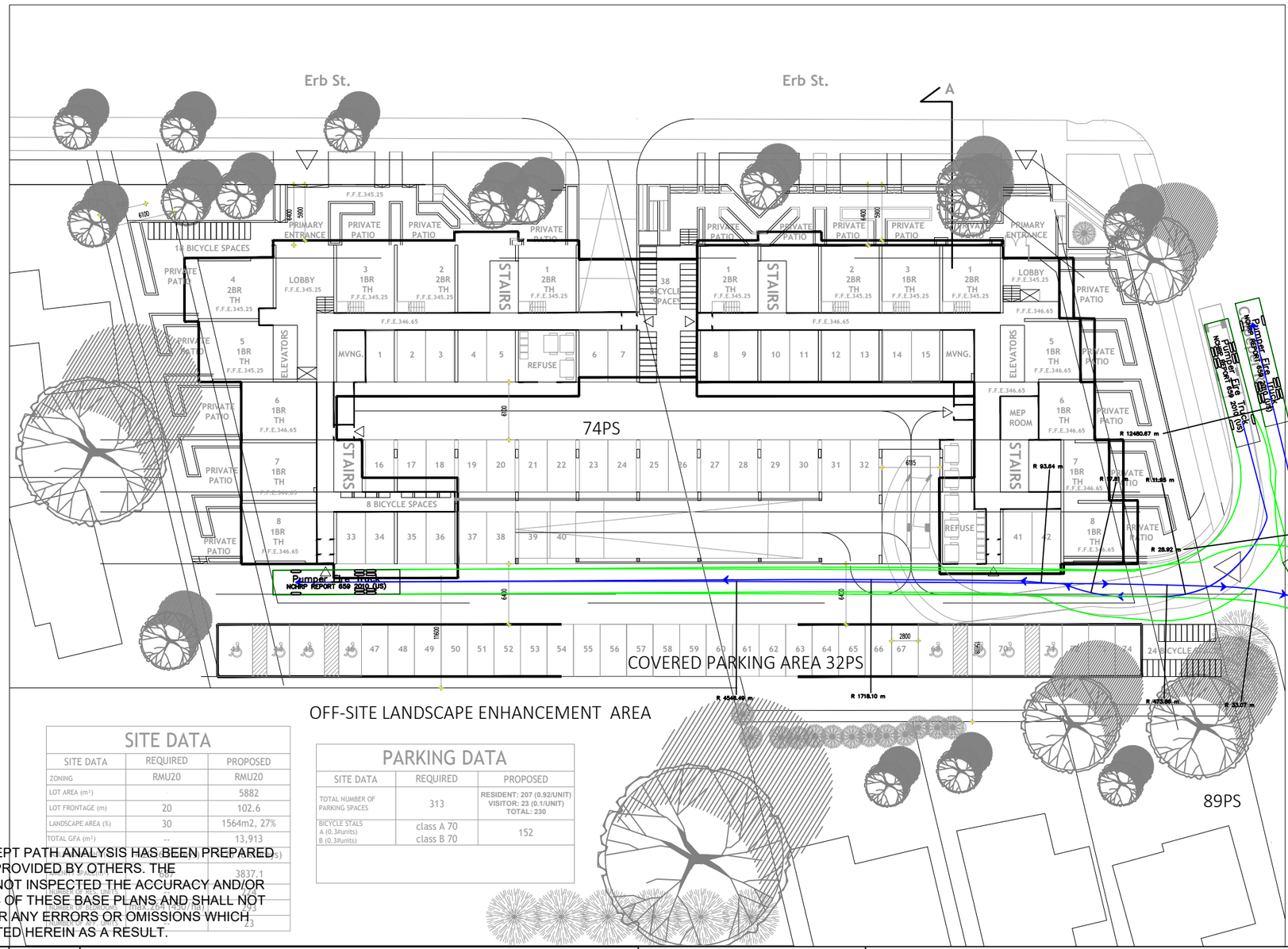
HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

AUTOTURN ASSESSMENT
359-369 ERB STREET WEST
WATERLOO, ON

paradigm

PROJECT NO.: 240209	DATE: AUGUST 2024	SCALE: 1:500	DRAWING NO.: 02
DRAWN: LC	DESIGN: LC	CHECK: AS	



SITE DATA

SITE DATA	REQUIRED	PROPOSED
ZONING	RMU20	RMU20
LOT AREA (m²)	-	5882
LOT FRONTAGE (m)	20	102.6
LANDSCAPE AREA (%)	30	1564m2, 27%
TOTAL GFA (m²)	--	13,913
FLOOR SPACE INDEX (FSI)	--	2.36
DENSITY (UPH)	150	3837.1
NUMBER OF UNITS	--	104
NUMBER OF 2BR UNITS	--	73
NUMBER OF 3BR UNITS	--	23

PARKING DATA

SITE DATA	REQUIRED	PROPOSED
TOTAL NUMBER OF PARKING SPACES	313	RESIDENT: 207 (0.92/UNIT) VISITOR: 23 (0.1/UNIT) TOTAL: 230
BICYCLE STALS A (0.3#units) B (0.3#units)	class A 70 class B 70	152

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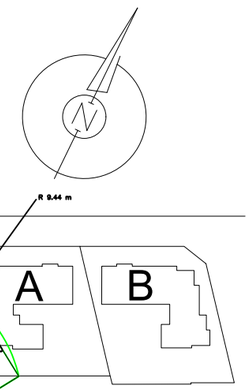
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2296342 ONT INC.



building location

359-369 Erb St. Waterloo, ON

project

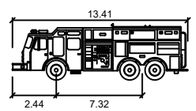
Erb MURB

drawing

Site Plan

NO.	DATE	INITIAL	REVISION DETAIL
3	2025-01-06	LC	UPDATED SITE PLAN
2	2024-10-17	LC	UPDATED SITE PLAN
1	2024-09-17	LC	UPDATED SITE PLAN

DESIGN VEHICLE:



Pumper Fire Truck

	meters
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

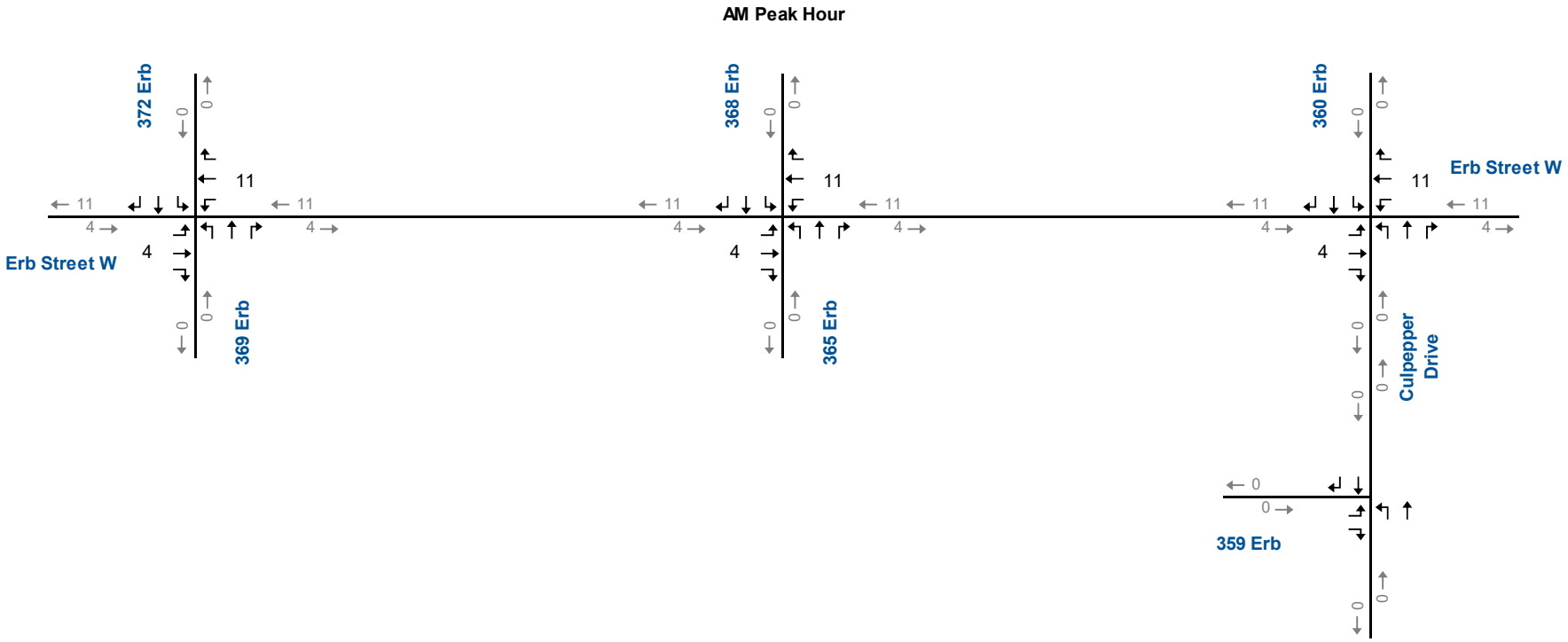
AUTOTURN ASSESSMENT
359-369 ERB STREET WEST
WATERLOO, ON

paradigm

PROJECT NO.: 240209	DATE: AUGUST 2024	SCALE: 1:500	DRAWING NO.: 03
DRAWN: LC	DESIGN: LC	CHECK: AS	

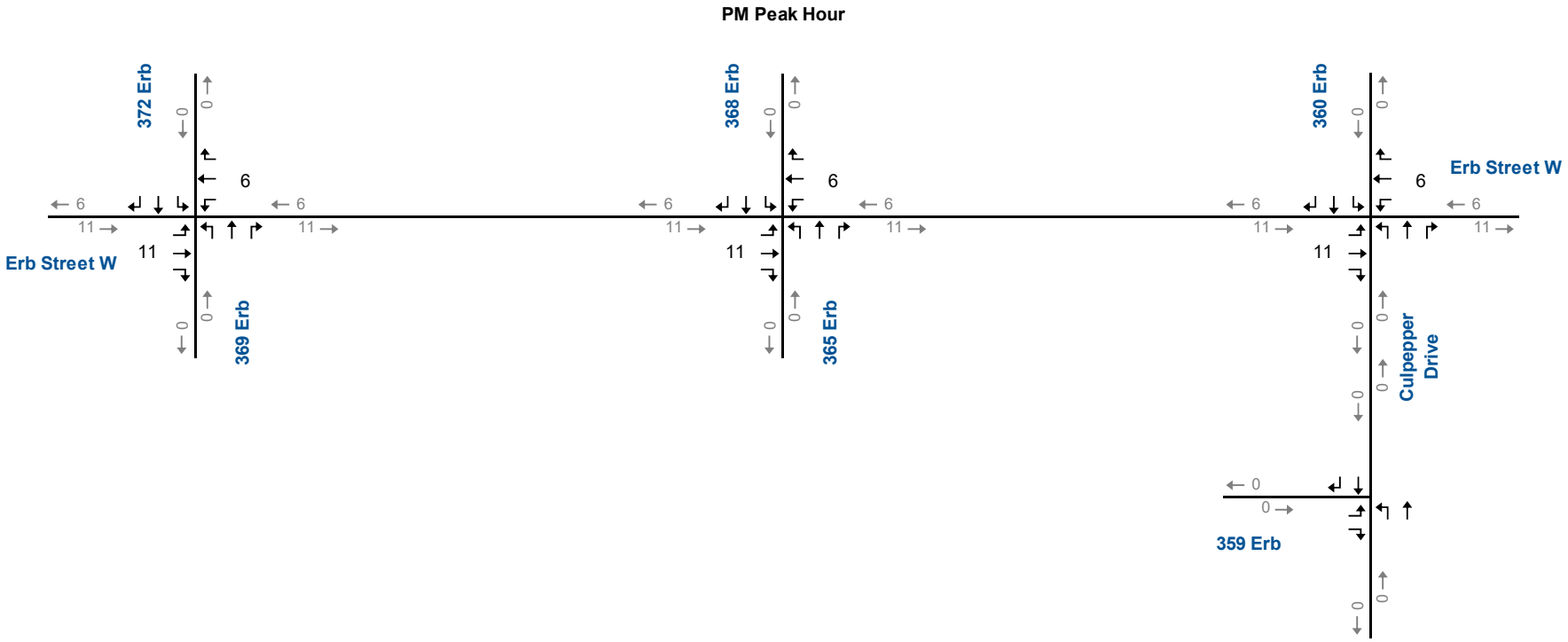
Appendix E

Background Development Traffic Volumes



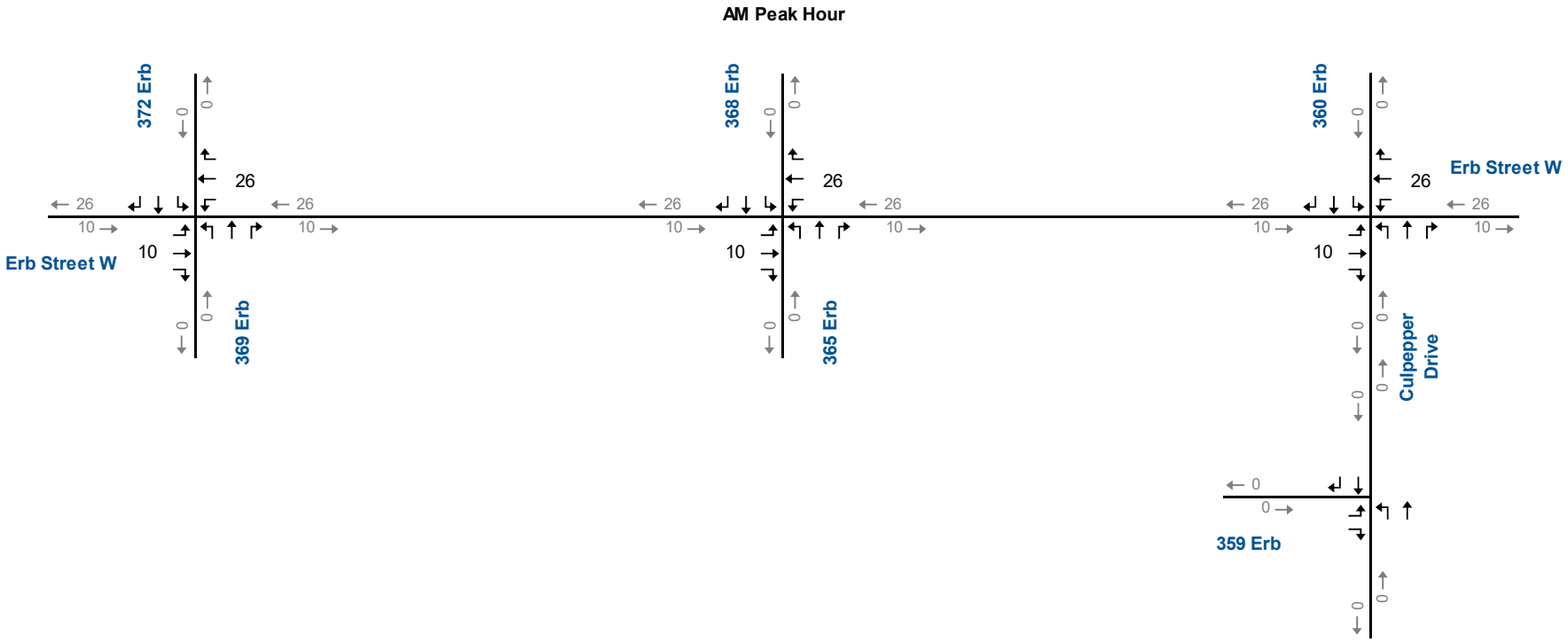
Background Development Traffic Volumes

6-14 Dietz Avenue North (AM Peak Hour)



Background Development Traffic Volumes

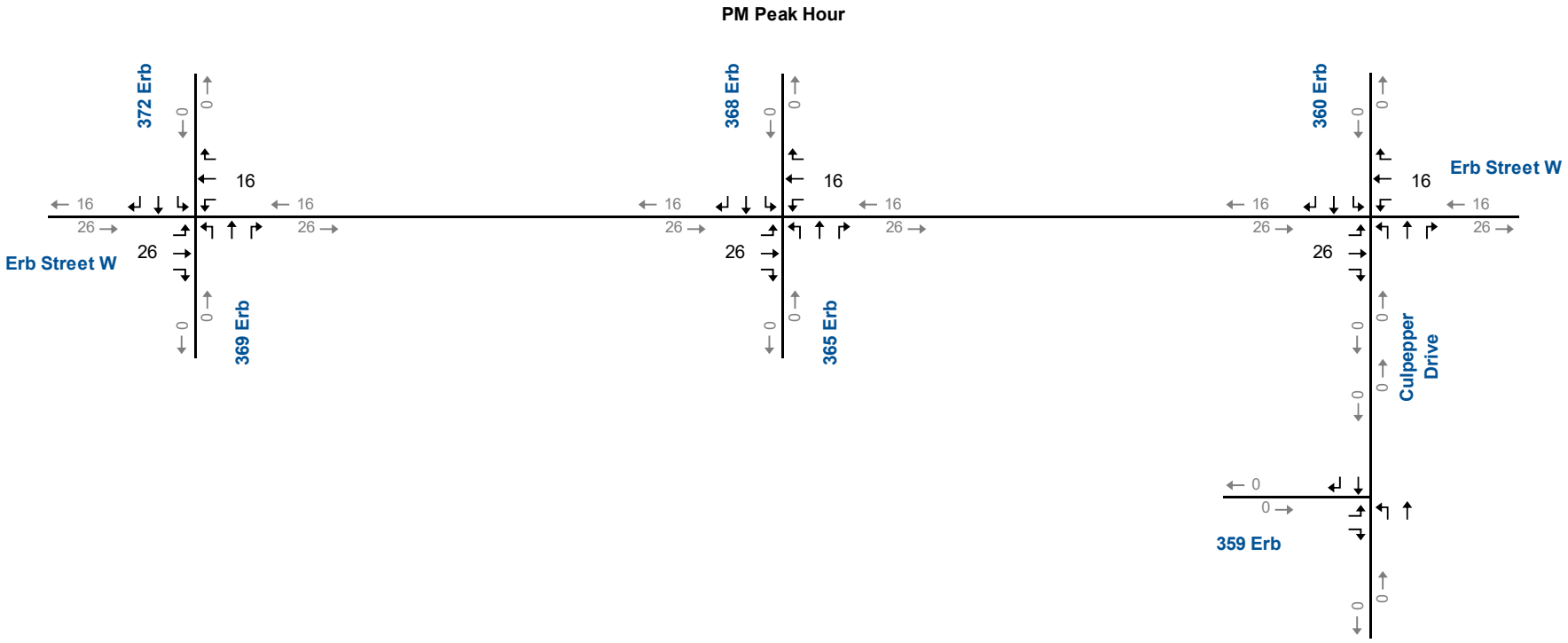
6-14 Dietz Avenue North (PM Peak Hour)



Background Development Traffic Volumes

359-369 Erb Street West TIS PS ACR
240209

50 Westmount Road – Phases 1 and 2 (AM Peak Hour)



Background Development Traffic Volumes

359-369 Erb Street West TIS PS ACR
240209

50 Westmount Road – Phases 1 and 2 (PM Peak Hour)

Appendix F

ITE Trip Generation Manual Excerpts

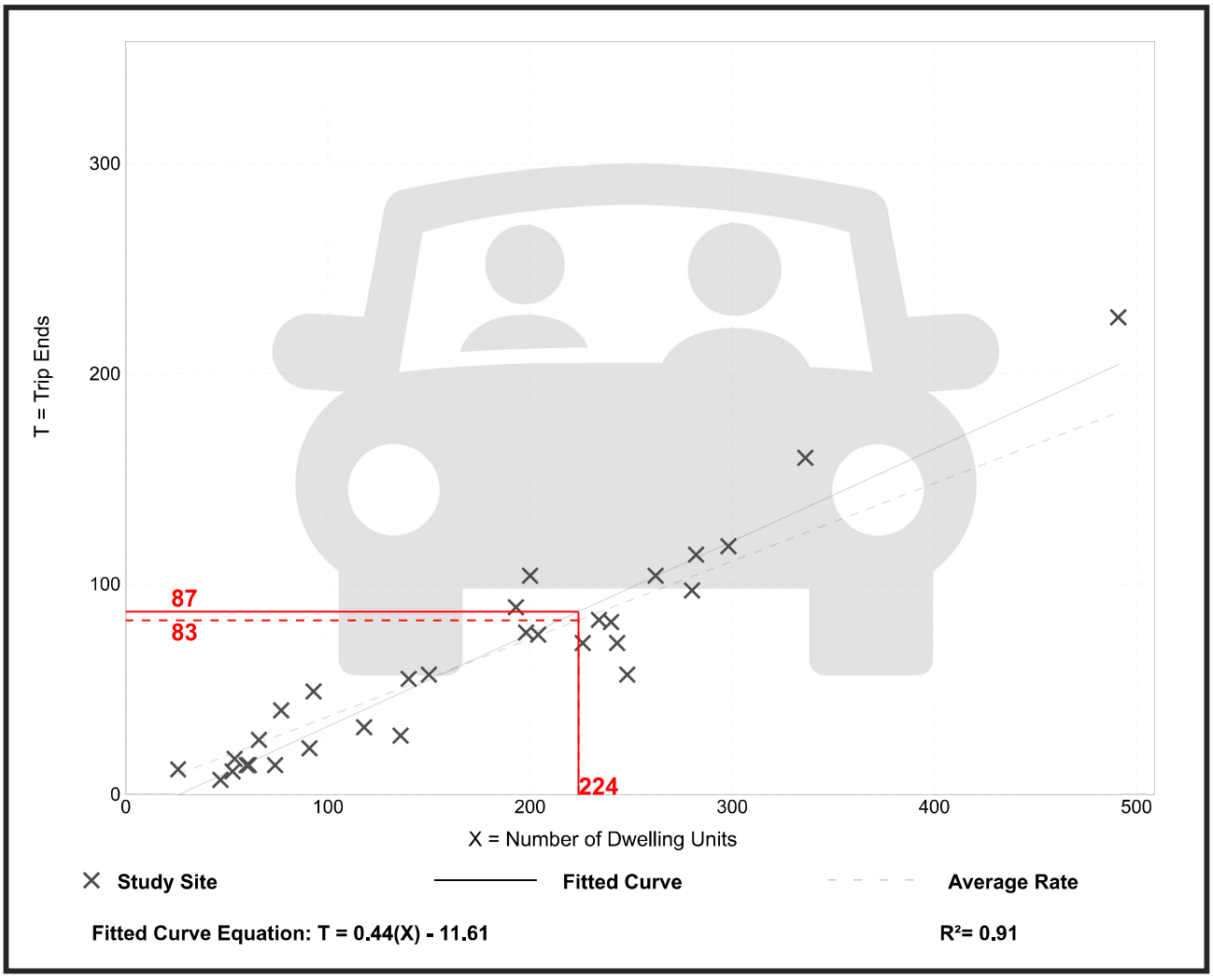
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 30
Avg. Num. of Dwelling Units: 173
Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

Data Plot and Equation



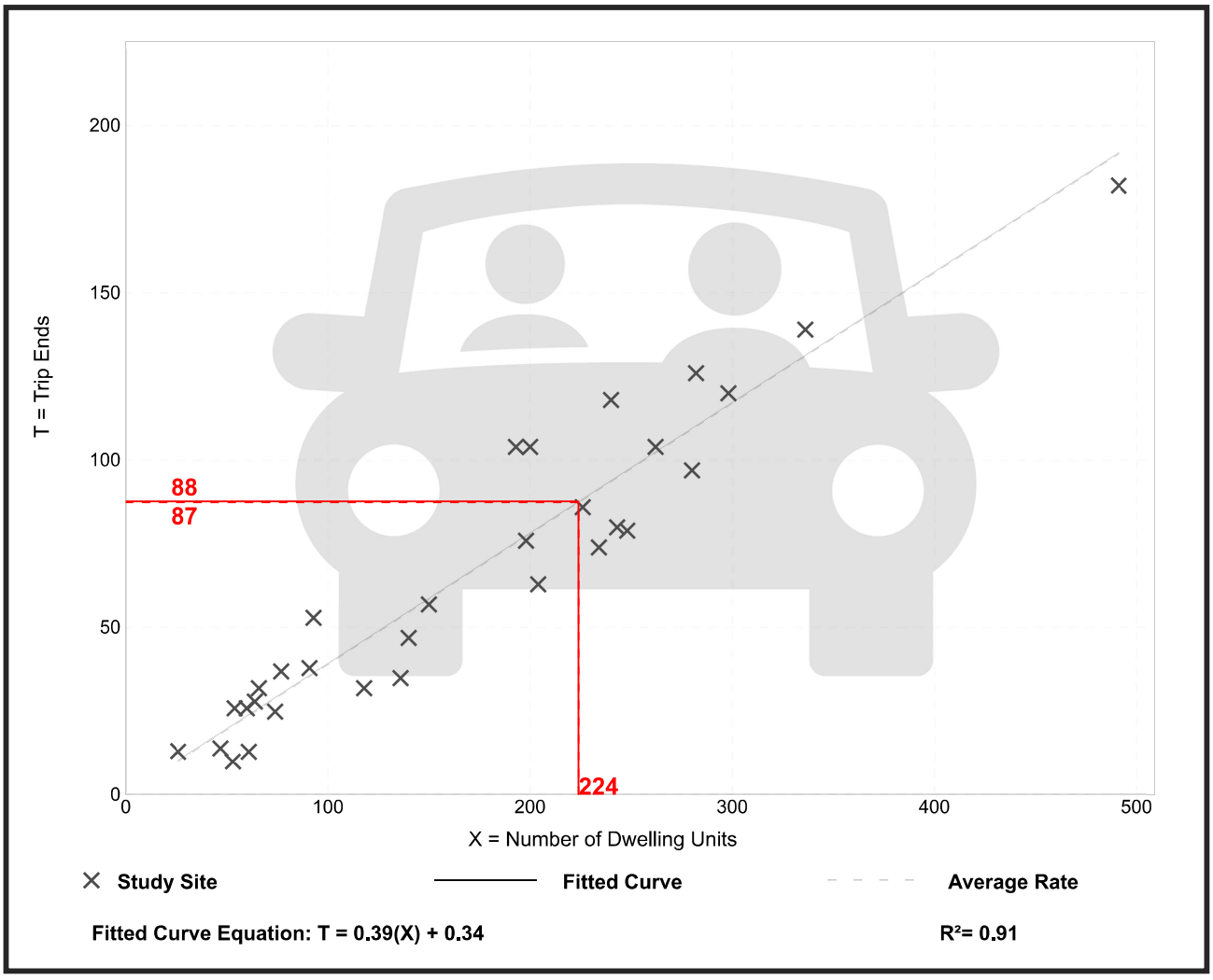
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 31
Avg. Num. of Dwelling Units: 169
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

Data Plot and Equation



Appendix G

Background Traffic Operations Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	909	0	0	565	14	0	0	0	5	0	23
Future Volume (vph)	19	909	0	0	565	14	0	0	0	5	0	23
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996						0.889	
Flt Protected		0.999									0.991	
Satd. Flow (prot)	0	3009	0	0	2917	0	0	1533	0	0	1350	0
Flt Permitted		0.999									0.991	
Satd. Flow (perm)	0	3009	0	0	2917	0	0	1533	0	0	1350	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		248.5			47.3			37.1			40.1	
Travel Time (s)		14.9			2.8			3.3			3.6	
Confl. Peds. (#/hr)			10	10			1		1	1		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	19	909	0	0	565	14	0	0	0	5	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	928	0	0	579	0	0	0	0	0	28	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	909	0	0	565	14	0	0	0	5	0	23
Future Vol, veh/h	19	909	0	0	565	14	0	0	0	5	0	23
Conflicting Peds, #/hr	0	0	10	10	0	0	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	19	909	0	0	565	14	0	0	0	5	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	579	0	0	919	0	0	1241	1536	466	1066	1529	291
Stage 1	-	-	-	-	-	-	957	957	-	572	572	-
Stage 2	-	-	-	-	-	-	284	579	-	494	957	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1005	-	-	751	-	-	133	117	549	179	118	712
Stage 1	-	-	-	-	-	-	281	339	-	477	508	-
Stage 2	-	-	-	-	-	-	705	504	-	531	339	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1005	-	-	745	-	-	124	112	544	174	113	711
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	112	-	174	113	-
Stage 1	-	-	-	-	-	-	268	323	-	459	508	-
Stage 2	-	-	-	-	-	-	682	504	-	510	323	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	0	13.4
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1005	-	-	745	-	-	458
HCM Lane V/C Ratio	-	0.019	-	-	-	-	-	0.061
HCM Control Delay (s)	0	8.7	0.2	-	0	-	-	13.4
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	884	1	0	565	19	1	0	2	20	1	13
Future Volume (vph)	28	884	1	0	565	19	1	0	2	20	1	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.995			0.910			0.948	
Flt Protected		0.998						0.984			0.971	
Satd. Flow (prot)	0	3007	0	0	2915	0	0	1373	0	0	1411	0
Flt Permitted		0.998						0.984			0.971	
Satd. Flow (perm)	0	3007	0	0	2915	0	0	1373	0	0	1411	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	16		13	13		16	1		1	1		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	28	884	1	0	565	19	1	0	2	20	1	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	913	0	0	584	0	0	3	0	0	34	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	884	1	0	565	19	1	0	2	20	1	13
Future Vol, veh/h	28	884	1	0	565	19	1	0	2	20	1	13
Conflicting Peds, #/hr	16	0	13	13	0	16	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	28	884	1	0	565	19	1	0	2	20	1	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	600	0	0	898	0	0	1238	1554	457	1090	1545	309
Stage 1	-	-	-	-	-	-	954	954	-	591	591	-
Stage 2	-	-	-	-	-	-	284	600	-	499	954	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	987	-	-	765	-	-	134	114	556	172	116	693
Stage 1	-	-	-	-	-	-	282	340	-	465	498	-
Stage 2	-	-	-	-	-	-	705	493	-	527	340	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	975	-	-	757	-	-	124	105	550	162	107	684
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	105	-	162	107	-
Stage 1	-	-	-	-	-	-	263	318	-	433	492	-
Stage 2	-	-	-	-	-	-	690	487	-	495	318	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	19.2	23.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	256	975	-	-	757	-	-	224
HCM Lane V/C Ratio	0.012	0.029	-	-	-	-	-	0.152
HCM Control Delay (s)	19.2	8.8	0.2	-	0	-	-	23.9
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	901	6	6	575	1	9	0	19	1	0	0
Future Volume (vph)	0	901	6	6	575	1	9	0	19	1	0	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999						0.908				
Flt Protected					0.999			0.984			0.950	
Satd. Flow (prot)	0	3004	0	0	2919	0	0	1316	0	0	1456	0
Flt Permitted					0.999			0.984			0.950	
Satd. Flow (perm)	0	3004	0	0	2919	0	0	1316	0	0	1456	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	14		18	18		14	2		4	4		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	17%	17%	6%	0%	0%	0%	6%	0%	0%	0%
Adj. Flow (vph)	0	901	6	6	575	1	9	0	19	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	907	0	0	582	0	0	28	0	0	1	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	901	6	6	575	1	9	0	19	1	0	0
Future Vol, veh/h	0	901	6	6	575	1	9	0	19	1	0	0
Conflicting Peds, #/hr	14	0	18	18	0	14	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	17	17	6	0	0	0	6	0	0	0
Mvmt Flow	0	901	6	6	575	1	9	0	19	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	925	0	0	1224	1524	476	1057	1527	304
Stage 1	-	-	-	-	-	-	922	922	-	602	602	-
Stage 2	-	-	-	-	-	-	302	602	-	455	925	-
Critical Hdwy	4.1	-	-	4.44	-	-	7.5	6.5	7.02	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.37	-	-	3.5	4	3.36	3.5	4	3.3
Pot Cap-1 Maneuver	995	-	-	648	-	-	137	119	525	182	119	698
Stage 1	-	-	-	-	-	-	295	352	-	458	492	-
Stage 2	-	-	-	-	-	-	688	492	-	560	351	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	984	-	-	639	-	-	133	114	516	171	114	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	133	114	-	171	114	-
Stage 1	-	-	-	-	-	-	291	347	-	453	480	-
Stage 2	-	-	-	-	-	-	677	480	-	538	346	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	20	26.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	268	984	-	-	639	-	-	171
HCM Lane V/C Ratio	0.104	-	-	-	0.009	-	-	0.006
HCM Control Delay (s)	20	0	-	-	10.7	0.1	-	26.2
HCM Lane LOS	C	A	-	-	B	A	-	D
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	0	0	26	12	1
Future Volume (vph)	2	0	0	26	12	1
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.990	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1539	1385	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1539	1385	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	3					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	6%	18%	0%
Adj. Flow (vph)	2	0	0	26	12	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	26	13	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	26	12	1
Future Vol, veh/h	2	0	0	26	12	1
Conflicting Peds, #/hr	3	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	6	18	0
Mvmt Flow	2	0	0	26	12	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	42	13	13	0	-	0
Stage 1	13	-	-	-	-	-
Stage 2	29	-	-	-	-	-
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	974	1073	1619	-	-	-
Stage 1	1015	-	-	-	-	-
Stage 2	999	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	974	1073	1619	-	-	-
Mov Cap-2 Maneuver	974	-	-	-	-	-
Stage 1	1015	-	-	-	-	-
Stage 2	999	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1619	-	974	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	8.7	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	722	0	0	923	13	0	0	0	12	0	22
Future Volume (vph)	15	722	0	0	923	13	0	0	0	12	0	22
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.913	
Flt Protected		0.999									0.983	
Satd. Flow (prot)	0	3038	0	0	3064	0	0	1533	0	0	1376	0
Flt Permitted		0.999									0.983	
Satd. Flow (perm)	0	3038	0	0	3064	0	0	1533	0	0	1376	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		248.5			47.3			37.1			40.1	
Travel Time (s)		14.9			2.8			3.3			3.6	
Confl. Peds. (#/hr)	4		15	15		4						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	15	722	0	0	923	13	0	0	0	12	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	737	0	0	936	0	0	0	0	0	34	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	722	0	0	923	13	0	0	0	12	0	22
Future Vol, veh/h	15	722	0	0	923	13	0	0	0	12	0	22
Conflicting Peds, #/hr	4	0	15	15	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	15	722	0	0	923	13	0	0	0	12	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	940	0	0	737	0	0	1229	1707	376	1325	1701	472
Stage 1	-	-	-	-	-	-	767	767	-	934	934	-
Stage 2	-	-	-	-	-	-	462	940	-	391	767	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	737	-	-	878	-	-	136	92	627	116	93	544
Stage 1	-	-	-	-	-	-	365	414	-	290	347	-
Stage 2	-	-	-	-	-	-	554	345	-	610	414	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	735	-	-	868	-	-	126	88	620	113	89	542
Mov Cap-2 Maneuver	-	-	-	-	-	-	126	88	-	113	89	-
Stage 1	-	-	-	-	-	-	349	395	-	279	346	-
Stage 2	-	-	-	-	-	-	532	344	-	589	395	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	0	23.2
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	735	-	-	868	-	-	232
HCM Lane V/C Ratio	-	0.02	-	-	-	-	-	0.147
HCM Control Delay (s)	0	10	0.2	-	0	-	-	23.2
HCM Lane LOS	A	B	A	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	0.5



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	714	4	3	911	26	0	0	1	19	0	24
Future Volume (vph)	16	714	4	3	911	26	0	0	1	19	0	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.996			0.865			0.925	
Flt Protected		0.999									0.978	
Satd. Flow (prot)	0	3035	0	0	3058	0	0	1326	0	0	1387	0
Flt Permitted		0.999									0.978	
Satd. Flow (perm)	0	3035	0	0	3058	0	0	1326	0	0	1387	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	23		23	23		23						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	16	714	4	3	911	26	0	0	1	19	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	734	0	0	940	0	0	1	0	0	43	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	714	4	3	911	26	0	0	1	19	0	24
Future Vol, veh/h	16	714	4	3	911	26	0	0	1	19	0	24
Conflicting Peds, #/hr	23	0	23	23	0	23	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	16	714	4	3	911	26	0	0	1	19	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	960	0	0	741	0	0	1233	1737	382	1342	1726	492
Stage 1	-	-	-	-	-	-	771	771	-	953	953	-
Stage 2	-	-	-	-	-	-	462	966	-	389	773	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	725	-	-	875	-	-	135	88	622	112	90	528
Stage 1	-	-	-	-	-	-	363	413	-	282	340	-
Stage 2	-	-	-	-	-	-	554	336	-	612	412	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	712	-	-	859	-	-	122	81	611	106	83	519
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	81	-	106	83	-
Stage 1	-	-	-	-	-	-	343	391	-	267	332	-
Stage 2	-	-	-	-	-	-	525	328	-	588	390	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	10.9	29.2
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	611	712	-	-	859	-	-	191
HCM Lane V/C Ratio	0.002	0.022	-	-	0.003	-	-	0.225
HCM Control Delay (s)	10.9	10.2	0.2	-	9.2	0	-	29.2
HCM Lane LOS	B	B	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.8



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	701	34	11	931	3	11	0	16	1	2	0
Future Volume (vph)	0	701	34	11	931	3	11	0	16	1	2	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.993						0.920				
Flt Protected					0.999			0.980			0.984	
Satd. Flow (prot)	0	3021	0	0	3067	0	0	1382	0	0	1508	0
Flt Permitted					0.999			0.980			0.984	
Satd. Flow (perm)	0	3021	0	0	3067	0	0	1382	0	0	1508	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	37		28	28		37			4	4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	701	34	11	931	3	11	0	16	1	2	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	735	0	0	945	0	0	27	0	0	3	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	701	34	11	931	3	11	0	16	1	2	0
Future Vol, veh/h	0	701	34	11	931	3	11	0	16	1	2	0
Conflicting Peds, #/hr	37	0	28	28	0	37	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	701	34	11	931	3	11	0	16	1	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	971	0	0	763	0	0	1235	1739	400	1347	1755	504
Stage 1	-	-	-	-	-	-	746	746	-	992	992	-
Stage 2	-	-	-	-	-	-	489	993	-	355	763	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	718	-	-	859	-	-	135	88	605	111	86	518
Stage 1	-	-	-	-	-	-	376	424	-	267	326	-
Stage 2	-	-	-	-	-	-	534	326	-	641	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	697	-	-	840	-	-	127	81	590	102	79	503
Mov Cap-2 Maneuver	-	-	-	-	-	-	127	81	-	102	79	-
Stage 1	-	-	-	-	-	-	368	415	-	259	308	-
Stage 2	-	-	-	-	-	-	516	308	-	622	407	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	22.1	48.9
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	697	-	-	840	-	-	85
HCM Lane V/C Ratio	0.114	-	-	-	0.013	-	-	0.035
HCM Control Delay (s)	22.1	0	-	-	9.3	0.1	-	48.9
HCM Lane LOS	C	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	0	0	24	45	1
Future Volume (vph)	2	0	0	24	45	1
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.997	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1632	1627	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1632	1627	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	1		3			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	2	0	0	24	45	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	24	46	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	14.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	24	45	1
Future Vol, veh/h	2	0	0	24	45	1
Conflicting Peds, #/hr	1	0	3	0	0	3
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	2	0	0	24	45	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	74	49	49	0	-	0
Stage 1	49	-	-	-	-	-
Stage 2	25	-	-	-	-	-
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	935	1025	1571	-	-	-
Stage 1	979	-	-	-	-	-
Stage 2	1003	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	931	1023	1567	-	-	-
Mov Cap-2 Maneuver	931	-	-	-	-	-
Stage 1	977	-	-	-	-	-
Stage 2	1001	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1567	-	931	-	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	0	-	8.9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Appendix H

Total Traffic Operations Reports



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	920	588	14	5	23
Future Volume (vph)	19	920	588	14	5	23
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.997		0.889	
Flt Protected		0.999			0.991	
Satd. Flow (prot)	0	3237	3141	0	1538	0
Flt Permitted		0.999			0.991	
Satd. Flow (perm)	0	3237	3141	0	1538	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		248.5	47.3		40.1	
Travel Time (s)		14.9	2.8		3.6	
Confl. Peds. (#/hr)					1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	6%	0%	0%	0%
Adj. Flow (vph)	19	920	588	14	5	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	939	602	0	28	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	920	588	14	5	23
Future Vol, veh/h	19	920	588	14	5	23
Conflicting Peds, #/hr	0	0	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	3	6	0	0	0
Mvmt Flow	19	920	588	14	5	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	602	0	-	0	1094	302
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	499	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	985	-	-	-	212	700
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	581	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	985	-	-	-	204	699
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	581	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	985	-	-	-	488
HCM Lane V/C Ratio	0.019	-	-	-	0.057
HCM Control Delay (s)	8.7	0.2	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	891	5	3	579	19	10	0	16	21	0	13
Future Volume (vph)	28	891	5	3	579	19	10	0	16	21	0	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.995			0.917			0.948	
Flt Protected		0.998						0.981			0.970	
Satd. Flow (prot)	0	3004	0	0	2916	0	0	1379	0	0	1409	0
Flt Permitted		0.998						0.981			0.970	
Satd. Flow (perm)	0	3004	0	0	2916	0	0	1379	0	0	1409	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	16		13	13		16	1		1	1		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	28	891	5	3	579	19	10	0	16	21	0	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	924	0	0	601	0	0	26	0	0	34	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	891	5	3	579	19	10	0	16	21	0	13
Future Vol, veh/h	28	891	5	3	579	19	10	0	16	21	0	13
Conflicting Peds, #/hr	16	0	13	13	0	16	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	28	891	5	3	579	19	10	0	16	21	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	614	0	0	909	0	0	1260	1583	462	1114	1576	316
Stage 1	-	-	-	-	-	-	963	963	-	611	611	-
Stage 2	-	-	-	-	-	-	297	620	-	503	965	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	975	-	-	757	-	-	129	110	552	165	111	686
Stage 1	-	-	-	-	-	-	278	337	-	453	487	-
Stage 2	-	-	-	-	-	-	693	483	-	524	336	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	963	-	-	749	-	-	119	101	546	150	102	677
Mov Cap-2 Maneuver	-	-	-	-	-	-	119	101	-	150	102	-
Stage 1	-	-	-	-	-	-	259	314	-	421	478	-
Stage 2	-	-	-	-	-	-	675	474	-	479	313	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	22.7	25
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	229	963	-	-	749	-	-	214
HCM Lane V/C Ratio	0.114	0.029	-	-	0.004	-	-	0.159
HCM Control Delay (s)	22.7	8.8	0.2	-	9.8	0	-	25
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	0.6



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	916	13	10	578	1	23	0	44	1	0	0
Future Volume (vph)	0	916	13	10	578	1	23	0	44	1	0	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998						0.911				
Flt Protected					0.999			0.983			0.950	
Satd. Flow (prot)	0	2998	0	0	2917	0	0	1321	0	0	1456	0
Flt Permitted					0.999			0.983			0.950	
Satd. Flow (perm)	0	2998	0	0	2917	0	0	1321	0	0	1456	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	14		18	18		14	2		4	4		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	17%	17%	6%	0%	0%	0%	6%	0%	0%	0%
Adj. Flow (vph)	0	916	13	10	578	1	23	0	44	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	929	0	0	589	0	0	67	0	0	1	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	916	13	10	578	1	23	0	44	1	0	0
Future Vol, veh/h	0	916	13	10	578	1	23	0	44	1	0	0
Conflicting Peds, #/hr	14	0	18	18	0	14	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	17	17	6	0	0	0	6	0	0	0
Mvmt Flow	0	916	13	10	578	1	23	0	44	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	593	0	0	947	0	0	1252	1554	487	1075	1560	306
Stage 1	-	-	-	-	-	-	941	941	-	613	613	-
Stage 2	-	-	-	-	-	-	311	613	-	462	947	-
Critical Hdwy	4.1	-	-	4.44	-	-	7.5	6.5	7.02	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.37	-	-	3.5	4	3.36	3.5	4	3.3
Pot Cap-1 Maneuver	993	-	-	635	-	-	131	114	516	177	113	696
Stage 1	-	-	-	-	-	-	287	345	-	451	486	-
Stage 2	-	-	-	-	-	-	680	486	-	554	342	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	982	-	-	626	-	-	127	109	507	156	108	687
Mov Cap-2 Maneuver	-	-	-	-	-	-	127	109	-	156	108	-
Stage 1	-	-	-	-	-	-	283	340	-	446	469	-
Stage 2	-	-	-	-	-	-	663	469	-	504	337	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.6	28.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	250	982	-	-	626	-	-	156
HCM Lane V/C Ratio	0.268	-	-	-	0.016	-	-	0.006
HCM Control Delay (s)	24.6	0	-	-	10.8	0.1	-	28.2
HCM Lane LOS	C	A	-	-	B	A	-	D
HCM 95th %tile Q(veh)	1.1	0	-	-	0	-	-	0



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	41	0	0	26	12	12
Future Volume (vph)	41	0	0	26	12	12
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.932	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1539	1395	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1539	1395	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	3					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	6%	18%	0%
Adj. Flow (vph)	41	0	0	26	12	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	0	0	26	24	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	0	0	26	12	12
Future Vol, veh/h	41	0	0	26	12	12
Conflicting Peds, #/hr	3	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	6	18	0
Mvmt Flow	41	0	0	26	12	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	47	18	24	0	-	0
Stage 1	18	-	-	-	-	-
Stage 2	29	-	-	-	-	-
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	968	1066	1604	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	999	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	968	1066	1604	-	-	-
Mov Cap-2 Maneuver	968	-	-	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	999	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1604	-	968	-	-
HCM Lane V/C Ratio	-	-	0.042	-	-
HCM Control Delay (s)	0	-	8.9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	741	942	13	12	22
Future Volume (vph)	15	741	942	13	12	22
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.998		0.913	
Flt Protected		0.999			0.983	
Satd. Flow (prot)	0	3268	3296	0	1566	0
Flt Permitted		0.999			0.983	
Satd. Flow (perm)	0	3268	3296	0	1566	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		248.5	47.3		40.1	
Travel Time (s)		14.9	2.8		3.6	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Adj. Flow (vph)	15	741	942	13	12	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	756	955	0	34	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	741	942	13	12	22
Future Vol, veh/h	15	741	942	13	12	22
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	1	0	0	0
Mvmt Flow	15	741	942	13	12	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	959	0	-	0	1354	482
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	725	-	-	-	143	536
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	651	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	723	-	-	-	137	534
Mov Cap-2 Maneuver	-	-	-	-	137	-
Stage 1	-	-	-	-	327	-
Stage 2	-	-	-	-	649	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	20.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	723	-	-	-	264
HCM Lane V/C Ratio	0.021	-	-	-	0.129
HCM Control Delay (s)	10.1	0.2	-	-	20.6
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	728	9	11	922	26	8	0	6	19	0	24
Future Volume (vph)	16	728	9	11	922	26	8	0	6	19	0	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.996			0.942			0.925	
Flt Protected		0.999			0.999			0.972			0.978	
Satd. Flow (prot)	0	3032	0	0	3055	0	0	1403	0	0	1387	0
Flt Permitted		0.999			0.999			0.972			0.978	
Satd. Flow (perm)	0	3032	0	0	3055	0	0	1403	0	0	1387	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		47.3			65.3			40.7			36.8	
Travel Time (s)		2.8			3.9			3.7			3.3	
Confl. Peds. (#/hr)	23		23	23		23						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	16	728	9	11	922	26	8	0	6	19	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	753	0	0	959	0	0	14	0	0	43	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	728	9	11	922	26	8	0	6	19	0	24
Future Vol, veh/h	16	728	9	11	922	26	8	0	6	19	0	24
Conflicting Peds, #/hr	23	0	23	23	0	23	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	16	728	9	11	922	26	8	0	6	19	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	971	0	0	760	0	0	1271	1781	392	1376	1772	497
Stage 1	-	-	-	-	-	-	788	788	-	980	980	-
Stage 2	-	-	-	-	-	-	483	993	-	396	792	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	718	-	-	861	-	-	127	83	613	106	84	524
Stage 1	-	-	-	-	-	-	355	405	-	272	331	-
Stage 2	-	-	-	-	-	-	539	326	-	606	404	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	705	-	-	846	-	-	113	75	602	98	76	515
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	75	-	98	76	-
Stage 1	-	-	-	-	-	-	335	383	-	257	316	-
Stage 2	-	-	-	-	-	-	499	311	-	577	382	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.2	27.6	31.4
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	173	705	-	-	846	-	-	179
HCM Lane V/C Ratio	0.081	0.023	-	-	0.013	-	-	0.24
HCM Control Delay (s)	27.6	10.2	0.2	-	9.3	0.1	-	31.4
HCM Lane LOS	D	B	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	706	48	29	939	3	22	0	24	1	2	0
Future Volume (vph)	0	706	48	29	939	3	22	0	24	1	2	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990						0.930				
Flt Protected					0.999			0.977			0.984	
Satd. Flow (prot)	0	3013	0	0	3067	0	0	1393	0	0	1508	0
Flt Permitted					0.999			0.977			0.984	
Satd. Flow (perm)	0	3013	0	0	3067	0	0	1393	0	0	1508	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	37		28	28		37			4	4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	706	48	29	939	3	22	0	24	1	2	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	754	0	0	971	0	0	46	0	0	3	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.1%		ICU Level of Service C	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	706	48	29	939	3	22	0	24	1	2	0
Future Vol, veh/h	0	706	48	29	939	3	22	0	24	1	2	0
Conflicting Peds, #/hr	37	0	28	28	0	37	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	706	48	29	939	3	22	0	24	1	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	979	0	0	782	0	0	1287	1795	409	1393	1818	508
Stage 1	-	-	-	-	-	-	758	758	-	1036	1036	-
Stage 2	-	-	-	-	-	-	529	1037	-	357	782	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	713	-	-	845	-	-	123	81	597	103	79	515
Stage 1	-	-	-	-	-	-	370	418	-	251	311	-
Stage 2	-	-	-	-	-	-	506	311	-	639	408	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	693	-	-	827	-	-	111	71	582	90	69	500
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	71	-	90	69	-
Stage 1	-	-	-	-	-	-	362	409	-	244	280	-
Stage 2	-	-	-	-	-	-	465	280	-	611	399	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	29.6	55
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	192	693	-	-	827	-	-	75
HCM Lane V/C Ratio	0.24	-	-	-	0.035	-	-	0.04
HCM Control Delay (s)	29.6	0	-	-	9.5	0.3	-	55
HCM Lane LOS	D	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.1



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	21	0	0	24	45	33
Future Volume (vph)	21	0	0	24	45	33
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.943	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1632	1539	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1632	1539	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	1		3			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	21	0	0	24	45	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	0	0	24	78	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	0	0	24	45	33
Future Vol, veh/h	21	0	0	24	45	33
Conflicting Peds, #/hr	1	0	3	0	0	3
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	21	0	0	24	45	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	90	65	81	0	-	0
Stage 1	65	-	-	-	-	-
Stage 2	25	-	-	-	-	-
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	915	1005	1529	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	1003	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	1003	1525	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	1001	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1525	-	911	-	-
HCM Lane V/C Ratio	-	-	0.023	-	-
HCM Control Delay (s)	0	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Appendix I

Total Traffic Operations Reports – Sensitivity



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	920	588	14	5	23
Future Volume (vph)	19	920	588	14	5	23
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.997		0.889	
Flt Protected		0.999			0.991	
Satd. Flow (prot)	0	3237	3141	0	1538	0
Flt Permitted		0.999			0.991	
Satd. Flow (perm)	0	3237	3141	0	1538	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		248.5	47.3		40.1	
Travel Time (s)		14.9	2.8		3.6	
Confl. Peds. (#/hr)					1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	6%	0%	0%	0%
Adj. Flow (vph)	19	920	588	14	5	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	939	602	0	28	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	920	588	14	5	23
Future Vol, veh/h	19	920	588	14	5	23
Conflicting Peds, #/hr	0	0	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	3	6	0	0	0
Mvmt Flow	19	920	588	14	5	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	602	0	-	0	1094	302
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	499	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	985	-	-	-	212	700
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	581	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	985	-	-	-	204	699
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	581	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	985	-	-	-	488
HCM Lane V/C Ratio	0.019	-	-	-	0.057
HCM Control Delay (s)	8.7	0.2	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	28	896	589	19	21	13
Future Volume (vph)	28	896	589	19	21	13
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.995		0.948	
Flt Protected		0.998			0.970	
Satd. Flow (prot)	0	3234	3136	0	1605	0
Flt Permitted		0.998			0.970	
Satd. Flow (perm)	0	3234	3136	0	1605	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		47.3	65.3		36.8	
Travel Time (s)		2.8	3.9		3.3	
Confl. Peds. (#/hr)	16			16	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	6%	0%	0%	0%
Adj. Flow (vph)	28	896	589	19	21	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	924	608	0	34	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	28	896	589	19	21	13
Future Vol, veh/h	28	896	589	19	21	13
Conflicting Peds, #/hr	16	0	0	16	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	3	6	0	0	0
Mvmt Flow	28	896	589	19	21	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	624	0	-	0	1120	321
Stage 1	-	-	-	-	615	-
Stage 2	-	-	-	-	505	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	967	-	-	-	204	681
Stage 1	-	-	-	-	507	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	955	-	-	-	188	672
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	21
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	955	-	-	-	259
HCM Lane V/C Ratio	0.029	-	-	-	0.131
HCM Control Delay (s)	8.9	0.2	-	-	21
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	900	18	13	575	1	33	0	60	1	0	0
Future Volume (vph)	0	900	18	13	575	1	33	0	60	1	0	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.913				
Flt Protected					0.999			0.983			0.950	
Satd. Flow (prot)	0	2993	0	0	2915	0	0	1324	0	0	1456	0
Flt Permitted					0.999			0.983			0.950	
Satd. Flow (perm)	0	2993	0	0	2915	0	0	1324	0	0	1456	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	14		18	18		14	2		4	4		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	17%	17%	6%	0%	0%	0%	6%	0%	0%	0%
Adj. Flow (vph)	0	900	18	13	575	1	33	0	60	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	918	0	0	589	0	0	93	0	0	1	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

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	0	900	18	13	575	1	33	0	60	1	0	0
Future Vol, veh/h	0	900	18	13	575	1	33	0	60	1	0	0
Conflicting Peds, #/hr	14	0	18	18	0	14	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	3	17	17	6	0	0	0	6	0	0	0
Mvmt Flow	0	900	18	13	575	1	33	0	60	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	936	0	0	1243	1543	481	1070	1552	304
Stage 1	-	-	-	-	-	-	927	927	-	616	616	-
Stage 2	-	-	-	-	-	-	316	616	-	454	936	-
Critical Hdwy	4.1	-	-	4.44	-	-	7.5	6.5	7.02	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.37	-	-	3.5	4	3.36	3.5	4	3.3
Pot Cap-1 Maneuver	995	-	-	641	-	-	133	116	521	178	115	698
Stage 1	-	-	-	-	-	-	293	350	-	450	485	-
Stage 2	-	-	-	-	-	-	675	485	-	560	346	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	984	-	-	632	-	-	128	110	512	151	109	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	128	110	-	151	109	-
Stage 1	-	-	-	-	-	-	289	345	-	445	465	-
Stage 2	-	-	-	-	-	-	654	465	-	493	341	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	28	29
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	248	984	-	-	632	-	-	151
HCM Lane V/C Ratio	0.375	-	-	-	0.021	-	-	0.007
HCM Control Delay (s)	28	0	-	-	10.8	0.2	-	29
HCM Lane LOS	D	A	-	-	B	A	-	D
HCM 95th %tile Q(veh)	1.7	0	-	-	0.1	-	-	0



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	67	0	0	26	12	20
Future Volume (vph)	67	0	0	26	12	20
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.916	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1539	1400	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1539	1400	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	3					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	6%	18%	0%
Adj. Flow (vph)	67	0	0	26	12	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	67	0	0	26	32	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	14.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	67	0	0	26	12	20
Future Vol, veh/h	67	0	0	26	12	20
Conflicting Peds, #/hr	3	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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	6	18	0
Mvmt Flow	67	0	0	26	12	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	51	22	32	0	-	0
Stage 1	22	-	-	-	-	-
Stage 2	29	-	-	-	-	-
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	963	1061	1593	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	999	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	963	1061	1593	-	-	-
Mov Cap-2 Maneuver	963	-	-	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	999	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1593	-	963	-	-
HCM Lane V/C Ratio	-	-	0.07	-	-
HCM Control Delay (s)	0	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	741	942	13	12	22
Future Volume (vph)	15	741	942	13	12	22
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.998		0.913	
Flt Protected		0.999			0.983	
Satd. Flow (prot)	0	3268	3296	0	1566	0
Flt Permitted		0.999			0.983	
Satd. Flow (perm)	0	3268	3296	0	1566	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		248.5	47.3		40.1	
Travel Time (s)		14.9	2.8		3.6	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Adj. Flow (vph)	15	741	942	13	12	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	756	955	0	34	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	741	942	13	12	22
Future Vol, veh/h	15	741	942	13	12	22
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	1	0	0	0
Mvmt Flow	15	741	942	13	12	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	959	0	-	0	1354	482
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	725	-	-	-	143	536
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	651	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	723	-	-	-	137	534
Mov Cap-2 Maneuver	-	-	-	-	137	-
Stage 1	-	-	-	-	327	-
Stage 2	-	-	-	-	649	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	20.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	723	-	-	-	264
HCM Lane V/C Ratio	0.021	-	-	-	0.129
HCM Control Delay (s)	10.1	0.2	-	-	20.6
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	737	930	26	19	24
Future Volume (vph)	16	737	930	26	19	24
Ideal Flow (vphpl)	1775	1775	1775	1775	1765	1765
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.996		0.925	
Flt Protected		0.999			0.978	
Satd. Flow (prot)	0	3268	3290	0	1579	0
Flt Permitted		0.999			0.978	
Satd. Flow (perm)	0	3268	3290	0	1579	0
Link Speed (k/h)		60	60		40	
Link Distance (m)		47.3	65.3		36.8	
Travel Time (s)		2.8	3.9		3.3	
Confl. Peds. (#/hr)	23			23		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Adj. Flow (vph)	16	737	930	26	19	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	753	956	0	43	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	737	930	26	19	24
Future Vol, veh/h	16	737	930	26	19	24
Conflicting Peds, #/hr	23	0	0	23	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	1	0	0	0
Mvmt Flow	16	737	930	26	19	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	979	0	-	0	1367	501
Stage 1	-	-	-	-	966	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	713	-	-	-	141	521
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	651	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	700	-	-	-	131	512
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	639	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	24.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	700	-	-	-	224
HCM Lane V/C Ratio	0.023	-	-	-	0.192
HCM Control Delay (s)	10.3	0.2	-	-	24.9
HCM Lane LOS	B	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	700	57	40	928	3	30	0	30	1	2	0
Future Volume (vph)	0	700	57	40	928	3	30	0	30	1	2	0
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1550	1550	1550	1550	1550	1550
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.989						0.932				
Flt Protected					0.998			0.976			0.984	
Satd. Flow (prot)	0	3010	0	0	3065	0	0	1394	0	0	1508	0
Flt Permitted					0.998			0.976			0.984	
Satd. Flow (perm)	0	3010	0	0	3065	0	0	1394	0	0	1508	0
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		65.3			212.5			50.7			60.9	
Travel Time (s)		3.9			12.8			4.6			5.5	
Confl. Peds. (#/hr)	37		28	28		37			4	4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	700	57	40	928	3	30	0	30	1	2	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	971	0	0	60	0	0	3	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	700	57	40	928	3	30	0	30	1	2	0
Future Vol, veh/h	0	700	57	40	928	3	30	0	30	1	2	0
Conflicting Peds, #/hr	37	0	28	28	0	37	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	700	57	40	928	3	30	0	30	1	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	968	0	0	785	0	0	1302	1805	411	1401	1832	503
Stage 1	-	-	-	-	-	-	757	757	-	1047	1047	-
Stage 2	-	-	-	-	-	-	545	1048	-	354	785	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	720	-	-	843	-	-	120	80	596	102	77	519
Stage 1	-	-	-	-	-	-	370	419	-	248	308	-
Stage 2	-	-	-	-	-	-	495	307	-	642	407	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	699	-	-	825	-	-	106	68	581	86	66	504
Mov Cap-2 Maneuver	-	-	-	-	-	-	106	68	-	86	66	-
Stage 1	-	-	-	-	-	-	362	410	-	241	269	-
Stage 2	-	-	-	-	-	-	442	268	-	607	398	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.8	34.9	57.2
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	179	699	-	-	825	-	-	72
HCM Lane V/C Ratio	0.335	-	-	-	0.048	-	-	0.042
HCM Control Delay (s)	34.9	0	-	-	9.6	0.4	-	57.2
HCM Lane LOS	D	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	1.4	0	-	-	0.2	-	-	0.1



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	35	0	0	24	45	53
Future Volume (vph)	35	0	0	24	45	53
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.927	
Flt Protected	0.950					
Satd. Flow (prot)	1658	0	0	1632	1513	0
Flt Permitted	0.950					
Satd. Flow (perm)	1658	0	0	1632	1513	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	34.5			56.5	50.7	
Travel Time (s)	3.1			5.1	4.6	
Confl. Peds. (#/hr)	1		3			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	0	0	24	45	53
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	0	24	98	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	0	0	24	45	53
Future Vol, veh/h	35	0	0	24	45	53
Conflicting Peds, #/hr	1	0	3	0	0	3
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	35	0	0	24	45	53

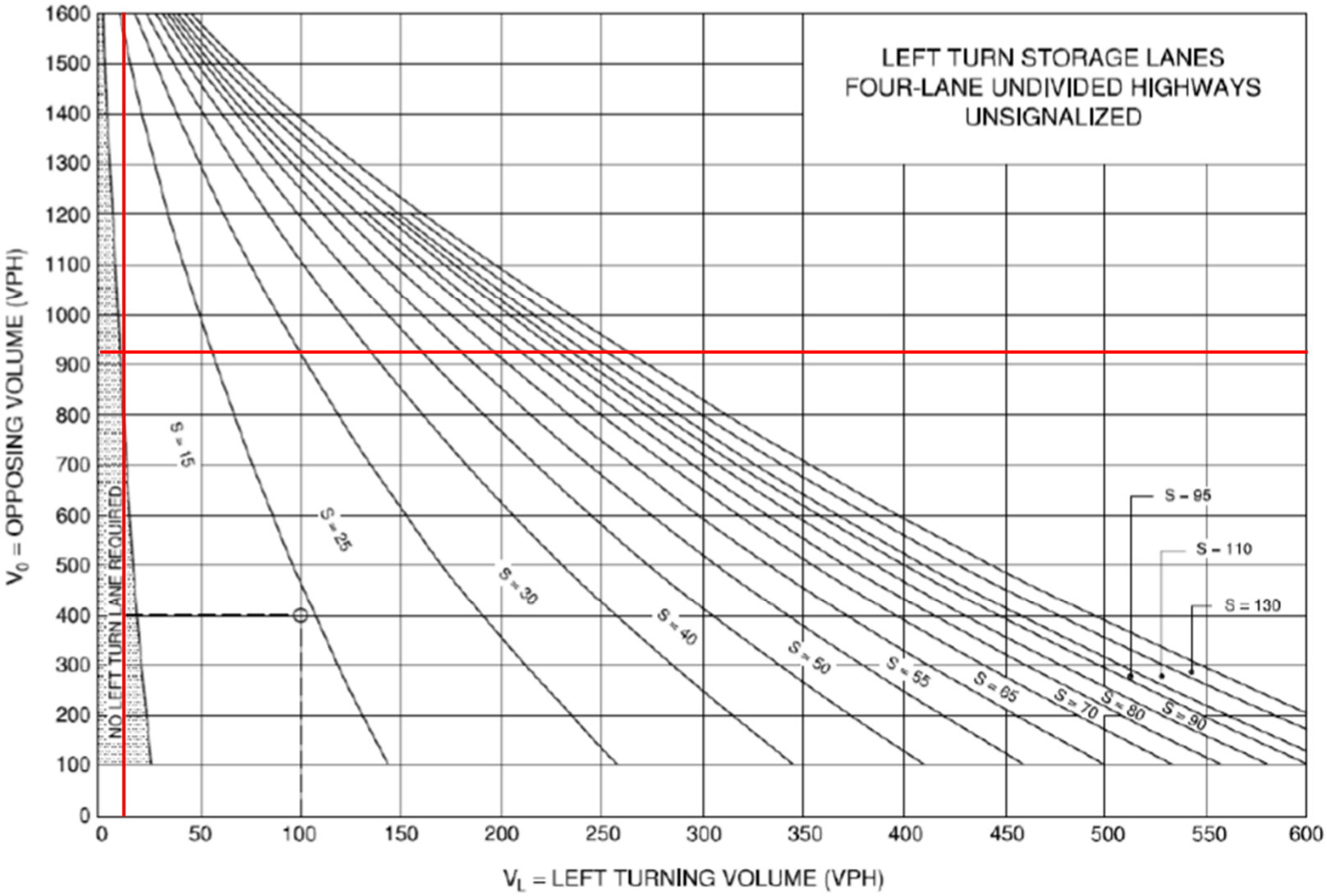
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	100	75	101	0	-	0
Stage 1	75	-	-	-	-	-
Stage 2	25	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	904	992	1504	-	-	-
Stage 1	953	-	-	-	-	-
Stage 2	1003	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	900	990	1500	-	-	-
Mov Cap-2 Maneuver	900	-	-	-	-	-
Stage 1	951	-	-	-	-	-
Stage 2	1001	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1500	-	900	-	-
HCM Lane V/C Ratio	-	-	0.039	-	-
HCM Control Delay (s)	0	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

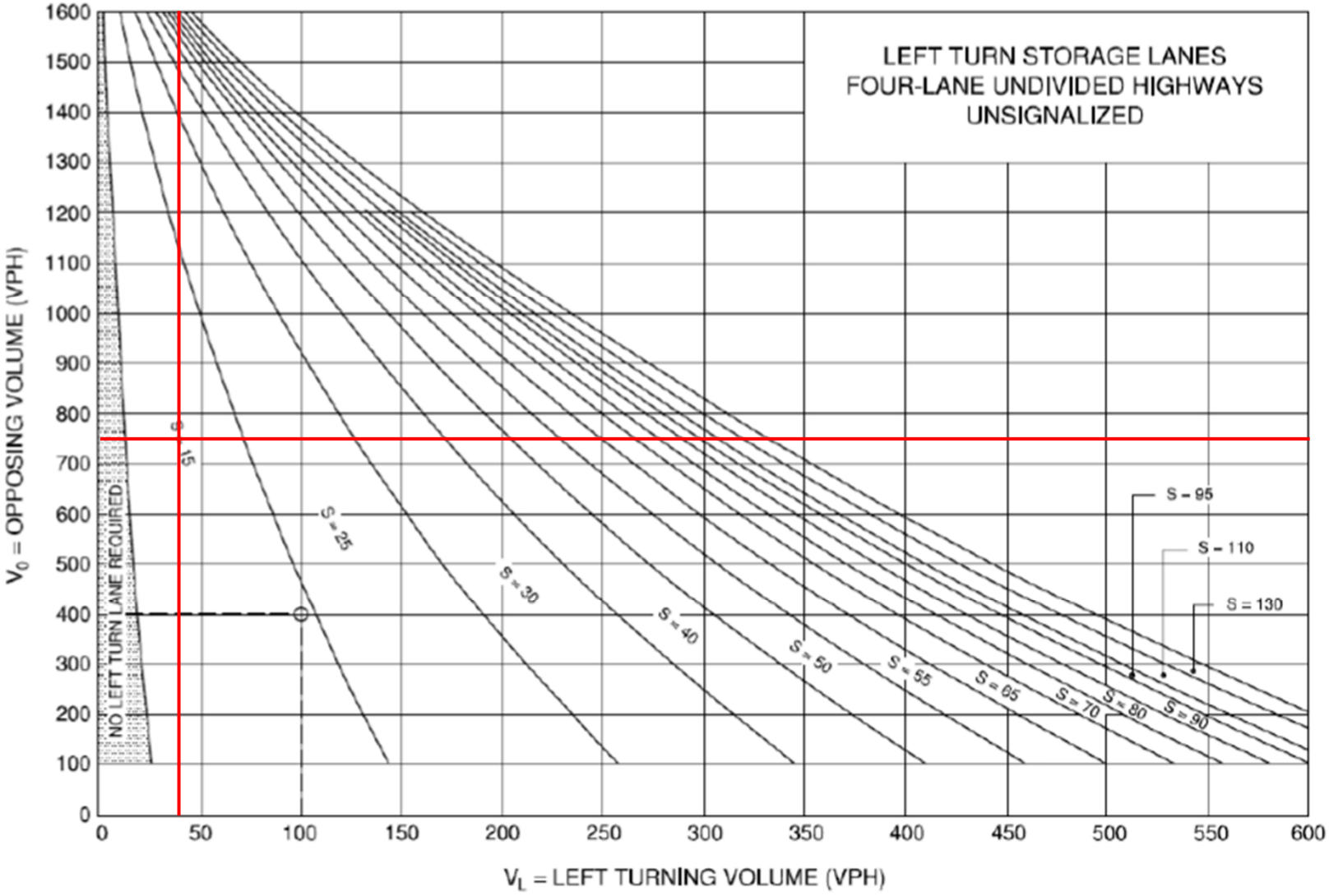
Appendix J

Left-Turn Lane Warrants



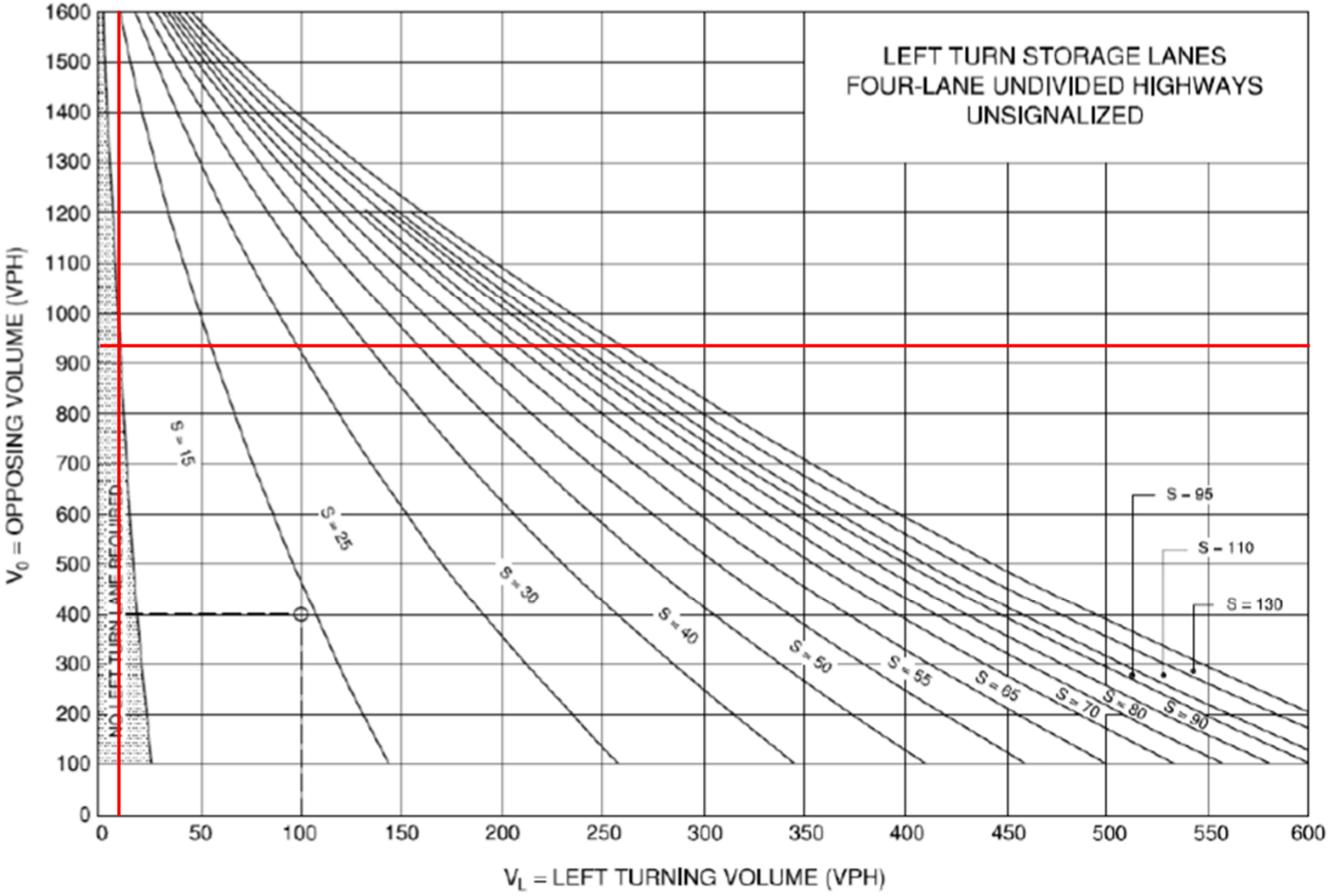
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Total 2029 – One Driveway (AM Peak Hour)



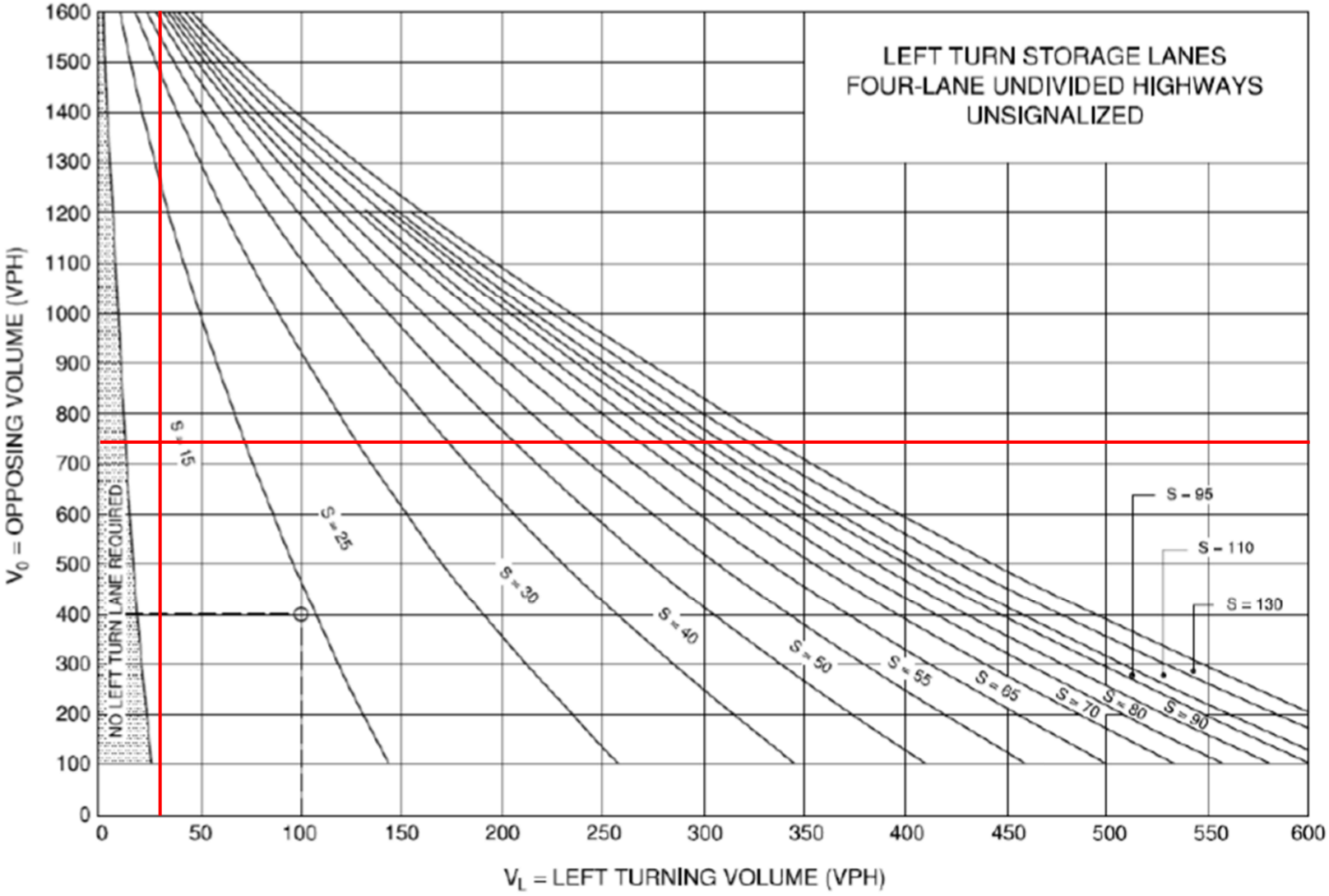
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Total 2029 – One Driveway (PM Peak Hour)



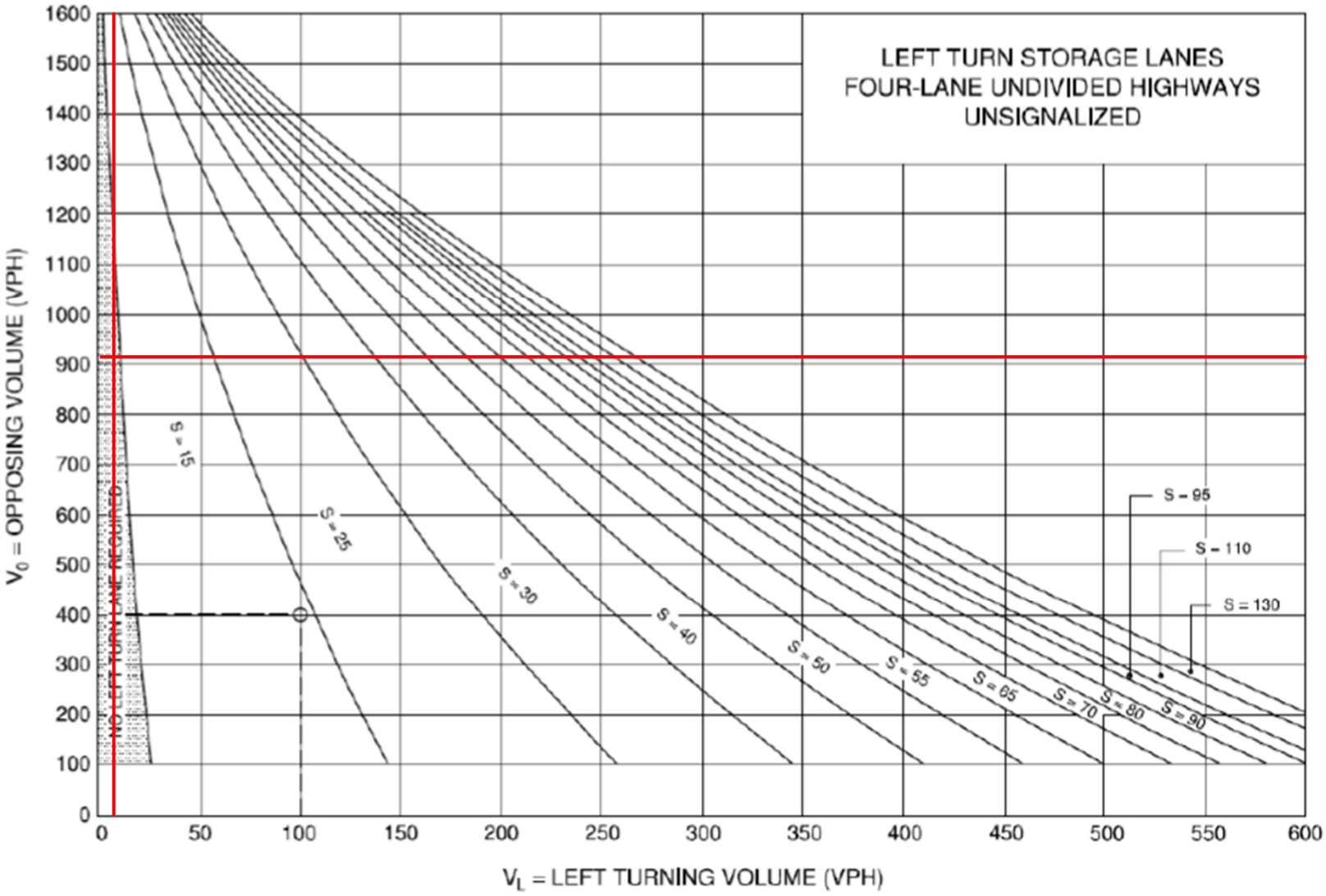
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Total 2029 – Two Driveways (AM Peak Hour)



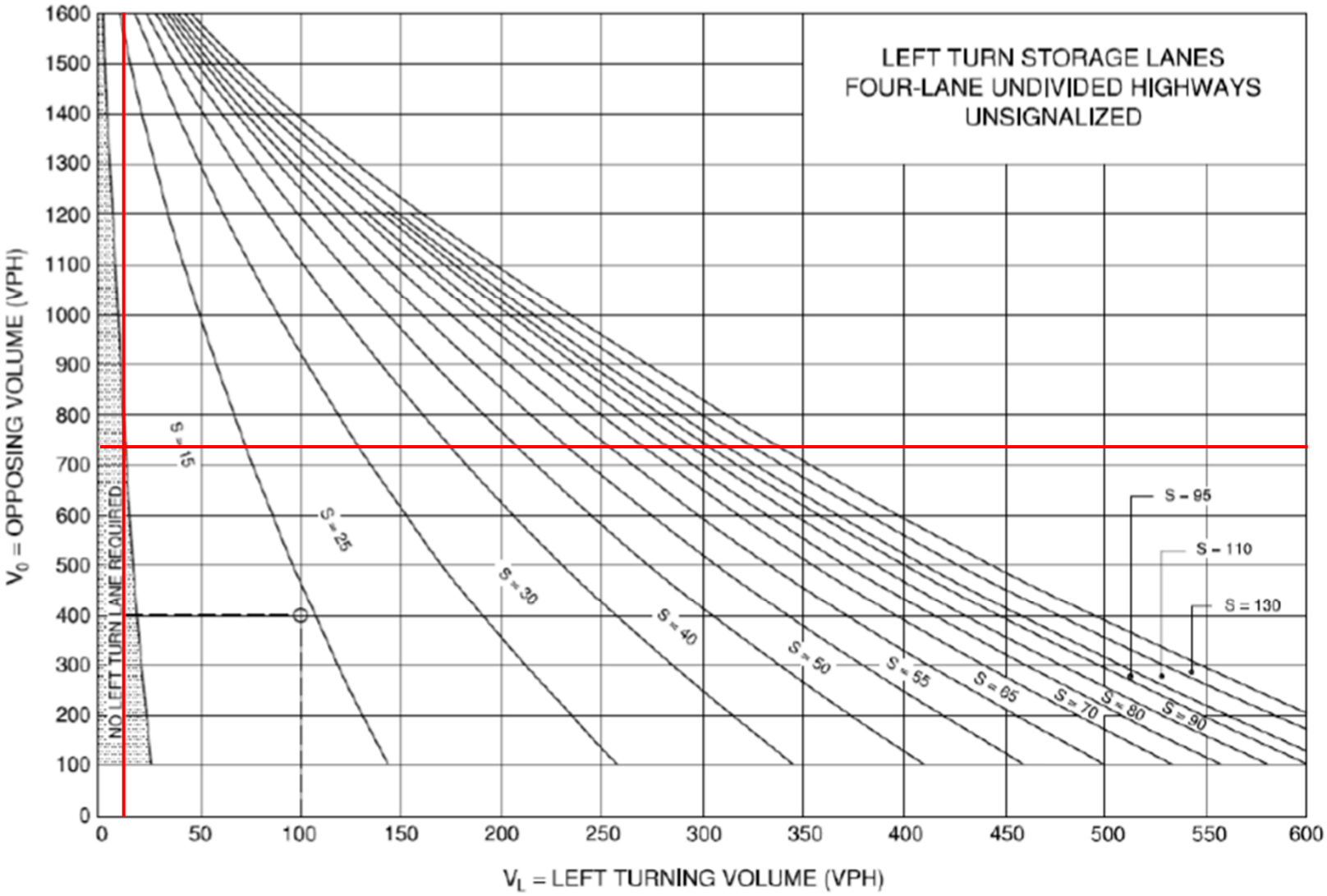
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Total 2029 – Two Driveways (PM Peak Hour)



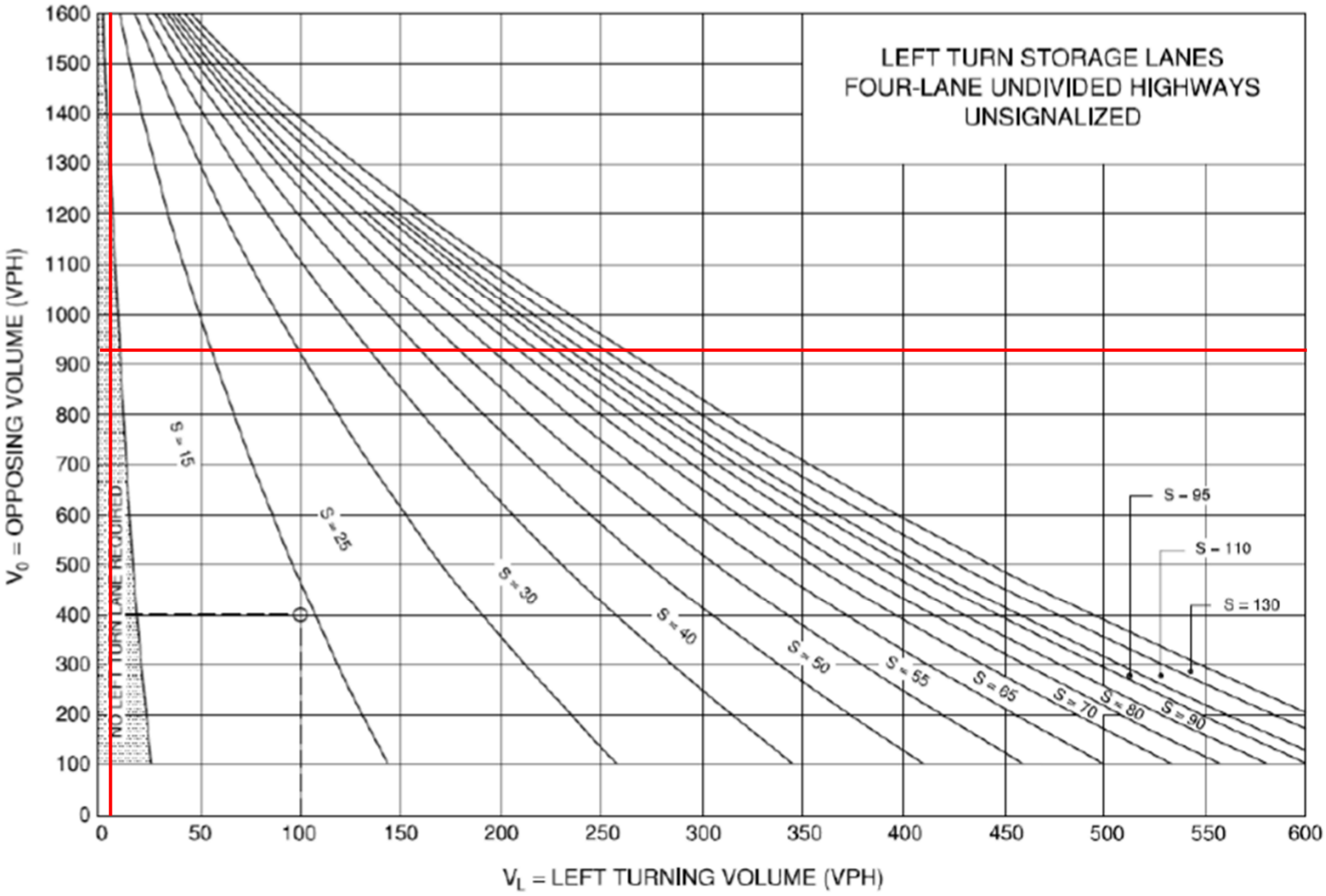
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Background 2029 (AM Peak Hour)



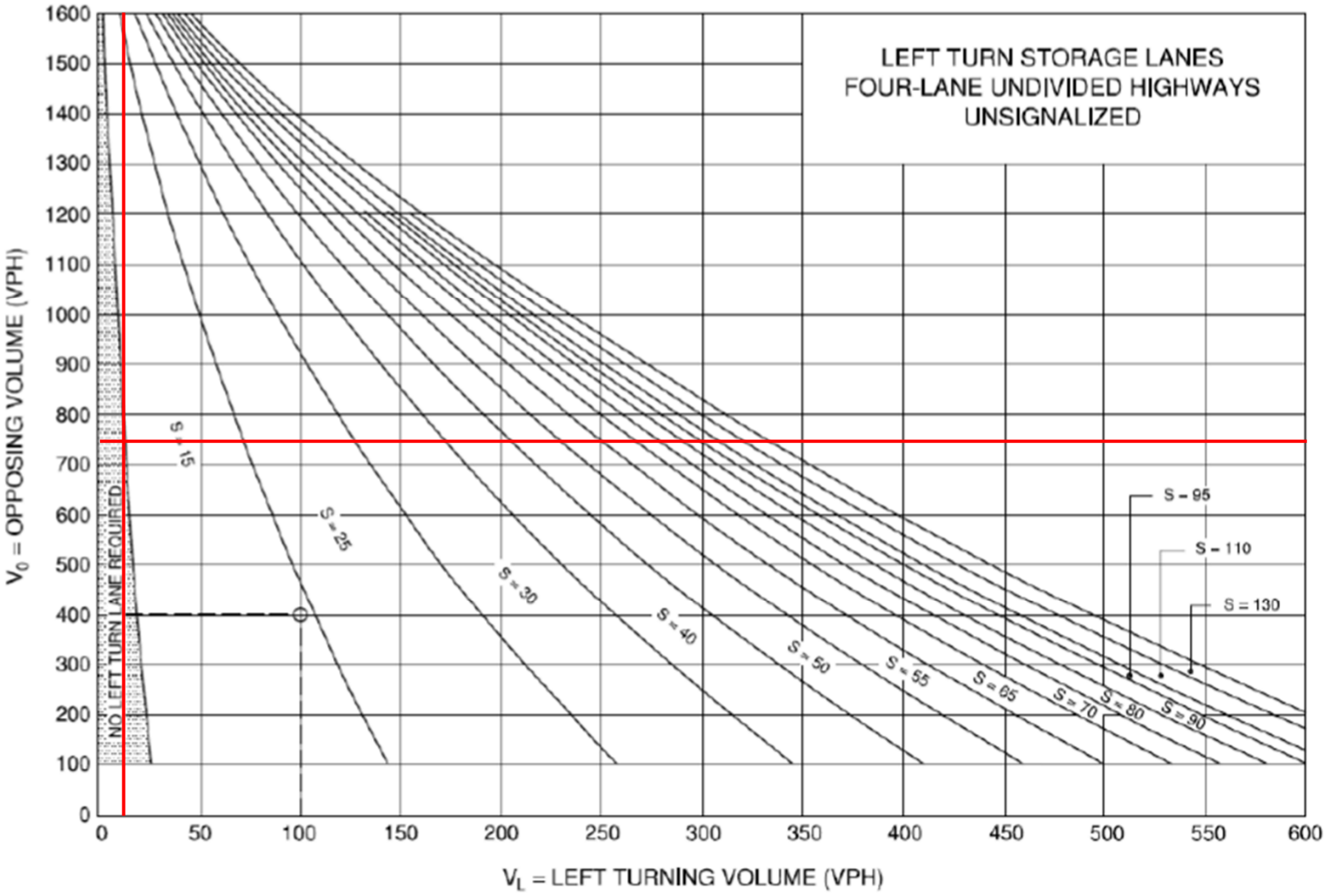
Erb Street West and Culpepper Drive
Left-Turn Lane Warrant

Background 2029 (PM Peak Hour)



Erb Street West and Site Driveway
Left-Turn Lane Warrant

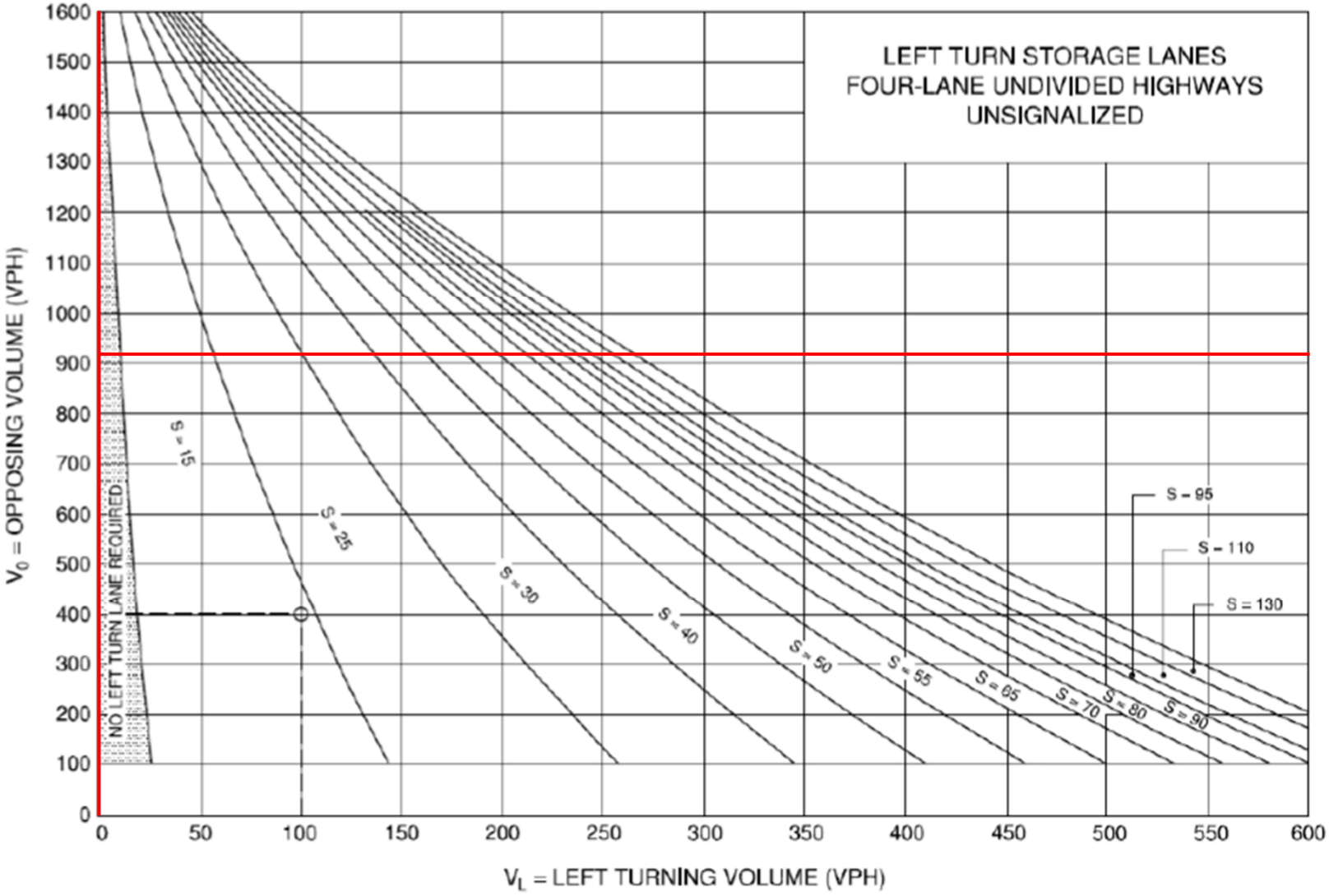
Total 2029 – Two Driveways (AM Peak Hour)



paradigm TRANSPORTATION SOLUTIONS LIMITED

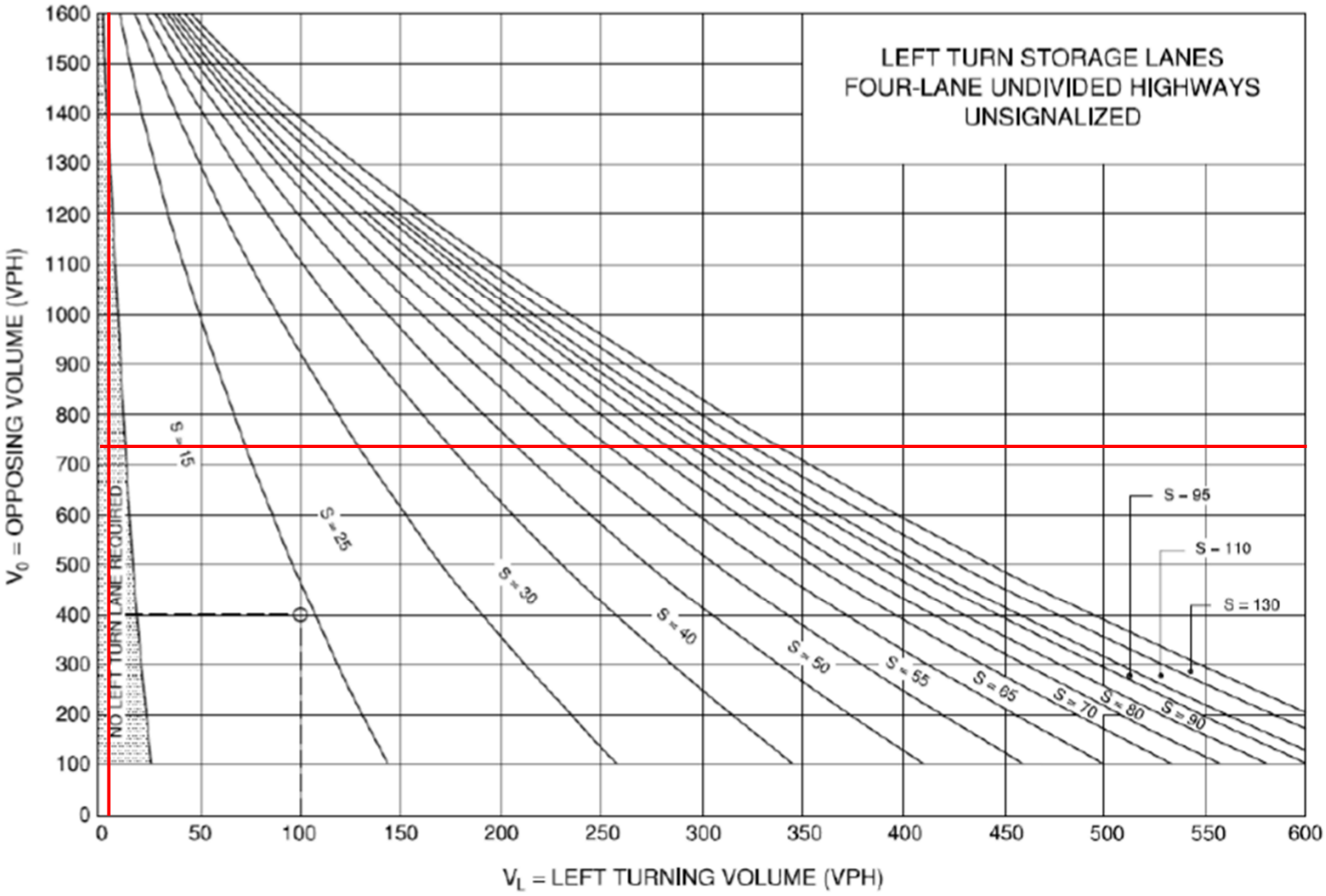
Erb Street West and Site Driveway
Left-Turn Lane Warrant

Total 2029 – Two Driveways (PM Peak Hour)



Erb Street West and Site Driveway
Left-Turn Lane Warrant

Background 2029 (AM Peak Hour)



Erb Street West and Site Driveway
Left-Turn Lane Warrant

359-369 Erb Street West TIS PS ACR
240209

Background 2029 (PM Peak Hour)

Appendix K

Traffic Control Signal Warrant

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2029 Total - One Driveway
Region/City/Township: Waterloo

Major Street: Erb Street West
Minor Street: Culpepper Drive

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street: Erb Street West						Minor Street: Culpepper Drive						
	Eastbound			Westbound			Northbound			Southbound			Peds
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	0	900	18	13	575	1	33	0	60	1	0	0	6
PM Peak Hour	0	700	57	40	928	3	30	0	30	1	2	0	4
Avg. Hourly Volume	0	400	19	13	376	1	16	0	23	1	1	0	3

Warrant	AHV
1A - All	848
1B - Minor	39
2A - Major	809
2B - Cross	19

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	848
					% Fulfilled	94%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	39
					% Fulfilled	23%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	809
					% Fulfilled	90%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	19
					% Fulfilled	26%

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2029 Total - Two Driveways
Region/City/Township: Waterloo

Major Street: Erb Street West
Minor Street: Culpepper Drive

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street: Erb Street West						Minor Street: Culpepper Drive						
	Eastbound			Westbound			Northbound			Southbound			Peds
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	0	916	13	10	578	1	23	0	44	1	0	0	6
PM Peak Hour	0	706	48	29	939	3	22	0	24	1	2	0	4
Avg. Hourly Volume	0	406	15	10	379	1	11	0	17	1	1	0	3

Warrant	AHV
1A - All	840
1B - Minor	29
2A - Major	811
2B - Cross	15

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	840
					% Fulfilled	93%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	29
					% Fulfilled	17%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	811
					% Fulfilled	90%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	15
					% Fulfilled	20%

Appendix L

Region of Waterloo TDM Checklist

Region of Waterloo

Travel Demand Management (TDM) Implementation Checklist

Version 9/18/2013

Appendix H

Case Study: 359-369 Erb Street West

Site Context:

TDM Checklist No: Not Applicable

ZBL Parking Requirement:

Date: January 2025

Applicable Parking Reduction:

The Transportation Demand Management (TDM) Checklist and Parking Management Worksheet are not designed for residential properties, but can be used to inform mixed-use developments.

TABLE A		Site Access					
In creating an environment that supports pedestrian and cycling activity, the public realm must be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s). These facilities and features should encourage walking and cycling.							
Points		**Features**				**Yes**	**N/A**
A1	**2**	Development incorporates functional building entrances that are oriented to public space or to locations where pedestrians and transit users arrive from such as a street, square, park or plaza.				**2**	
A2	**1**	External to site: Continuous sidewalks (consistent with AODA Accessible Built Environment Standard) are provided along both sides of all adjacent public streets (over and above requirement) AND Internal to site: Pedestrian walkways (consistent with AODA Accessible Built Environment Standard e.g.1.8m min width) are provided through large parking areas to link the building with the public street sidewalk system				**1**	
A3	**3**	Non-residential: development provides secure bike storage for 5% of the building occupants. Consistent with LEED requirements.					
A4	**4**	Shower and change facilities for employees provided on-site consistent with LEED requirements.					
A5	**2**	Provision of active uses at-grade along street frontages (e.g. retail).				**2**	
Category Max =		10	**Total Points Applicable =**	10	**Score =**	5	

TABLE B		Public Transportation Access					
The availability and proximity of convenient public transit service with direct pedestrian linkages to the building will provide viable travel options for employees, visitors and residents.							
Points		**Features**				**Yes**	**N/A**
B1	**1**	Bus shelters with seating are provided at the transit stop immediately adjacent to the development in consultation with Transportation Planning at the Region of Waterloo					
B2	**1**	Information regarding public transit routes, schedules and fares are provided in an accessible and visible location on site and in adjacent bus stops					
B3a	**5**	Located within 800m of a Rapid Transit Station					
B3b	**3**	Located within 600 m of a bus service with headways of 15 min or less or is located in a designated mixed use corridor or node. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**				**3**	
B3c	**1**	Located within 400 m of a bus service with headways of 16 min to 30 min. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**					
Category Max =		5	**Total Points Applicable =**	5	**Score =**	3	

TABLE C		Parking		
Vehicle parking facilities can affect the character, travel mode and cost of a development. Reducing parking supply to match expected demand can a have a positive influence on the selection of alternative travel modes.				
Points		**Features**	**Yes**	**N/A**
C1	**24**	Utilizes reduced parking supply consistent with the TDM Parking Management Worksheet. Contact your Area Municipal planning authority to determine whether the Worksheet is applicable to your development. **Note: Points are awarded for either C1, C2, or C3 only. Please choose whichever applies with the highest value.**		
C2	**24**	Includes allowances for shared parking in mixed-use zones. **Note: Points are awarded for C1, C2, or C3 only. Please choose whichever applies after consulting with the Area Municipal planning authority.**		
C3	**15**	Provides no more than the minimum number of parking spaces, as required by applicable Zoning By-Law. **Note: Points are awarded for either C1, C2, or C3 only. Please choose whichever applies.**	**15**	
C4	**10**	Implements paid parking on part or all of the site (e.g. parking permits, paid parking zones near main entrances)		
C5	**3**	Provides priority parking for carpooling/vanpooling participants equivalent to 5% of employee spaces		
C6	**5**	Commercial Uses: Provide car-share spaces equivalent to 2% of building occupants		
C7	**3**	Parking is not located on major street frontage or between a road right of way and the building facade.		
C8	**5**	25% to 50% of parking is located underground or in a structure		

C9	**10**	50% to 75% of parking is located underground or in a structure				
C10	**15**	75% of parking or more is located underground or in a structure			**15**	
C11	**3**	Parking spaces provided off-site on a lot within 300 metres of the lot containing such use.				
Category Max =		25	**Total Points Applicable =**	25	**Score =**	25

Region of Waterloo TDM Checklist v2.0 **FORM-1**

Case Study: 359-369 Erb Street West **Checklist No:** Not Applicable
Date: January 2025 **Site Context:**

TABLE D		**Trip Reduction Incentives**				
A formal TDM plan will identify specific initiatives that will be initiated in order to encourage reduced single occupant vehicle travel.						
Points		**Features**				**N/A**
D1	**2**	The building owner/occupant will make available a ride matching service for car/vanpooling				
D2	**2**	The building owner/occupant will make available emergency ride home options				
D3	**5**	The building owner/occupant will make available subsidized transit passes for all occupants for a period of two years				
D4	**5**	The building owner/occupant agrees to charge for parking as an unbundled cost to occupants			**5**	
D5	**2**	The building owner/occupant agrees to provide reduced cost parking for users of car/van pool, bicycle, moped/motorcycle spaces				
D6	**10**	The building owner/occupant has prepared a TDM plan to the satisfaction of the Region of Waterloo and the Area Municipality that targets a 10% reduction in peak hour trips using forecast trip generation with status quo travel characteristics				
D7	**5**	The employer has provided flexible working hours, telework or shift work arrangements.				
D8	**14**	The development agrees to join Travelwise (TMA) that provides the same services outlined under items D1, D2, D6				
D9	**5**	The building owner/occupant will make available car sharing services				
D10	**2**	The development includes mixed uses (i.e. retail, commercial or food services, daycares, or other complementary uses) on-site or located within 400 metres.				
Category Max =		25	**Total Points Applicable =**	25	**Score =**	5

TABLE E	**Checklist Summary**			
For each item, a "Yes" answer is equivalent to the points as indicated in the section. N/A sections should be explained in an attachment to this table. The score for each section is reflected as a percentage and calculated by dividing the points by the "Total Applicable".				
Category	**Minimum Requirement**	**Total Applicable**	**Points Scored**	**Comments**
Pedestrian & Cyclist Orientation	24	10	5	
Public Transit Access		5	3	
Parking		25	25	
SUB-TOTAL		**40**	**33**	
Trip Reduction Incentives		*25*	5	
OVERALL TOTAL		***65***	**38**	

TABLE F	**Scoring Summary**		
FINAL SCORE	**RATING (check one)**		
50 - 65	****		**TDM SUPPORTIVE DEVELOPMENT**
40 -49	***		
30 - 39	**	**X**	
24 - 29	*		
0 - 23			Non-TDM Supportive Development (Review and upgrade TDM elements to pass)

Comments:

Appendix M

TTS Auto Ownership Data

Tue Jan 07 2025 09:08:12 GMT-0500 (Eastern Standard Time) - Run Time: 719ms

Cross Tabulation Query Form - Household - 2022

Row: 2022 TTS zone of household - tts22_hhld
Column: No. of vehicles in household - n_vehicle

RowG:(12024,12025,12030,12031,12035,12038,12098,12100,12101,12102)
ColG:
TblG:

Filters:
Type of dwelling unit - dwell_type In 2

Household 2022
Table:

Veh/HH	HH	Veh	AVG	89%
0	890	0	No Veh	23%
1	2641	2641		
2	324	648		
3	37	111		
4	18	72		
Total	3910	3472	0.89	vehicles per household

Tue Jan 07 2025 09:03:10 GMT-0500 (Eastern Standard Time) - Run Time: 2256ms

Cross Tabulation Query Form - Trip - 2022

Row: 2022 TTS zone of household - tts22_hhld
Column: Primary travel mode of trip - mode_prime

RowG:(12024,12025,12030,12031,12035,12038,12098,12100,12101,12102)
ColG:
TblG:

Filters:
Type of dwelling unit - dwell_type In 2

Trip 2022
Table:

Mode	# of Trips	Trip %
Transit excluding GO rail	1721	12%
Cycle	496	4%
Auto driver	6491	46%
Auto passenger	1700	12%
School bus	143	1%
Taxi passenger	38	0%
Paid rideshare	16	0%
Walk	3405	24%
Total	14010	100%

Appendix N

Proxy Site Parking Data

Location	Supply	Demand		
		6:15 AM	11:50 AM	9:10 PM
201 Erb St W	51	32	21	22
247-251 Erb St W	44	29	20	28

** Data collected on 25 April 2023*

Location: 55 William St E, Waterloo
Date:
Surveyor:

Number of Units: 142
Total Number of Spaces: 147
Number of Visitor Spaces: 6

Time	Observed Demand		
	Total	Resident	Visitor
6:00AM	102	101	1
7:00AM	99	98	1
8:00AM	97	96	1
8:00PM	90	88	2
9:00PM	98	98	0
10:00PM	104	104	0

Appendix O

Region of Waterloo Parking Management Worksheet

Region of Waterloo

Parking Management Worksheet

Version 9/18/2013

Appendix I

Case Study: 359-369 Erb Street West **Site Context:**

Date: January 2025 **Reduction Worksheet No:**

"**Urban Growth Centres -** (UGC) area classification includes the Downtown / Uptown and RT Station Areas of Kitchener, Waterloo and Cambridge.

"**Intensification Corridor**" (IC) classification is applied to sites within 800 metres of the future CTC line

"**Other**" classification applies to all other sites

Please highlight the cell percentages applicable to your development under the appropriate classification. Please note that the Parking Management Worksheet and the Transportation Demand Management (TDM) Checklist are not designed for residential properties, but can be used for mixed-use developments. Local municipalities are the decision-making bodies with respect to consideration of parking reductions below Zoning By-law requirements.

TABLE A	Pedestrian and Cyclist Orientation			
In creating an environment that supports pedestrian and cycling activity, the public realm must be accessible, safe, and comfortable to encourage movement on the street and in the surrounding area(s). These facilities and features should encourage walking and cycling.				
	Features	**UGC**	**IC**	**Other**
A1	Development incorporates functional building entrances that are oriented to public space or to locations where pedestrians and transit users arrive from such as a street, square, park or plaza.	1%	1%	1%
A2	Continuous sidewalks (1.5m min. width) are provided along both sides of all adjacent public streets and pedestrian walkways (1.5m min width) are provided through large parking areas to link the building with the public street sidewalk system	0%	0%	1%
A3	Non-Residential: Development provides secure bike storage for 4% of the building occupants	2%	2%	1%
A4	Shower and change facilities provided on-site consistent with LEED requirements.	1%	1%	1%
A5	Provision of active uses at-grade along street frontages.	1%	1%	1%
	Category Maximum	**4%**	**4%**	**4%**
	Available Parking Reduction			**3%**

TABLE B	Public Transportation Access			
The availability and proximity of convenient public transit service with direct pedestrian linkages to the building will provide viable travel options for employees, visitors and residents.				
	Features	**UGC**	**IC**	**Other**
B1	Bus shelters with seating are provided at the transit stop immediately adjacent to the development, in consultation with Transportation Planning at the Region of Waterloo	0%	0%	1%
B2	Information regarding public transit routes, schedules and fares are provided in an accessible and visible location on site and in adjacent bus stops	0%	0%	1%
B3a	Located in an UGC or within 800 m of a future Rapid Transit Station	24%	12%	0%

B3b	Located within 600m a transit route with 15 minute headways (or less) or is located in a designated mixed use corridor or node. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**	-	-	3%
B3c	Located within 400 metres of a bus service with headways of 15 min to 30 min. **Note: Points are awarded for either B3a, B3b or B3c only. Please choose whichever represents the highest order of transit.**	-	-	1%
	Category Maximum	**24%**	**12%**	**5%**
	Available Parking Reduction			**3%**

TABLE C	**Parking**			
Vehicle parking facilities can affect the character, travel mode and cost of a development. Reducing parking supply to match expected demand can have a positive influence on the selection of alternative travel modes.				
	Features	**UGC**	**IC**	**Other**
C1	Provides priority parking for carpooling/vanpooling participants equivalent to 5% of employee spaces	0%	0%	5%
C2	Commercial Uses: Provide car-share spaces equivalent to 2% of building occupants	2%	2%	0%
C3	Implements paid parking system on all or part of the site (e.g. parking permits, paid parking zones near main entrances)	2%	2%	1%
C4	Parking is not located on major street frontage.	0%	0%	1%
C5	25% to 50% of parking is located underground or in a structure	2%	1%	0%
C6	50% to 75% of parking is located underground or in a structure	4%	2%	0%
C7	75% of parking or more is located underground or in a structure	5%	3%	0%
	Category Maximum	**6%**	**4%**	**6%**
	Available Parking Reduction			**0%**

Sample Parking Reduction Worksheet **FORM-2**

Case Study: 359-369 Erb Street West **Site Context:**
Date: January 2025 **Worksheet No:**

TABLE D	Trip Reduction Incentives			
A formal TDM plan will identify specific initiatives that will be initiated in order to encourage reduced single occupant vehicle travel.				
	Features	**UGC**	**IC**	**Other**
D1	The building owner/occupant will provide a ride matching service for car/vanpooling	0%	0%	1%
D2	The building owner/occupant will provide emergency ride home options	3%	2%	1%
D3	The building owner/occupant will provide subsidized transit passes for all occupants for a period of two years	10%	4%	2%
D4	The building owner/occupant agrees to charge for parking as a separate cost to occupants	10%	5%	2%
D5	The building owner/occupant agrees to provide reduced cost for users of car/van pool, bicycle, moped/motorcycle spaces	0%	0%	1%
D6	The development agrees to join Travelwise (TMA) that provides the same services outlined under items D1 and D2	9%	6%	4%
	Category Maximum	**23%**	**11%**	**7%**
	Available Parking Reduction			**2%**

TABLE E	Parking Reduction Summary				
Please indicate the total reduction available based upon Tables A through D above.					
Category	**Reduction Achieved**	**Maximum Achievable Reduction**			**Comments**
		UGC	**IC**	**Other**	
Pedestrian & Cyclist Orientation	**3%**	4%	4%	4%	
Public Transit Access	**3%**	24%	12%	5%	
Parking	**0%**	6%	4%	6%	
Trip Reduction Incentives	**2%**	23%	11%	7%	
TOTAL	**8%**	**57%**	**31%**	**22%**	

TABLE F	TOTAL REDUCTION ACHIEVED	8%

Comments: