



**87-95 Seagram Drive,
Waterloo, ON**

Transportation Impact Study

Paradigm Transportation Solutions Limited

2025-12
240494



Project Summary

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87-95 Seagram Drive, Waterloo, ON Transportation Impact Study



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Executive Summary

Content

Modern Real Estate Development, through Masri O Inc. Architects, retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Study (TIS) for a proposed mixed-use redevelopment at 87-95 Seagram Drive in the City of Waterloo.

The purpose of this study is to identify and assess the potential transportation impact(s), if any, resulting from the redevelopment.

The scope of this report includes a review of existing and future traffic conditions near the development and the identification of future roadway improvements necessary to support the development, if needed.

Development Concept

Redevelopment of the site proposes two 27-storey towers and a six-storey podium with 522 residential apartment units and approximately 550m² (5,920 sq.ft.) of ground floor commercial. Vehicle access is proposed via two all-moves driveway connections to Seagram Drive. The development plan proposes 76 parking spaces. Build-out is anticipated to be complete by 2028 subject to market conditions.

Conclusions

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

- ▶ **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service with capacity issues at the intersection of Albert Street and Seagram Drive.
- ▶ **Development Trip Generation:** at full occupancy, the development is forecast to generate approximately 138 and 122 AM and PM peak hour trips, respectively.
- ▶ **Background Traffic Conditions:** As the traffic volumes increase at the study area intersections, the existing capacity issues are exacerbated at the intersections of Albert Street and Seagram Drive.
- ▶ **Total Traffic Conditions:** The capacity deficiencies identified under background conditions will continue to occur with the addition of the site generated traffic at the intersection of Albert Street and Seagram Drive.



- ▶ The site driveway connections to Seagram Drive are forecast to operate at LOS C or better and with v/c ratios of 0.13 or lower during the AM and PM peak hours.
- ▶ **Remedial Measures:** traffic control signals are not justified at Albert Street and Seagram Drive under future total traffic conditions.
- ▶ An eastbound left-turn lane on Seagram Drive at Lester Street is not warranted under future background and total traffic conditions.
- ▶ Westbound left-turn lanes on Seagram Drive at the two proposed site driveways are not warranted under future total traffic conditions.

Recommendations

Based on the conclusions of this study, it is recommended that the development be approved with no requirement for offsite transportation measures.

It is further recommended that the City of Waterloo monitor the future traffic and pedestrian volumes at the intersection of Albert Street and Seagram Drive to determine when traffic control signals can be installed.



Contents

1	Introduction	1
1.1	Overview	1
1.2	Purpose and Scope	1
2	Existing Conditions	3
2.1	Road Network	3
2.2	Transit Services.....	5
2.3	Active Transportation	8
2.3.1	Pedestrian	8
2.3.2	Cycling.....	8
2.4	Traffic Volumes	11
2.5	Traffic Operations	13
2.5.1	8-Hour Traffic Control Signal Justification	16
3	Development Concept	17
3.1	Site Description	17
3.2	Site Trip Generation & Distribution	19
3.2.1	Trip Generation	19
3.2.2	Trip Distribution	20
4	Future Conditions	23
4.1	2033 Forecast Traffic Volumes.....	23
4.2	Forecast Traffic Operations.....	27
4.2.1	2033 Background Traffic Operations	27
4.2.2	Total Traffic Operations	27
5	Remedial Measures.....	30
5.1	Left-Turn Lanes	30
5.1.1	Seagram Drive and Lester Street	30
5.1.2	Seagram Drive and Site Driveways	31
5.2	Traffic Control Signal Warrant	32
6	Conclusions and Recommendations	33
6.1	Conclusions.....	33
6.2	Recommendations	33



Appendices

Appendix A	Pre-Study Consultation
Appendix B	Turning Movement Count Data
Appendix C	Base Year Traffic Operations Reports
Appendix D	Eight-Hour Traffic Control Signal Justification
Appendix E	ITE Trip Generation Sheets
Appendix F	Background Development Traffic Volumes
Appendix G	Background Traffic Operations Reports
Appendix H	Total Traffic Operations Reports
Appendix I	Left-Turn Lane Warrant Nomographs
Appendix J	Traffic Control Signal Justifications

Figures

Figure 1.1:	Location of Subject Site	2
Figure 2.1:	Existing Lane Configurations & Traffic Control	4
Figure 2.2:	Transit Network	7
Figure 2.3:	Active Transportation Network	10
Figure 2.4:	Base Year Traffic Volumes	12
Figure 3.1:	Conceptual Site Plan	18
Figure 3.2:	Site Generated Traffic Volumes	21
Figure 3.3:	Pass-by Traffic Volumes	22
Figure 4.1:	2033 Background Traffic Volumes	25
Figure 4.2:	2033 Total Traffic Volumes	26

Tables

Table 2.1:	Base Year Traffic Operations	15
Table 3.1:	Estimated Trip Generation	19
Table 3.3:	Estimated Trip Distribution	20
Table 4.1:	2033 Background Traffic Operations	28
Table 4.2:	2033 Total Traffic Operations	29
Table 5.1:	Left-Turn Lane Warrant Summary (Lester Street)	31
Table 5.2:	Left-Turn Lane Warrant Summary (Site Driveways)	31



1 Introduction

1.1 Overview

Modern Real Estate Development, through Masri O Inc. Architects, retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Study (TIS) for a proposed mixed-use redevelopment at 87-95 Seagram Drive in the City of Waterloo.

Figure 1.1 illustrates the location of the subject site.

1.2 Purpose and Scope

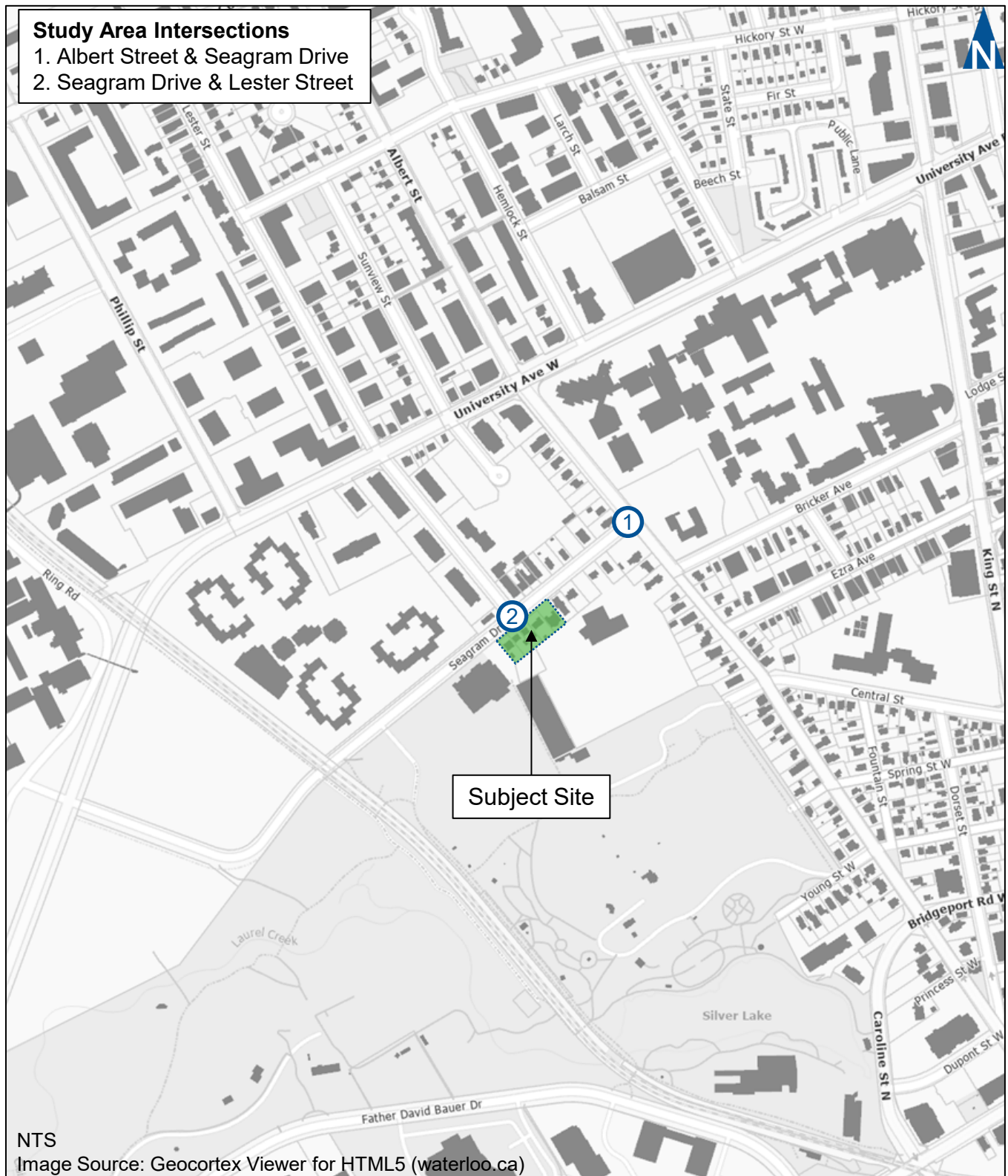
The purpose of this study is to identify and assess the potential transportation impact(s), if any, resulting from the development. The scope of this study, developed in consultation with the City of Waterloo (the city) via email in June 2025 includes:

- ▶ assessing current traffic volumes and operations at the following intersections:
 - Seagram Drive and Lester Street (unsignalized);
 - Seagram Drive and Albert Street (unsignalized); and
 - Proposed driveway connections to Seagram Drive (unsignalized)
- ▶ estimating background traffic growth for a five-year horizon from the assumed build-out of the subject site (Year 2033);
- ▶ forecasting site-generated traffic arising from the proposed development; and
- ▶ Analyses of the impacts of the future traffic on the intersections noted above, with and without the proposed redevelopment.

Appendix A contains the pre-study consultation material and responses from the City in June 2025. This study has been completed in general accordance with the Region of Waterloo *Transportation Impact Study Guidelines*.¹

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





2 Existing Conditions

2.1 Road Network

The main roads in the study area include Seagram Drive, Lester Street and Albert Street, governed by City of Waterloo. The feature of each road include:

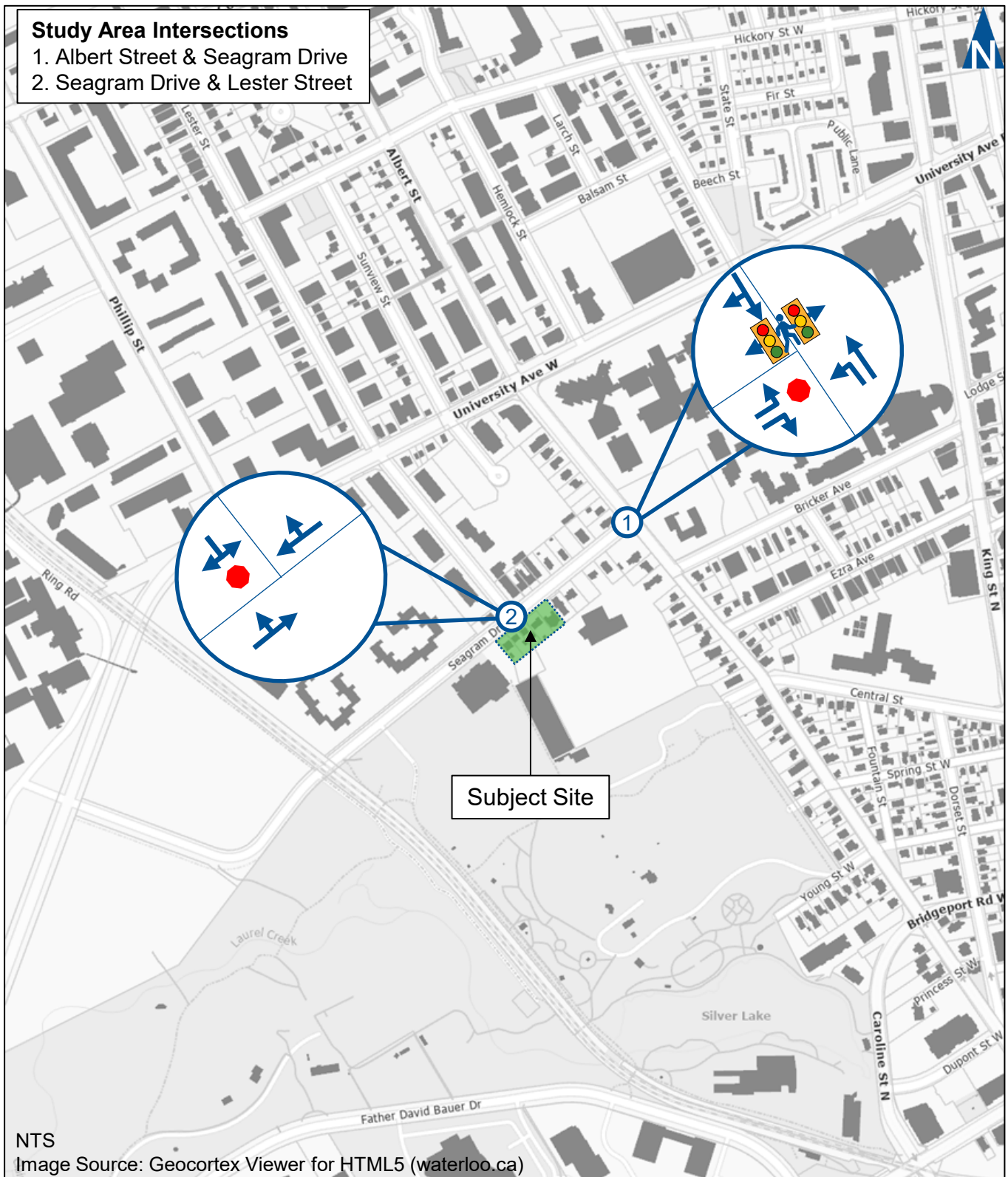
- ▶ **Seagram Drive** is an east-west, two-lane, minor collector road with an undivided urban cross-section comprising one general purpose travel lane per direction². The posted speed limit is 40 km/h. Sidewalks and on-road bicycle lanes are provided on both sides of the road north and south of Seagram Drive. Parking is not permitted on either side of the road.
- ▶ **Lester Street** is a north-south, two-lane, local road with an undivided urban cross-section comprising one general purpose travel lane per direction². The posted speed limit is 30 km/h. Sidewalks are provided on both sides of the road east and west of Lester Street. Dedicated cycling facilities are not provided. Parking is prohibited on the east side of the road from Monday to Friday, between 8:00 AM and 6:00 PM.
- ▶ **Albert Street** is a north-south, two-lane, major collector road with an undivided urban cross-section comprising one general purpose travel lane per direction². The speed limit is not posted and is assumed to be 50 km/h, as part of the City's speed management implementation plan.³ Sidewalks are provided on both sides of the road east and west of Albert Street. Dedicated and physically segregated cycling facilities are provided on both sides of the road, north of Seagram Drive. South of Seagram Drive, cyclists are required to share the road network with motor vehicles. Parking is not permitted on either side of the road.

Figure 2.1 illustrates the existing lane configurations and traffic control at the study intersections.

² City of Waterloo, *Official Plan, Schedule E (Road Classification System)*, (Waterloo: City of Waterloo, 2018).

³ "Speed management: safe streets for all," Engage Waterloo, 2024, <https://www.engagewr.ca/speed-management>.





2.2 Transit Services

Figure 2.2 illustrates the existing Grand River Transit⁴ routes near the development:

- ▶ **Route 301 (ION Right Rail)** operates between Conestoga and Fairway. The route operates Monday to Friday (4:45 AM to 12:23AM) with alternating headways of 10 to 15 minutes, Saturdays (5:25 AM to 12:14 AM) with headways approximately every 15 minutes, and Sundays/Holidays (6:16 AM to 12:14 AM) with headways approximately every 15 minutes.
- ▶ **Route 202 iXpress University** operates between Conestoga Station and the Boardwalk Station with service along University Avenue in the study area. The route operates Monday to Friday (5:50 AM to 12:21 AM) with 15-minute headways, Saturdays (6:15 AM to 12:39 AM) with 30-minute headways, and Sunday/Holidays (7:15 AM to 12:39 AM) with 30-minute headways.
- ▶ **Route 7 (King)** operates between Conestoga Station and Fairway Station with service along King Street near the study area. The route operates Monday to Friday (5:32 AM to 12:44 AM) with headways approximately every 15 minutes, Saturdays (5:42 AM to 12:40 AM) with headways approximately every 15 minutes, and Sunday/Holidays (8:00 AM to 12:40 AM) with headway approximately every 15 minutes.
- ▶ **Route 12 (Westmount)** operates between University/King intersection to Fairway Station with service along University Avenue near the study area. The route operates Monday to Friday (5:27 AM to 12:29 AM) with headways approximately every 15 minutes, Saturdays (6:22 AM to 12:47 AM) with headways approximately every 30 minutes, and Sundays/Holidays (7:20 AM to 12:47 AM) with headways approximately every 30 minutes.
- ▶ **Route 91 (Late Night Loop)** operates between the University of Waterloo Station and Queen Station with service along University Avenue near the study area. The route operates Thursday to Saturday (12:00 AM to 2:34 AM) with headways approximately every 30 minutes.

The closest transit stop to the subject site is the Laurier-Waterloo Park ION LRT Station (approximately 300 metres or a 4-minute walk) on Seagram Drive.

⁴ Grand River Transit (grt.ca)



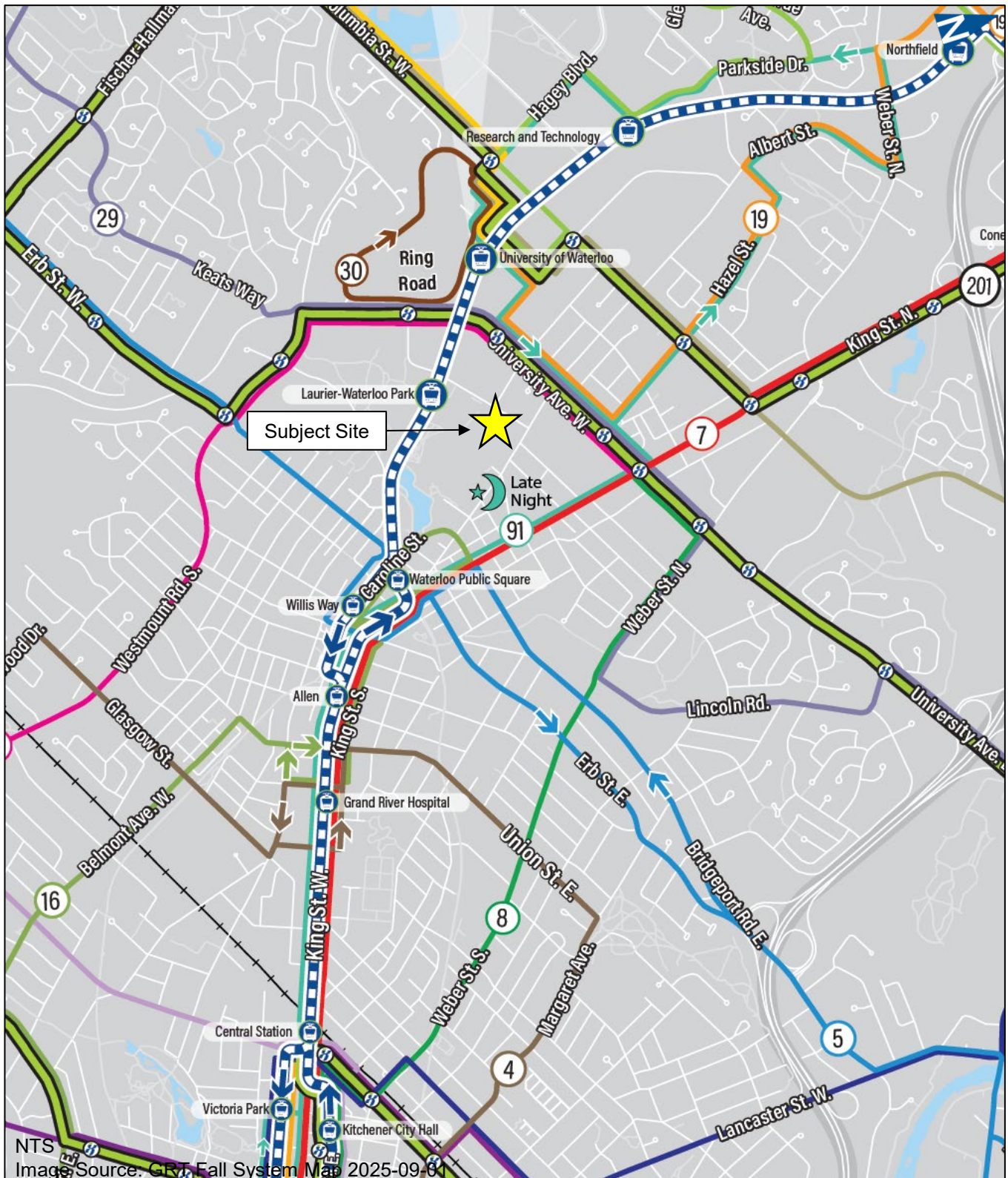
The following are the approximate distances and walking times to select ION Stations from the subject site:

- ▶ Laurier-Waterloo Park Station: 0.3 kilometres (4 minutes);
- ▶ University of Waterloo Station: 1.0 kilometre (14 minutes);
- ▶ Waterloo Public Square Station: 1.4 kilometres (18 minutes);
and
- ▶ Willis Way Station: 1.4 kilometres (18 minute).

The subject site earns a transit score of 70. This is considered “Excellent Transit,” which means transit is convenient for most trips.

Compared to other locations in the Region/City, this site is afforded frequent conventional and higher-order transit service, supporting residents to choose non-auto travel more frequently.





2.3 Active Transportation

2.3.1 Pedestrian

87-95 Seagram Drive earns a Walk Score⁵ of 83 (“Very Walkable”) which means that most errands can be accomplished on foot. This is evident with sidewalks provided on both sides of the study area roadways and their connections to multiple trails in Waterloo Park and the Laurel Trail.

There is a signalized pedestrian crossing on Albert Street just north of Seagram Drive which allows controlled pedestrian crossings of Albert Street.

The following are the approximate distances and walking times from the subject site to select land uses for food, entertainment, and recreation:

- ▶ University Shops Plaza – 0.65 kilometres (9-minute walk);
- ▶ Waterloo Memorial Recreation Complex – 1.1 kilometres (14-minute walk); and
- ▶ Uptown Waterloo – 1.2 kilometres (17-minute walk).

2.3.2 Cycling

The City’s cycling infrastructure consists of on street and off-street facilities. On-street facilities comprise cycling lanes, signed bicycle routes, and paved shoulders. Off-street facilities are in the form of multi-use trails or informal trails. Travel by bicycle to/from the subject site is not restricted by any access-controlled roadways. Cyclists are permitted to ride on all roadways in the study area.

Within the study area, painted on-street bicycle lanes are provided on both sides of Seagram Drive. Albert Street south of Seagram Drive provides “Sharrow” lanes where vehicles and bicycles share the lane. North of Seagram Drive, Albert Street has on-street bicycle lanes separated by curbs and bollards. Lester Street does not have any dedicated cycling infrastructure.

As noted above, the Laurel Trail intersects with Seagram Drive approximately 300 metres (1 minute cycle) west of the subject site.

⁵ Walk Score (www.walkscore.com) is an online tool that assigns a numerical number score between 0 and 100 and illustrates how many businesses, parks, theatres, schools, and other common destinations are near a given address.

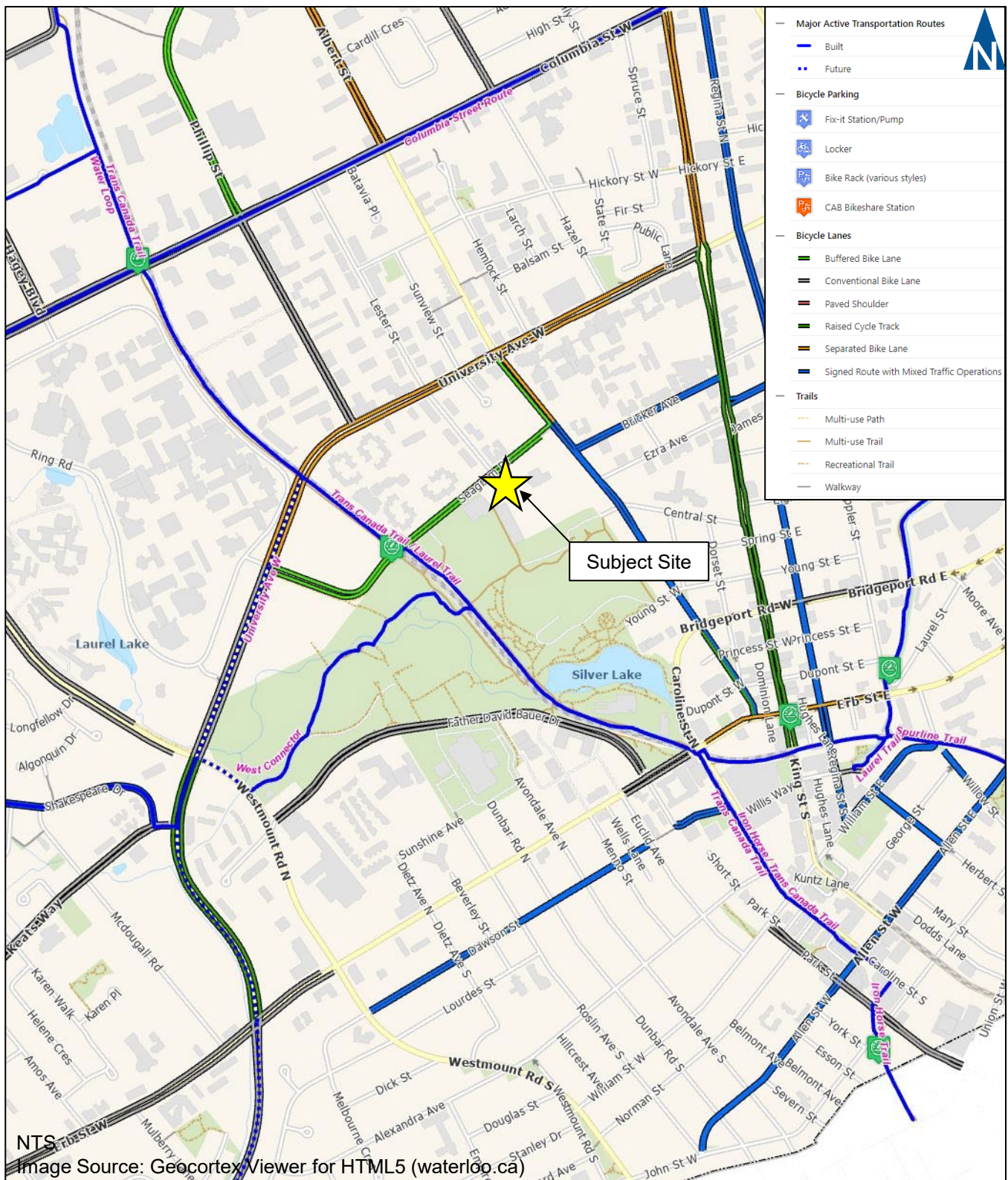


The Laurel Trail offers direct connection between Uptown Waterloo and the two universities.

The subject site earns a Bike Score of 91 (“Biker’s Paradise”) which means that daily errands can be accomplished on a bicycle.

Figure 2.3 illustrates the active transportation network in the study area.





2.4 Traffic Volumes

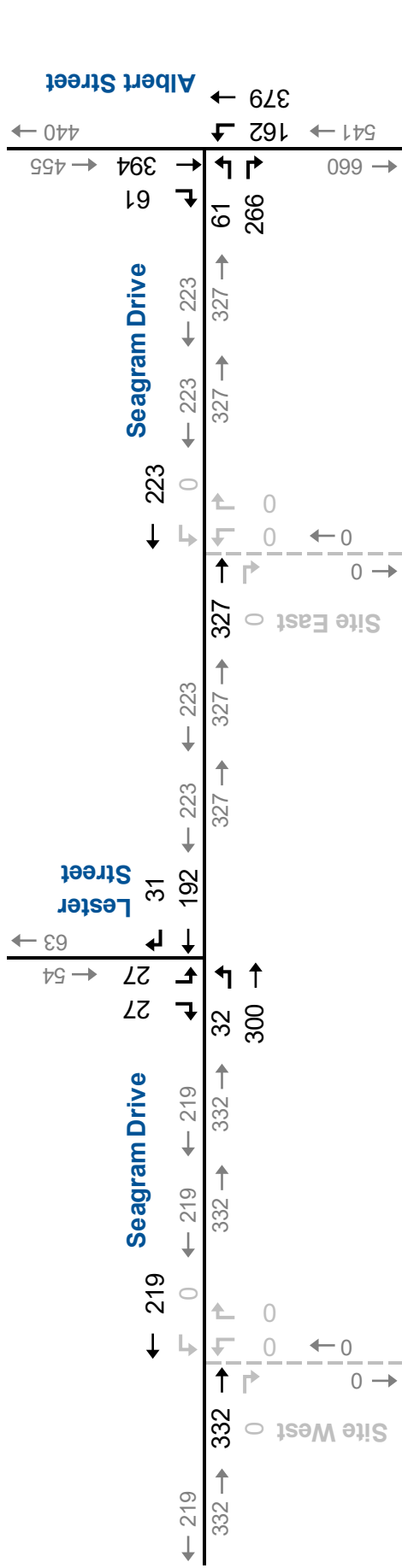
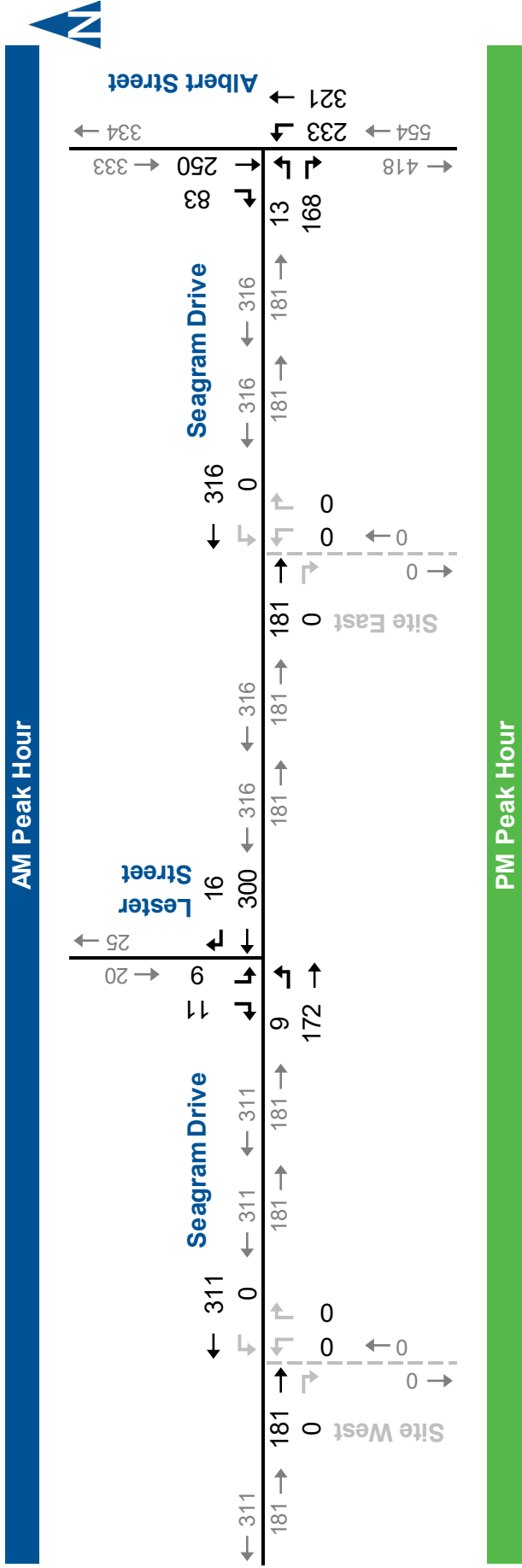
To assess intersection operations, turning movement counts (TMCs) are used to quantify the movement of vehicles through an intersection. Existing traffic data at an intersection or on a road section forms the foundation for the analyses. The TMCs are usually conducted in such a manner to identify the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

Turning movement counts for the intersection of Albert Street and Seagram Drive were obtained from the Region of Waterloo and are dated April 2023. Paradigm conducted turning movement counts at the intersection of Seagram Drive and Lester Street in September 2025. The April 2023 turning movement counts were factored to the 2025 base year using the pre-study consultation approved 2.0% annual growth rate .

Appendix B contains the raw turning movement count data collected.

Figure 2.4 illustrates the base year traffic volumes for 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.





Base Year Traffic Volumes

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles wanting to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized intersections), the movement is considered to have a LOS F, and remedial measures are usually implemented if they are feasible.

The intersection analysis considered three separate measures of performance:

- ▶ The LOS for each turning movement. LOS is based on the average control delay per vehicle;
- ▶ The volume to capacity (v/c) ratio for movements and overall intersection; and
- ▶ 95th percentile queue length (metres).

Under the Region's TIS Guidelines⁶, the operational analysis must include identification of signalized and unsignalized intersections where:

- ▶ The criteria for identifying "critical" intersections are:
 - overall Level of Service E or F (i.e. average control delay per vehicle greater than 55 seconds) for signalized intersections; and
 - overall Level of Service E or F (i.e. average control delay per vehicle greater than 35 seconds) for unsignalized intersections.
- ▶ The criteria for identifying "critical" movements are:
 - the average control delay for individual movements is greater than 55 seconds;
 - estimated 95th percentile queue length for an exclusive movement exceeds the available storage space;

⁶ Region of Waterloo, *Transportation Impact Study Guidelines*, [ROW: July 2014].



- estimated 95th percentile queue length for an individual movement will block an existing access;
- exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes; and
- poor quality of service for non-auto modes (as per the assessment in section 7.3).

The evaluation criteria used to analyze signalized and unsignalized intersections are based on the Highway Capacity Manual (HCM) 7th Edition⁷ procedures output from Synchro software.

The operations of the intersections in the study area were evaluated using the existing lane configuration, signal timings, and traffic control along with the existing traffic volumes, including the calculated intersection peak hour factors, crossing pedestrians, and heavy vehicle percentages.

Table 2.1 summarizes the level of service conditions. All intersections operate within acceptable levels under existing conditions except at Albert Street and Seagram Drive where the eastbound left-turn movement operates at LOS F, with v/c ratio of 0.56, and 95th percentile queue length greater than the available storage during the PM peak hour.

While eastbound left-turn from Seagram Drive onto Albert Street experiences high delays, the v/c ratio indicates that there remains excess capacity for this movement.

Appendix C contains the detailed Synchro reports.

⁷National Academies of Sciences, Engineering, and Medicine; Transportation Research Board, *Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis*, [NASEM: 2022]



TABLE 2.1: BASE YEAR TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	D 33 0.09 2 20 18		B 12 0.25 8 - -	B 14					A 9 0.21 6 30 24	A 0 0.19 0 - -		A 4		A 0 0.20 0 - -	> > > > >	A 0	A 4
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < 8 0.01 0 - <	A 8 0.01 0 - -		A 0	0.19 0 - -	> > > >	A 0					B 12 0.04 1 - -		> > > > >	B 12	A 1	
PM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	F 74 0.56 22 20 -2		C 18 0.50 22 - -	D 29					A 9 0.17 5 30 25	A 0 0.22 0 - -		A 3		A 0 0.27 0 - -	> > > > >	A 0	A 8
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < 8 0.03 1 - <	A 8 0.03 1 - -		A 1	0.13 0 - -	> > > >	A 0					B 14 0.12 3 - -		> > > > >	B 14	A 2	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex - Existing Available Storage (m)

Avail. - Available Storage (m)

TWSC - Two-Way Stop Control

< / > - Shared Turn Lane



2.5.1 8-Hour Traffic Control Signal Justification

There is currently an intersection pedestrian signal (IPS) across the north leg of Albert Street at the Albert Street and Seagram intersection.

The Ontario Traffic Manual (OTM) Book 12⁸ traffic signal justification (Justification one through three) was used with the observed eight-hour traffic volumes factored to 2025 base year condition for the intersection of Albert Street and Seagram Drive to see if full traffic control signals are justified.

The traffic signal justification shows that full traffic control signals are not justified under base year conditions for the intersection of Albert Street and Seagram Drive.

Appendix D contains the justification work sheet.

⁸ Ministry of Transportation, Ontario. *Ontario Traffic Manual Book 12: Traffic Signals*. 2012. Queen's Printer of Ontario.



3 Development Concept

3.1 Site Description

Redevelopment of the site proposes two 27-storey towers connected by a six-storey podium providing 522 residential apartment units and approximately 550m² (5,920 sq.ft.) of ground floor commercial.

Vehicle access is proposed via two all-moves driveway connections to Seagram Drive. The site proposes 76 parking spaces.

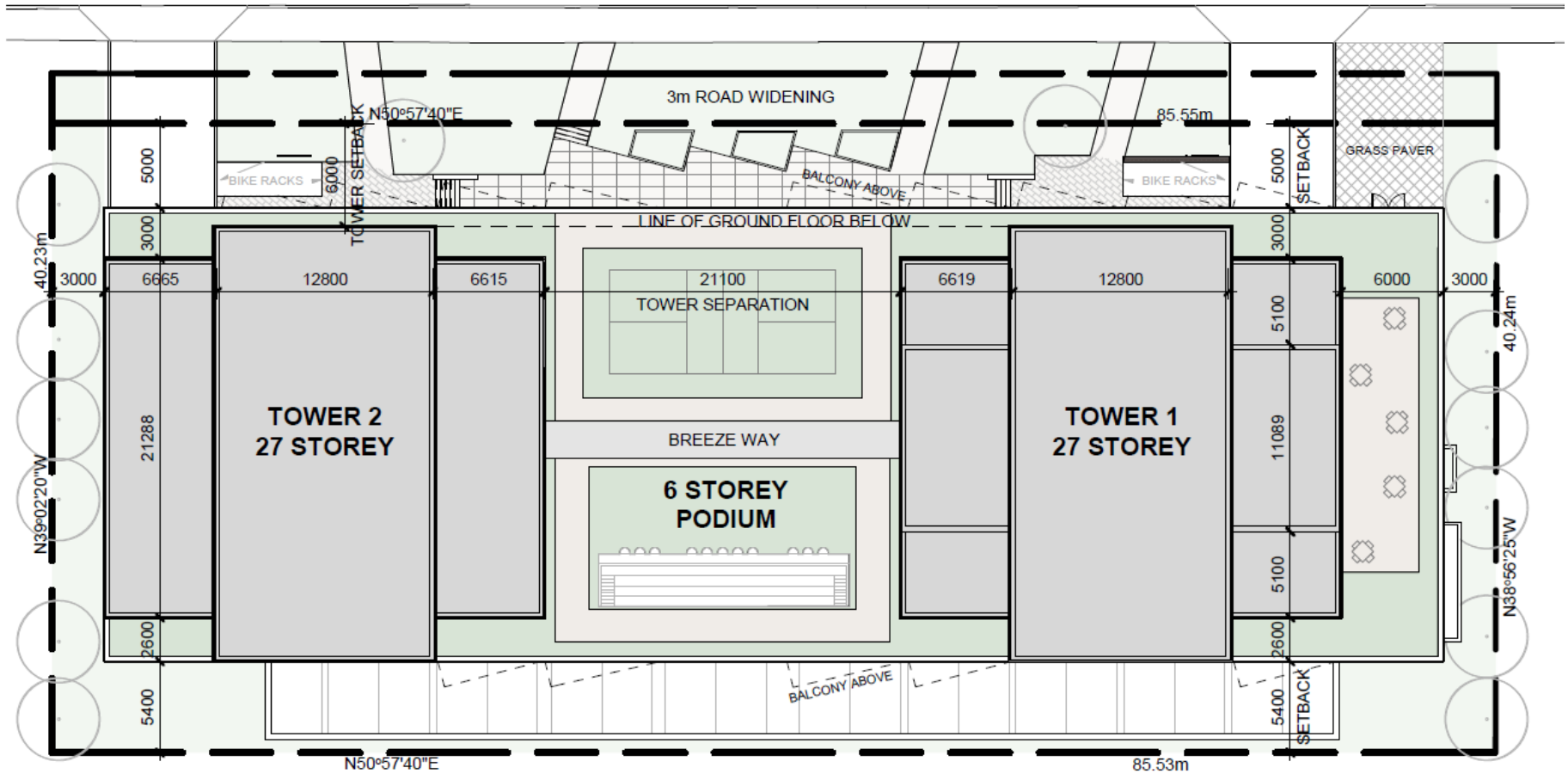
Build-out is anticipated to be complete by 2028 subject to market conditions.

Figure 3.1 illustrates the conceptual site plan.





SEAGRAM DRIVE



NTS



Concept Plan

87-95 Seagram Drive, Waterloo
240494

Figure 3.1

3.2 Site Trip Generation & Distribution

3.2.1 Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation⁹ provides methods to estimate site trip generation. The following Land Use Codes were used to estimate the site trip generation:

- ▶ 222 Multifamily Housing, High-Rise (Dwelling Units); and
- ▶ 822 Strip Retail Plaza, <40k (GFA/1,000 sq.ft.).

Table 3.1 summarizes the estimated trip generation. For LUC 222, the “Dense Multiuse Urban” land use setting was selected along with the “Close to Rail Transit” variable as the site is 300 metres from an ION LRT Station. The average rates were used to calculate the trips as the regression square results were considered low. No modal split reduction was assumed in the site trip generation.

Upon full build-out, the site is estimated to generate approximately 138 AM peak hour trips and approximately 136 PM peak hour trips.

IPass-by trips for the commercial land uses in the PM peak hour were obtained from Land Use Code 821 (Shopping Plaza) from the ITE *Trip Generation Handbook*¹⁰.

The resulting net trip generation is approximately 138 AM peak hour trips and approximately 122 PM peak hour trips

Appendix E contains the ITE Trip Generation work sheets.

TABLE 3.1: ESTIMATED TRIP GENERATION

ITE Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
222 - Multifamily Housing, High-Rise (Dwelling Units)	522	13	102	115	68	31	99
822 - Strip Retail Plaza, <40k (GFA/1,000ft ²)	5.9	13	10	23	18	19	37
Total Trip Generation		26	112	138	86	50	136
822 Passby PM Peak Hour	40%				-	7	- 14
Net Trip Generation		26	112	138	79	43	122

⁹ Institute of Transportation Engineers, *Trip Generation Manual*, 12th ed., (Washington, DC: ITE, 2025).

¹⁰ Institute of Transportation Engineers, *Trip Generation Handbook*, 3rd ed., (Washington, DC: ITE, 2017).



3.2.2 Trip Distribution

Given that the area is largely developed, and the immediate area is similar to the proposed subject site, the trip distribution was based on the existing travel patterns at the study area intersections.

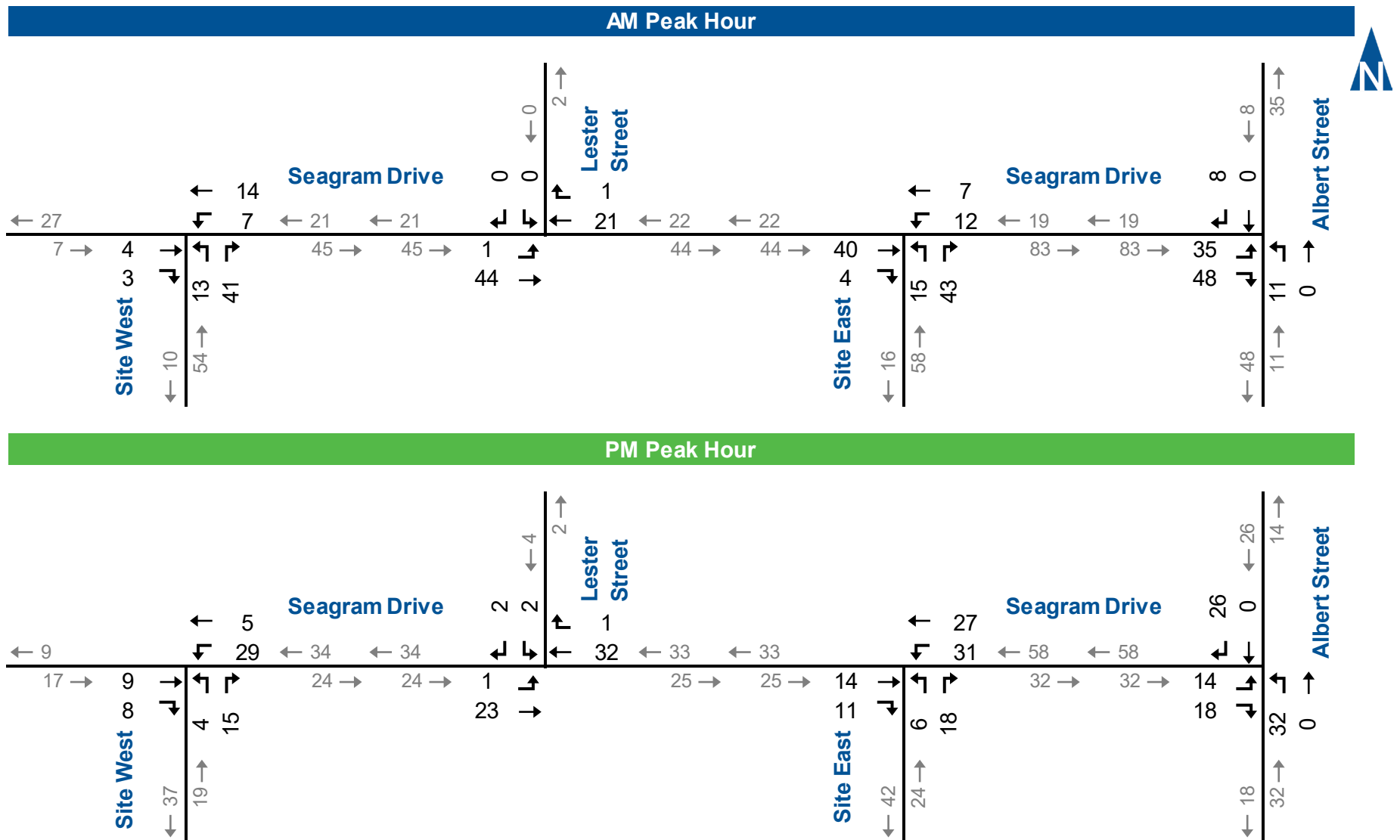
Table 3.2 summarizes the estimated trip distribution.

TABLE 3.1: ESTIMATED TRIP DISTRIBUTION

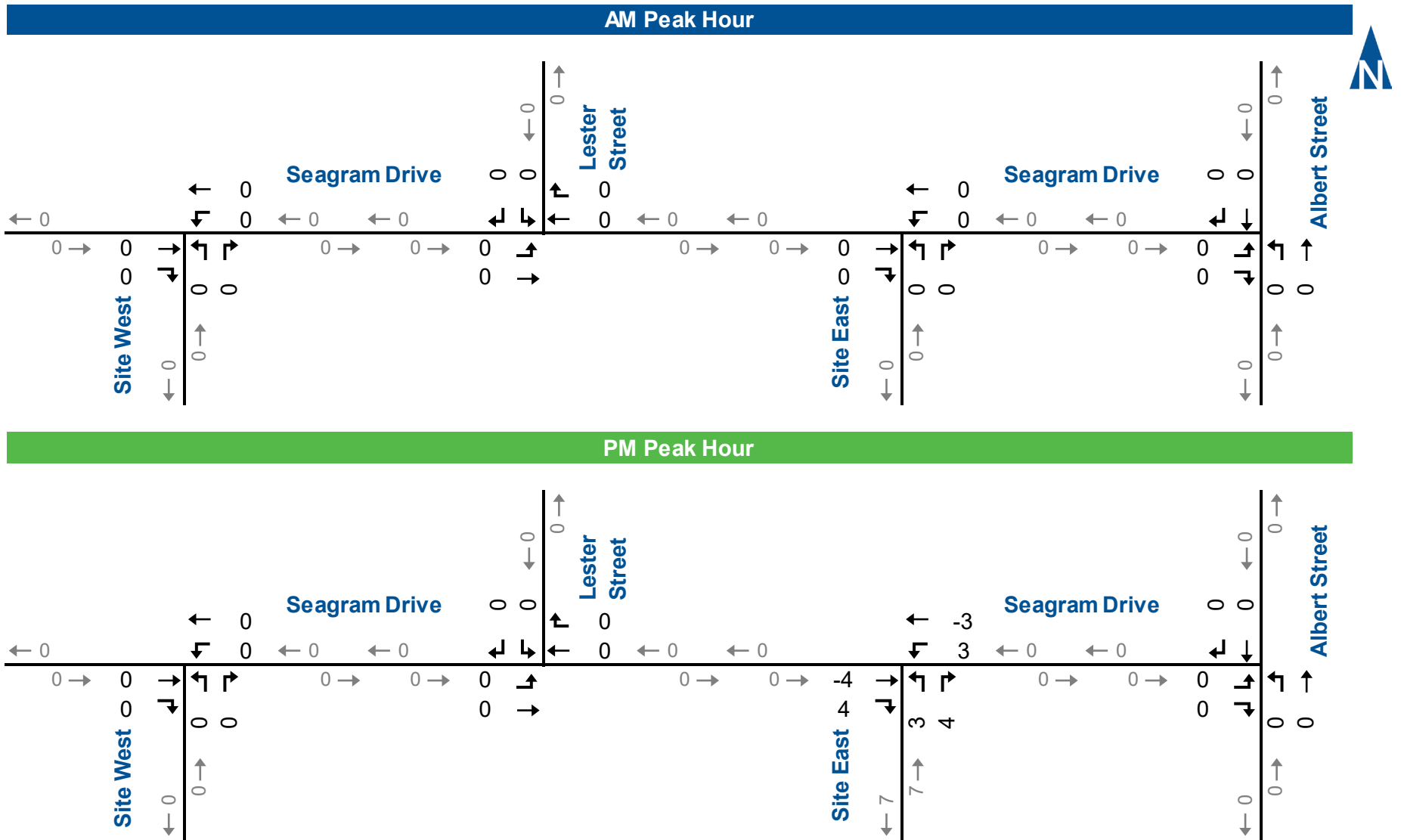
To/From	AM	PM
North via Albert Street	31%	32%
North via Leaster Street	2%	4%
South via Albert Street	42%	42%
West via Seagram Drive	24%	21%
Total	100%	100%

Figure 3.2 contains the AM and PM peak hour trip assignment to the adjacent road network. **Figure 3.3** contains the pass-by traffic volumes.





Site Generated Traffic Volumes



4 Future Conditions

The assessment of future conditions in this section includes the following components necessary to assess the traffic implications on the adjacent road network:

- ▶ future background traffic estimates;
- ▶ level of service analysis for background traffic (pre-development);
- ▶ future total traffic estimates; and
- ▶ level of service analysis for total traffic (post-development).

4.1 2033 Forecast Traffic Volumes

The likely future traffic volumes five years from the assumed build-out date consist of:

- ▶ increased non-site traffic (generalized background traffic growth) estimated to be 2.00 percent per annum (as identified by the city);
- ▶ traffic generated by the following nearby developments:
 - 177-179 Albert Street¹¹;
 - 251 Albert Street¹²;
 - 262-289 Albert Street¹³;
 - 88 Hickory Street¹³;
 - 155 University Avenue West; and
- ▶ traffic generated by the subject site.

The background traffic volumes for 177-179 Albert Street and 251 Albert Street were obtained from their respective traffic studies. The background traffic volumes for 262-289 Albert Street and 88 Hickory Street were obtained from the 290-296 Hemlock traffic study. The background traffic volumes for 155 University were estimated using ITE Trip Generation methodology.

¹¹ Paradigm Transportation Solutions Limited, *177-179 Albert Street Waterloo ON Transportation Impact Study and Parking Study*, (PTSL, November 2023).

¹² Paradigm Transportation Solutions Limited, *251 Albert Street Waterloo ON Transportation Impact and Parking Study*, (PTSL, August 2023).

¹³ Paradigm Transportation Solutions Limited, *290-298 Hemlock Waterloo Ontario Transportation Impact Study*, (PTSL, July 2021).

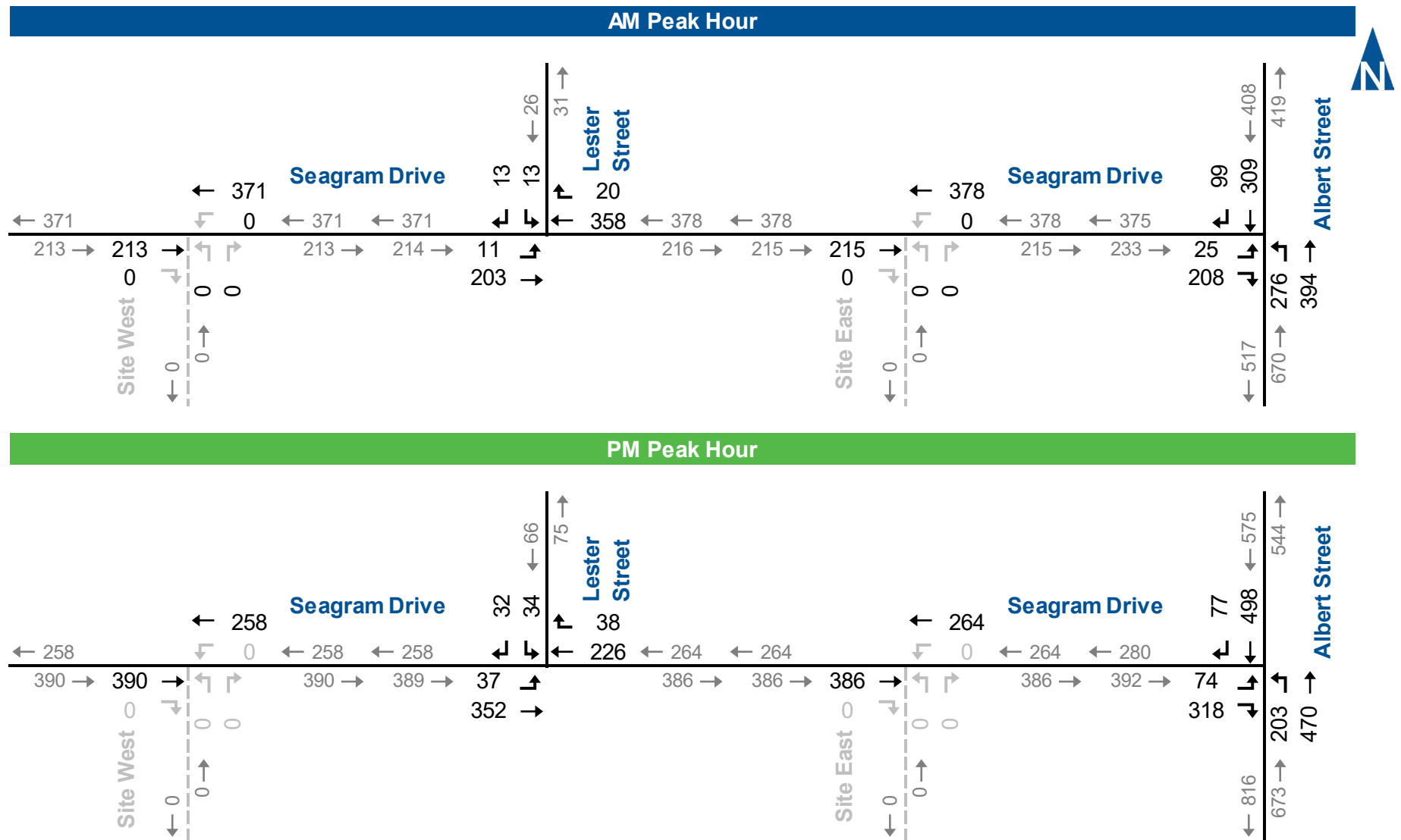


Appendix F contains the background development traffic volumes.

Figure 4.1 details the forecast 2033 background traffic volumes.

Figure 4.2 details the forecast 2033 total traffic volumes (background traffic volumes plus the site generated traffic volumes and pass-by traffic volumes).





4.2 Forecast Traffic Operations

4.2.1 2033 Background Traffic Operations

The study area intersection operations analysis for the background traffic scenario followed the same methodology used for the existing traffic conditions. **Table 4.1** details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections and turning movements are forecast to operate within acceptable levels of service during the AM and PM peak hour except for the eastbound left-turn movement at Albert Street and Seagram Drive that is forecast to operate at LOS F and with a v/c ratio of 0.26 during the AM peak hour, and at LOS F, with a v/c ratio greater than 1.00, and queue length greater than its available storage during the PM peak hour.

Appendix G contains the detailed Synchro reports.

4.2.2 Total Traffic Operations

The study area intersection operations analysis for the future total traffic scenario followed the same methodology used for the background traffic conditions. **Table 4.2** details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections and turning movements are forecast to operate within acceptable levels of service during the AM and PM peak hour with the Eastbound left-turn at Albert Street and Seagram Drive which is forecast to operate at LOS F, with a v/c ratio of 0.65, and queue length greater than the available storage during the AM peak hour and at LOS F, with a v/c ratio greater than 1.00, and queue length greater than the available storage during the PM peak hour.

The site driveway connections to Seagram Drive are forecast to operate at LOS C or better, with v/c ratios of 0.13 or lower during the AM and PM peak hours.

Appendix H contains the detailed Synchro reports.



TABLE 4.1: 2033 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	F 55 0.26 7 20 13		B 14 0.34 12 - -	C 18					A 10 0.26 8 30 22	A 0 0.23 0 - -		A 4		A 0 0.24 0 - -	> > > > >	A 0	A 5
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < < < <	A 9 0.01 0 - -		A 0 0.22 0 - -	> > > > >	A 0					B 13 0.06 2 - -		> > > > >	B 13	A 1		
PM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	F 246 1.10 46 20 -26		D 28 0.69 41 - -	F 69					B 10 0.23 7 30 23	A 0 0.28 0 - -		A 3		A 0 0.34 0 - -	> > > > >	A 0	C 18
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < < < <	A 8 0.03 1 - -		A 1		A 0 0.16 0 - -	> > > > >	A 0					C 15 0.16 5 - -	> > > > >	C 15	A 2	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TWSC - Two-Way Stop Control

< / > - Shared Turn Lane



TABLE 4.2: 2033 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	F 99 0.65 25 20 -5		B 15 0.41 16 - -	D 31					A 10 0.27 9 30 21	A 0 0.23 0 - -		A 4		A 0 0.24 0 - -	> > > > >	A 0	A 9
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < < < <	A 9 0.01 0 - -		A 0		A 0 0.24 0 - -	> > > > >						B 14 0.06 2 - -	> > > > >	B 14	A 1	
	Seagram Drive & West Site Driveway	TWSC	LOS Delay V/C Q Ex Avail.		A 0 0.13 0 - -	> > > > >	A 0	< < < < <	A 9 0.01 1 - -		A 0	B 13 0.11 3 - -				B 13				A 1
	Seagram Drive & East Site Driveway	TWSC	LOS Delay V/C Q Ex Avail.		A 0 0.15 0 - -	> > > > >	A 0	< < < < <	A 9 0.01 0 - -		A 0	B 14 0.13 3 - -				B 14				A 1
PM Peak Hour	Albert Street & Seagram Drive	TWSC	LOS Delay V/C Q Ex Avail.	F 434 1.55 64 20 -44		D 32 0.74 48 - -	F 115					B 11 0.27 9 30 21	A 0 0.28 0 - -		A 4		A 0 0.35 0 - -	> > > > >	A 0	D 30
	Seagram Drive & Lester Street	TWSC	LOS Delay V/C Q Ex Avail.	< < < < <	A 8 0.03 1 - -		A 1		A 0 0.17 0 - -	> > > > >						C 16 0.18 5 - -	> > > > >	C 16	A 2	
	Seagram Drive & West Site Driveway	TWSC	LOS Delay V/C Q Ex Avail.		A 0 0.24 0 - -	> > > > >	A 0	< < < < <	A 9 0.03 1 - -		A 1	B 14 0.05 1 - -				B 14				A 1
	Seagram Drive & East Site Driveway	TWSC	LOS Delay V/C Q Ex Avail.		A 0 0.24 0 - -	> > > > >	A 0	< < < < <	A 9 0.04 1 - -		A 1	C 16 0.08 2 - -				C 16				A 1

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex - Existing Available Storage (m)

Avail. - Available Storage (m)

TWSC - Two-Way Stop Control

< / > - Shared Turn Lane



5 Remedial Measures

The analyses presented in **Chapter 4** indicate the study intersections are forecast to operate at acceptable levels of service and within capacity with or without the proposed development. The need for remedial measures to support the site generated traffic reflects an assessment of auxiliary turning lanes for the proposed driveway connections and traffic control improvements at Albert Street and Seagram Drive.

5.1 Left-Turn Lanes

The need for dedicated left-turn lanes at the unsignalized intersections on Seagram Drive was assessed using Ministry of Transportation (MTO) procedures outlined in the *Design Supplement for the TAC Guide*¹⁴.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5%, as nomographs are only provided for 5% increments. This apparent requirement is due to the nature of the warrant procedure that assumes a minimum of 5% of left turning vehicles in the advancing volume. Therefore, left-turn lanes are automatically not warranted for any left turning volume less than 5%.

A design speed of 50 km/h was assessed for Seagram Drive as 40 km/h design speed nomographs are not available.

Appendix I contains the left-turn lane warrant nomographs.

5.1.1 Seagram Drive and Lester Street

Table 5.1 summarizes the left-turn lane warrant for an eastbound left-turn lane on Seagram Drive at Lester Street for future background and total traffic conditions. It indicates that an eastbound left-turn lane is not warranted under future traffic conditions

¹⁴ Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020),



TABLE 5.1: LEFT-TURN LANE WARRANT SUMMARY (LESTER STREET)

Roadway	Seagram Drive			
Intersection	Lester Street			
Approach Direction	Eastbound			
Design Speed	50 km/h			
Horizon	BG (2033)		TT (2033)	
Peak Hour	AM	PM	AM	PM
Advancing Volume	214	389	259	413
Opposing Volumes	378	264	400	297
Left Turning Traffic	11	37	12	38
% of Left Turning Traffic	5.1%	9.5%	4.6%	9.2%
Figure Used*	9A-3	9A-3	9A-3	9A-3
Warranted	No	No	No	No
Storage Length Required	-	-	-	-

Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023

5.1.2 Seagram Drive and Site Driveways

Table 5.2 summarizes the left-turn lane warrant for westbound left-turn lanes on Seagram Drive at both the west and east site driveways for future total traffic conditions. It indicates that westbound left-turn lanes are not warranted at the two proposed site driveways.

TABLE 5.2: LEFT-TURN LANE WARRANT SUMMARY (SITE DRIVEWAYS)

Roadway	Seagram Drive			
Intersection	Site West		Site East	
Approach Direction	Westbound		Westbound	
Design Speed	50 km/h		50 km/h	
Horizon	TT (2033)		TT (2033)	
Peak Hour	AM	PM	AM	PM
Advancing Volume	392	292	397	322
Opposing Volumes	220	407	259	411
Left Turning Traffic	7	29	12	34
% of Left Turning Traffic	1.8%	9.9%	3.0%	10.6%
Figure Used*	9A-3	9A-3	9A-3	9A-3
Warranted	No	No	No	No
Storage Length Required	-	-	-	-

Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023



5.2 Traffic Control Signal Warrant

The operational analyses identified the eastbound left-turn movement on Seagram Drive at Albert Street as critical, with or without the proposed development. This critical movement is caused by the high volume of through traffic on Albert Street, which provides limited opportunities for side-street traffic to enter along with the high pedestrian volume crossing Albert Street at the Intersection Pedestrian Signal (IPS). To improve traffic operations at the intersection and provide controlled pedestrian crossings for each leg of the intersection, the City could consider installing a full traffic signal to replace the current IPS.

The intersection of Albert Street and Seagram Drive was assessed using the *Ontario Traffic Manual*¹⁵ (Book 12 – Traffic Signals) Justification 7 signal warrant procedures for both future background and total traffic conditions. **Appendix J** contains the warrant analysis. It indicates that traffic control signals are not justified under future background and total traffic conditions at Albert Street and Seagram Drive.

It is recommended that the City monitor the future traffic and pedestrian volumes at the intersection of Albert Street and Seagram Drive to determine when traffic control signals can be installed.

¹⁵ Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2024).



6 Conclusions and Recommendations

6.1 Conclusions

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

- ▶ **Existing Traffic Conditions:** Overall, the study area intersections currently operate within acceptable levels of service with problem movements at the intersection of Albert Street and Seagram Drive.
- ▶ **Development Trip Generation:** the proposed development is forecast to generate approximately 138 and 122 AM and PM peak hour trips, respectively.
- ▶ **Background Traffic Conditions:** As the traffic volumes increase at the study area intersections, the existing capacity issues are exacerbated at the intersection of Albert Street and Seagram Drive.
- ▶ **Total Traffic Conditions:** The capacity deficiencies identified under background conditions will continue to occur with the addition of the site generated traffic at the intersection of Albert Street and Seagram Drive.
- ▶ The site driveway connections to Seagram Drive are forecast to operate at LOS C or better and with v/c ratios of 0.13 or lower during the AM and PM peak hours.
- ▶ **Remedial Measures:** traffic control signals are not justified at Albert Street and Seagram Drive under future total traffic conditions.
- ▶ An eastbound left-turn lane on Seagram Drive at Lester Street is not warranted under future background and total traffic conditions.
- ▶ Westbound left-turn lanes on Seagram Drive at the two proposed site driveways are not warranted under future total traffic conditions.

6.2 Recommendations

Based on the conclusions of this study, it is recommended that the development be approved with no requirement for offsite transportation measures.

It is further recommended that the City of Waterloo monitor the future traffic and pedestrian volumes at the intersection of Albert Street and



Seagram Drive to determine when traffic control signals can be installed.

.



Appendix A

Pre-Study Consultation



From: [Ainsley Rego](#)
To: [Erica Bayley](#); [Prateek Jain](#)
Subject: RE: (240494) 87-95 Seagram Dr - Paradigm Transportation Study - Terms of Reference
Date: July 2, 2025 11:03:00 AM
Attachments: [image001.jpg](#)
[image002.png](#)

Hi Erica,

Yes, we would prefer the 3rd to 4th week of September when students return for school.

Thank you,

Ainsley

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: Erica Bayley <ebayley@ptsl.com>

Sent: June 27, 2025 11:46 AM

To: Ainsley Rego <Ainsley.Rego@waterloo.ca>; Prateek Jain <pjain@ptsl.com>

Subject: [EXTERNAL] RE: (240494) 87-95 Seagram Dr - Paradigm Transportation Study - Terms of Reference

CAUTION:

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Thanks Ainsley – what is your preferred data collection schedule?

Late September?

Erica Bayley, P.Eng.

Senior Project Manager, Associate

(She/Her)

Vacation Notice: June 27-July 4

Paradigm Transportation Solutions Limited

5A-150 Pinebush Road Cambridge ON N1R 8J8

m: 519-635-5349

e: ebayley@ptsl.com

From: Ainsley Rego <Ainsley.Rego@waterloo.ca>

Sent: June 27, 2025 11:43 AM

To: Prateek Jain <pjain@ptsl.com>

Cc: Erica Bayley <ebayley@ptsl.com>

Subject: RE: (240494) 87-95 Seagram Dr - Paradigm Transportation Study - Terms of Reference

Good morning Prateek,

Thank you for reaching out to confirm the below scope of work. Please see below in red with my comments.

Let me know if you have any questions or concerns.

Best Regards,
Ainsley

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: Prateek Jain <pjain@ptsl.com>

Sent: June 25, 2025 3:02 PM

To: Ainsley Rego <Ainsley.Rego@waterloo.ca>

Cc: Erica Bayley <ebayley@ptsl.com>

Subject: [EXTERNAL] (240494) 87-95 Seagram Dr - Paradigm Transportation Study - Terms of Reference

CAUTION:

This email originated from outside the organization. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hello Ainsley,

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study (TIS) for a proposed mixed-use redevelopment located at 87-95 Seagram Drive in the City of Waterloo. The proposed redevelopment of the subject site includes two 32-storey towers and a six-storey podium, comprising a total of 480 residential units and ground-floor commercial space. Vehicle access is proposed via two all-moves driveway connections to Seagram Drive (concept plan attached).

We'd like to prepare our report based on the following scope, subject to your comments:

PROPOSED TERMS OF REFERENCE

Study Area Intersections:

- Seagram Drive and Lester Street (unsignalized);
- Seagram Drive and Albert Street (signalized); and – This signal is an IPS. We encourage the applicant to review warrants for a full signal at this location.
- Proposed driveway connections to Seagram Drive (unsignalized). – The study should provide justification to support two proposed accesses on site.

Analysis Periods:

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

Existing Data:

- Existing 8-hour TMC data to be collected at the intersections of Lester Street and Albert Street with Seagram Drive.
- We'd like to collect in July, please confirm this is acceptable. – This is not acceptable to City staff. Traffic patterns in this area fluctuate in the summer. There is also construction planned in this area which may impact the data.

Horizon Year:

- Five years from the date the study is commissioned (2030).
- Five years post build-out

Analysis:

- Synchro 12, HCM 6 analysis.

Background Traffic:

- Background traffic annual growth rate Please confirm – 2% growth rate
- Approved developments to include in background. Please confirm 1) 177 – 179 Albert Street, 2) 251 Albert Street, 3) 262 -280 Albert Street, 4) 88 Hickory Street, 5) 155 University Avenue West

Future Road Improvements:

- Please confirm – In 2024, the City reduced speeds in this area. Local and minor collector roads reduced to 40 km/h in Ward 6. There is an active Municipal Speed Camera on Central Street.

Trip Generation:

- ITE Trip Generation Data 11th Edition.

Trip Distribution:

- Existing Distribution; and
- 2022 Transportation Tomorrow Survey (TTS) data.

Best Regards,

Prateek Jain, M.A.Sc.

Transportation Consultant
(He/Him)



5A-150 Pinebush Road, Cambridge ON, N1R 8J8
m: 647.687.6877
e: pjain@ptsl.com

w: www.ptsl.com

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Appendix B

Turning Movement Count Data



REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Morning Peak Diagram

Count Period

From: 7:30 AM
To: 10:30 AM

Peak Hour

From: 8:00 AM
To: 9:00 AM

Municipality: Waterloo

Intersection: Albert St @ Seagram Dr

Control: IPS

Major Road: Albert St

Weather conditions:

Cloudy/Damp

Person(s) who counted:

Cam

GeoID: 9057

Count Date: Tuesday, 04-Apr-23

North Leg Total: 625

North Entering: 307

North Peds: 117

Peds Cross: X

% Trks	0%	5%	0%	
Heavys	0	7	0	7
Trucks	0	6	0	6
Cars	67	227	0	294
Total	67	240	0	

Heavys	13
Trucks	3
Cars	302
Total	318

East Leg Total: 0

East Entering: 0

East Peds: 0

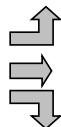
Peds Cross: X

Heavys	Trucks	Cars	Total
3	1	253	257



Seagram Dr

% Trks	Heavys	Trucks	Cars	Total
0%	0	0	9	9
0%	0	0	0	0
2%	1	1	107	109
	1	1	116	



Albert St



Albert St



Total	Cars	Trucks	Heavys	% Trks
0	0	0	0	0%
0	0	0	0	0%
0	0	0	0	0%
	0	0	0	

na



Cars	Trucks	Heavys	Total
0	0	0	0

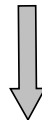
Peds Cross: X

West Peds: 44

West Entering: 118

West leg Total: 375

Heavys	8
Trucks	7
Cars	334
Total	349



Total	190	309	0	
Cars	186	293	0	479
Trucks	1	3	0	4
Heavys	3	13	0	16
% Trks	2%	5%	0%	

Peds Cross: X

South Peds: 2

South Entering: 499

South leg Total: 848

Comments

To determine total vehicles entering the intersection during morning peak hour, add all leg totals entering.

Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
Therefore, total vehicles entering intersection = **924**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
Therefore, vehicles entering from the west = **118**

REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Mid-day Peak Diagram

Count Period
From: 12:00 PM
To: 2:00 PM

Peak Hour
From: 12:15 PM
To: 1:15 PM

Municipality: Waterloo
Intersection: Albert St @ Seagram Dr
Control: IPS
Major Road: Albert St

Weather conditions:
 Cloudy/Damp
Person(s) who counted:
 Cam

GeoID: 9057
Count Date: Tuesday, 04-Apr-23

North Leg Total: 625
North Entering: 292
North Peds: 204
Peds Cross: X

	% Trks	3%	1%	0%	
Heavys	0	0	0	0	0
Trucks	1	2	0	3	
Cars	31	258	0	289	
Total	32	260	0		

Heavys 0
 Trucks 3
 Cars 330
 Total 333

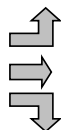
East Leg Total: 0
East Entering: 0
East Peds: 0
Peds Cross: X

Heavys 0
 Trucks 3
 Cars 148
 Total 151



Seagram Dr

% Trks	Heavys	Trucks	Cars	Total
0%	0	0	38	38
0%	0	0	0	0
0%	0	0	98	98
	0	0	136	



Albert St



	Total	119	295	0	
Cars	117	292	0	409	
Trucks	2	3	0	5	
Heavys	0	0	0	0	
% Trks	2%	1%	0%		

Total	Cars	Trucks	Heavys	% Trks
0	0	0	0	0%
0	0	0	0	0%
0	0	0	0	0%
	0	0	0	

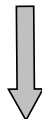
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Cars	Trucks	Heavys	Total
0	0	0	0

Peds Cross: X
West Peds: 58
West Entering: 136
West leg Total: 287

Heavys	0
Trucks	2
Cars	356
Total	358



Peds Cross: X
South Peds: 7
South Entering: 414
South leg Total: 772

Comments

To determine total vehicles entering the intersection during mid-day peak hour, add all leg totals entering.

Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **842**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **136**

REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Afternoon Peak Diagram

Count Period

From: 3:00 PM
To: 6:00 PM

Peak Hour

From: 4:30 PM
To: 5:30 PM

Municipality: Waterloo

Intersection: Albert St @ Seagram Dr

Control: IPS

Major Road: Albert St

Weather conditions:

Cloudy/Damp

Person(s) who counted:

Cam

GeoID: 9057

Count Date: Tuesday, 04-Apr-23

North Leg Total: 852
North Entering: 443
North Peds: 236
Peds Cross: X

% Trks	0%	1%	0%	
Heavys	0	0	0	0
Trucks	0	2	0	2
Cars	64	377	0	441
Total	64	379	0	

Heavys 1
Trucks 0
Cars 408
Total 409

East Leg Total: 0
East Entering: 0
East Peds: 0
Peds Cross: X

Heavys 0
Trucks 0
Cars 235
Total 235



Seagram Dr

% Trks	0%	0%	0%	0%	
Heavys	0	0	0	0	45
Trucks	0	0	0	0	0
Cars	0	0	0	196	196
Total	0	0	0	241	

Albert St



Albert St



Total	Cars	Trucks	Heavys	% Trks
0	0	0	0	0%
0	0	0	0	0%
0	0	0	0	0%
	0	0	0	

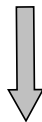
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Cars 0
Trucks 0
Heavys 0
Total 0

Peds Cross: X
West Peds: 70
West Entering: 241
West leg Total: 476

Heavys 0
Trucks 2
Cars 573
Total 575



Total	171	364	0	
Cars	171	363	0	534
Trucks	0	0	0	0
Heavys	0	1	0	1
% Trks	0%	0%	0%	

Peds Cross: X
South Peds: 4
South Entering: 535
South leg Total: 1,110

Comments

To determine total vehicles entering the intersection during afternoon peak hour, add all leg totals entering.

Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering

Example 1: Therefore, total vehicles entering intersection = **1,219**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn

Therefore, vehicles entering from the west = **241**

REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Total Count Diagram

Municipality: Waterloo
Intersection: Albert St @ Seagram Dr
Control: IPS
Major Road: Albert St

Weather conditions:
 Cloudy/Damp

Person(s) who counted:
 Cam

GeoID: 9057
Count Date: Tuesday, 04-Apr-23

North Leg Total: 4,959
North Entering: 2,419
North Peds: 1,323
Peds Cross: X
Bicycles Entering: 13
Buggies Entering: 0

% Trks	1%	2%	0%	
Heavys	1	15	0	16
Trucks	2	18	0	20
Cars	349	2,034	0	2,383
Total	352	2,067	0	

Heavys	21
Trucks	12
Cars	2,507
Total	2,540

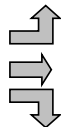
East Leg Total: 0
East Entering: 0
East Peds: 0
Peds Cross: X
Bicycles Entering: 0
Buggies Entering: 0

Heavys	Trucks	Cars	Total
5	7	1,474	1,486



Seagram Dr

% Trks	Heavys	Trucks	Cars	Total
1%	1	2	223	226
0%	0	0	0	0
1%	3	2	943	948
	4	4	1,166	



Albert St



Total	Cars	Trucks	Heavys	% Trks
0	0	0	0	0%
0	0	0	0	0%
0	0	0	0	0%
	0	0	0	

na



Cars	Trucks	Heavys	Total
0	0	0	0

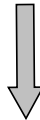
Albert St



Total	1,134	2,314	0
Cars	1,125	2,284	0
Trucks	5	10	0
Heavys	4	20	0
% Trks	1%	1%	0%
			3,409

Peds Cross: X
West Peds: 402
West Entering: 1,174
West leg Total: 2,660
Bicycles Entering: 14
Buggies Entering: 0

Heavys	18
Trucks	20
Cars	2,977
Total	3,015



Peds Cross: X
South Peds: 37
South Entering: 3,448
South leg Total: 6,463
Bicycles Entering: 17
Buggies Entering: 0

Comments

To determine total vehicles entering the intersection, add all leg totals entering.

Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **7,041**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **1,174**

Notes: None

REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Estimated Daily Traffic

Total Factor = Monthly Factor 1 x Daily Factor 1 x 24 Hour Factor 1.74 = 1.740000

Municipality: Waterloo
Intersection: Albert St @ Seagram Dr
Control: IPS
Major Road: Albert St

Weather conditions:
 Cloudy/Damp
Person(s) who counted:
 Cam

GeoID: 9057
Count Date: Tuesday, 04-Apr-23

North Leg Total: 8,629
North Entering: 4,209
North Peds: N/A
Peds Cross: X

% Trks	1%	2%	0%	
Heavys	2	26	0	28
Trucks	3	31	0	35
Cars	607	3,539	0	4,146
Total	612	3,597	0	

Heavys 37
 Trucks 21
 Cars 4,362
 Total 4420

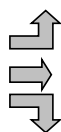
East Leg Total: 0
East Entering: 0
East Peds: N/A
Peds Cross: X

Heavys 9
 Trucks 12
 Cars 2,565
 Total 2,586



Seagram Dr

% Trks	Heavys	Trucks	Cars	Total
1%	2	3	388	393
0%	0	0	0	0
1%	5	3	1,641	1,650
	7	7	2,029	



Albert St



Total	Cars	Trucks	Heavys	% Trks
0	0	0	0	0%
0	0	0	0	0%
0	0	0	0	0%
	0	0	0	

na



Cars 0
 Trucks 0
 Heavys 0
 Total 0

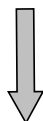
Albert St



Total	1,973	4,026	0	
Cars	1,958	3,974	0	5,932
Trucks	9	17	0	26
Heavys	7	35	0	42
% Trks	1%	1%	0%	

Peds Cross: X
West Peds: N/A
West Entering: 2,043
West leg Total: 4,628

Heavys 31
 Trucks 35
 Cars 5,180
 Total 5,246



Peds Cross: X
South Peds: N/A
South Entering: 6,000
South leg Total: 11,246

Comments

To determine the EDT (Estimated Daily Traffic), add all four leg totals and divide by two.
 This will give you the approximate number of vehicles entering and exiting the intersection in a 24-hour period

Example:
$$\frac{(\text{West leg total} + \text{South leg total} + \text{East leg total} + \text{North leg total})}{2}$$
 EDT = 12,251

REGIONAL MUNICIPALITY OF WATERLOO

TURNING MOVEMENT COUNT



Peak Hour Factor By Movement

Municipality: Waterloo
Intersection: Albert St @ Seagram Dr
Control: IPS
Major Road: Albert St

Weather conditions:
 Cloudy/Damp

Person(s) who counted:
 Cam

GeoID: 9057
Count Date: Tuesday, 04-Apr-23

North Approach PHF

AM Peak: 0.82
 Mid-day Peak: 0.90
 PM Peak: 0.86

	Movement		
PM	0.84	0.83	0.00
MID	0.89	0.90	0.00
AM	0.76	0.83	0.00

East Approach PHF

AM Peak: 0.00
 Mid-day Peak: 0.00
 PM Peak: 0.00

AM AM Peak Hour
 MID Mid-day Peak Hour
 PM PM Peak Hour

Seagram Dr

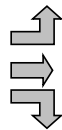
	PM	MID	AM
Movement	0.87	0.79	0.75
	0.00	0.00	0.00
	0.74	0.77	0.76

Albert St



AM	MID	PM	Movement
0.00	0.00	0.00	
0.00	0.00	0.00	
0.00	0.00	0.00	

na



Albert St

West Approach PHF

AM Peak: 0.76
 Mid-day Peak: 0.81
 PM Peak: 0.76

0.81	0.77	0.00	AM
0.85	0.84	0.00	MID
0.79	0.90	0.00	PM
Movement			

South Approach PHF

AM Peak: 0.78
 Mid-day Peak: 0.87
 PM Peak: 0.86

Comments

Intersection: Albert St @ Seagram Dr
GeoID: 9057
Municipality: Waterloo
Major Road: Albert St

Intersection Control: IPS
Date: Tuesday, 04-Apr-23
Name: Cam
Weather: Cloudy/Damp

Approach Control			EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			TOTAL	TOTAL HOUR
			Stop Control			N/A			IPS			IPS				
7:30 to 7:45	2	0	10	0	0	0	19	31	0	0	28	5	95	769		
7:45 to 8:00	0	0	25	0	0	0	31	60	0	0	46	6	168			
8:00 to 8:15	1	0	25	0	0	0	49	71	0	0	47	21	214			
8:15 to 8:30	3	0	36	0	0	0	59	100	0	0	72	22	292			
8:30 to 8:45	3	0	25	0	0	0	45	61	0	0	59	14	207			
8:45 to 9:00	2	0	23	0	0	0	37	77	0	0	62	10	211			
9:00 to 9:15	2	0	20	0	0	0	44	48	0	0	48	14	176			
9:15 to 9:30	4	0	18	0	0	0	41	56	0	0	50	5	174			
9:30 to 9:45	8	0	21	0	0	0	40	51	0	0	38	13	171			
9:45 to 10:00	2	0	28	0	0	0	36	61	0	0	57	14	198			
10:00 to 10:15	6	0	24	0	0	0	30	49	0	0	53	4	166	709		
10:15 to 10:30	3	0	22	0	0	0	15	46	0	0	37	8	131	666		
AM Peak Hour																
8:00 to 9:00			9	0	109	0	0	0	190	309	0	0	240	67		924
# of trucks in peak			0	0	1	0	0	0	1	3	0	0	6	0		11
# of heavies in peak			0	0	1	0	0	0	3	13	0	0	7	0		24
% heavies (Total)			0%	0%	2%	0%	0%	0%	2%	5%	0%	0%	5%	0%	4%	
12:00 to 12:15	4	0	16	0	0	0	28	72	0	0	73	7	200	829		
12:15 to 12:30	10	0	22	0	0	0	26	64	0	0	59	8	189			
12:30 to 12:45	6	0	18	0	0	0	35	67	0	0	63	9	198			
12:45 to 13:00	10	0	32	0	0	0	31	88	0	0	72	9	242			
13:00 to 13:15	12	0	26	0	0	0	27	76	0	0	66	6	213			
13:15 to 13:30	7	0	20	0	0	0	26	62	0	0	57	7	179			
13:30 to 13:45	8	0	25	0	0	0	29	70	0	0	48	7	187			
13:45 to 14:00	6	0	27	0	0	0	19	56	0	0	56	8	172			
Midday Peak Hour																
12:15 to 13:15			38	0	98	0	0	0	119	295	0	0	260	32		842
# of trucks in peak			0	0	0	0	0	0	2	3	0	0	2	1		8
# of heavies in peak			0	0	0	0	0	0	0	0	0	0	0	0		0
% heavies (Total)			0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	1%	3%	1%	
15:00 to 15:15	5	0	18	0	0	0	38	72	0	0	70	9	212	949		
15:15 to 15:30	10	0	31	0	0	0	18	94	0	0	57	16	226			
15:30 to 15:45	11	0	29	0	0	0	30	73	0	0	64	6	213			
15:45 to 16:00	15	0	39	0	0	0	47	105	0	0	79	13	298			
16:00 to 16:15	14	0	42	0	0	0	38	88	0	0	82	9	273			
16:15 to 16:30	11	0	57	0	0	0	46	76	0	0	70	9	269			
16:30 to 16:45	13	0	66	0	0	0	54	101	0	0	80	13	327			
16:45 to 17:00	11	0	40	0	0	0	35	91	0	0	101	19	297			
17:00 to 17:15	8	0	39	0	0	0	32	88	0	0	84	17	268			
17:15 to 17:30	13	0	51	0	0	0	50	84	0	0	114	15	327			
17:30 to 17:45	6	0	41	0	0	0	44	77	0	0	92	12	272	1,164		
17:45 to 18:00	10	0	32	0	0	0	35	99	0	0	83	17	276	1,143		
PM Peak Hour																
16:30 to 17:30			45	0	196	0	0	0	171	364	0	0	379	64		1,219
# of trucks in peak			0	0	0	0	0	0	0	0	0	2	0	2		
# of heavies in peak			0	0	0	0	0	0	0	1	0	0	0	1		
% heavies (Total)			0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%		

Intersection: Albert St @ Seagram Dr
 GeoID: 9057
 Municipality: Waterloo
 Major Road: Albert St

Intersection Control: IPS
 Date: Tuesday, 04-Apr-23
 Name: Cam
 Weather: Cloudy/Damp

PEDESTRIAN CROSSING							
Time		Crossing Approach					TOTAL HOUR
		East App.	West App.	North App.	South App.	TOTAL	
7:30 to 7:45		0	3	4	2	9	
7:45 to 8:00		0	2	8	0	10	
8:00 to 8:15		0	7	17	0	24	
8:15 to 8:30		0	18	55	1	74	117
8:30 to 8:45		0	8	25	0	33	141
8:45 to 9:00		0	11	20	1	32	163
9:00 to 9:15		0	6	19	1	26	165
9:15 to 9:30		0	4	19	0	23	114
9:30 to 9:45		0	5	29	0	34	115
9:45 to 10:00		0	21	58	0	79	162
10:00 to 10:15		0	10	33	1	44	180
10:15 to 10:30		0	3	26	0	29	186
AM Peak Hour						417	
8:00 to 9:00		0	44	117	2	163	
12:00 to 12:15		0	10	24	2	36	
12:15 to 12:30		0	10	31	3	44	
12:30 to 12:45		0	16	45	1	62	
12:45 to 13:00		0	19	84	2	105	247
13:00 to 13:15		0	13	44	1	58	269
13:15 to 13:30		0	9	33	1	43	268
13:30 to 13:45		0	12	35	0	47	253
13:45 to 14:00		0	11	40	3	54	202
Midday Peak Hour						449	
12:15 to 13:15		0	58	204	7	269	
15:00 to 15:15		0	8	37	4	49	
15:15 to 15:30		0	23	51	0	74	
15:30 to 15:45		0	18	63	3	84	
15:45 to 16:00		0	21	88	2	111	318
16:00 to 16:15		0	17	56	0	73	342
16:15 to 16:30		0	21	51	0	72	340
16:30 to 16:45		0	14	46	0	60	316
16:45 to 17:00		0	12	60	1	73	278
17:00 to 17:15		0	25	63	1	89	294
17:15 to 17:30		0	19	67	2	88	310
17:30 to 17:45		0	16	46	1	63	313
17:45 to 18:00		0	10	46	4	60	300
PM Peak Hour						896	
16:30 to 17:30		0	70	236	4	310	



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lester Street & Seagram Drive
Site Code: 240494
Start Date: 09/17/2025
Page No: 1

Turning Movement Data

Start Time	Seagram Drive Eastbound					Seagram Drive Westbound					Lester Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:30 AM	0	15	0	2	15	26	1	0	0	27	2	0	0	1	2	44
7:45 AM	2	30	0	1	32	40	1	0	0	41	1	2	0	6	3	76
Hourly Total	2	45	0	3	47	66	2	0	0	68	3	2	0	7	5	120
8:00 AM	0	40	0	1	40	92	5	0	0	97	1	3	0	27	4	141
8:15 AM	4	58	0	2	62	90	2	0	1	92	1	2	0	18	3	157
8:30 AM	3	36	0	2	39	70	6	0	1	76	4	4	0	9	8	123
8:45 AM	2	38	0	1	40	48	3	0	0	51	3	2	0	6	5	96
Hourly Total	9	172	0	6	181	300	16	0	2	316	9	11	0	60	20	517
9:00 AM	3	37	0	2	40	55	4	0	0	59	3	0	0	13	3	102
9:15 AM	3	25	0	2	28	66	2	0	0	68	1	1	0	9	2	98
9:30 AM	3	25	0	1	28	89	2	0	0	91	3	1	0	9	4	123
9:45 AM	5	29	0	1	34	51	1	0	0	52	1	4	0	16	5	91
Hourly Total	14	116	0	6	130	261	9	0	0	270	8	6	0	47	14	414
10:00 AM	2	34	0	1	36	45	5	0	0	50	2	3	0	15	5	91
10:15 AM	3	26	0	2	29	43	4	0	0	47	2	6	0	8	8	84
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	5	60	0	3	65	88	9	0	0	97	4	9	0	23	13	175
12:00 PM	4	22	0	1	26	35	8	0	1	43	4	5	0	11	9	78
12:15 PM	4	28	0	3	32	42	4	0	3	46	2	6	1	14	9	87
12:30 PM	7	35	0	1	42	39	5	0	0	44	5	5	0	18	10	96
12:45 PM	5	30	0	3	35	43	7	0	0	50	4	6	0	14	10	95
Hourly Total	20	115	0	8	135	159	24	0	4	183	15	22	1	57	38	356
1:00 PM	4	45	0	1	49	32	5	0	0	37	12	3	0	18	15	101
1:15 PM	5	28	0	1	33	35	9	0	0	44	6	4	0	7	10	87
1:30 PM	6	28	0	2	34	27	4	0	0	31	4	2	0	7	6	71
1:45 PM	5	24	0	0	29	33	14	0	0	47	9	7	0	13	16	92
Hourly Total	20	125	0	4	145	127	32	0	0	159	31	16	0	45	47	351
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	3	37	0	3	40	25	6	0	0	31	7	4	0	15	11	82
3:15 PM	2	29	0	3	31	35	12	0	1	47	7	4	0	6	11	89
3:30 PM	8	49	0	0	57	39	7	0	0	46	6	5	0	6	11	114
3:45 PM	8	71	0	2	79	45	10	0	1	55	6	7	0	34	13	147
Hourly Total	21	186	0	8	207	144	35	0	2	179	26	20	0	61	46	432
4:00 PM	10	88	0	1	98	52	13	0	3	65	6	7	0	18	13	176
4:15 PM	7	65	0	4	72	39	4	0	1	43	7	6	0	15	13	128
4:30 PM	7	76	0	5	83	56	4	0	2	60	8	7	0	10	15	158

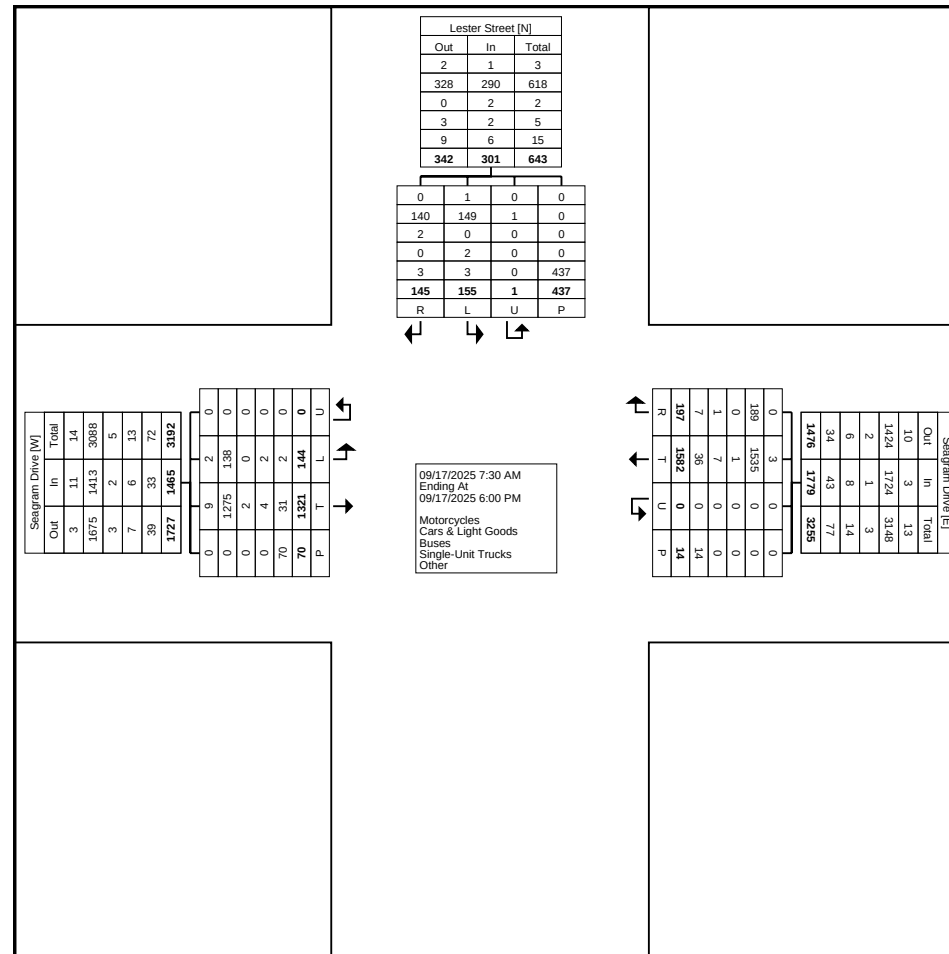
4:45 PM	9	47	0	2	56	50	11	0	0	61	4	6	0	11	10	127
Hourly Total	33	276	0	12	309	197	32	0	6	229	25	26	0	54	51	589
5:00 PM	2	48	0	4	50	59	9	0	0	68	5	9	0	17	14	132
5:15 PM	10	57	0	4	67	63	4	0	0	67	9	8	0	23	17	151
5:30 PM	3	76	0	7	79	65	9	0	0	74	11	7	0	30	18	171
5:45 PM	5	45	0	5	50	53	16	0	0	69	9	9	0	13	18	137
Hourly Total	20	226	0	20	246	240	38	0	0	278	34	33	0	83	67	591
Grand Total	144	1321	0	70	1465	1582	197	0	14	1779	155	145	1	437	301	3545
Approach %	9.8	90.2	0.0	-	-	88.9	11.1	0.0	-	-	51.5	48.2	0.3	-	-	-
Total %	4.1	37.3	0.0	-	41.3	44.6	5.6	0.0	-	50.2	4.4	4.1	0.0	-	8.5	-
Motorcycles	2	9	0	-	11	3	0	0	-	3	1	0	0	-	1	15
% Motorcycles	1.4	0.7	-	-	0.8	0.2	0.0	-	-	0.2	0.6	0.0	0.0	-	0.3	0.4
Cars & Light Goods	138	1275	0	-	1413	1535	189	0	-	1724	149	140	1	-	290	3427
% Cars & Light Goods	95.8	96.5	-	-	96.5	97.0	95.9	-	-	96.9	96.1	96.6	100.0	-	96.3	96.7
Buses	0	2	0	-	2	1	0	0	-	1	0	2	0	-	2	5
% Buses	0.0	0.2	-	-	0.1	0.1	0.0	-	-	0.1	0.0	1.4	0.0	-	0.7	0.1
Single-Unit Trucks	2	4	0	-	6	7	1	0	-	8	2	0	0	-	2	16
% Single-Unit Trucks	1.4	0.3	-	-	0.4	0.4	0.5	-	-	0.4	1.3	0.0	0.0	-	0.7	0.5
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	-	0.0	0.0
Bicycles on Road	2	31	0	-	33	36	7	0	-	43	3	3	0	-	6	82
% Bicycles on Road	1.4	2.3	-	-	2.3	2.3	3.6	-	-	2.4	1.9	2.1	0.0	-	2.0	2.3
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	0	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	2.9	-	-	-	-	0.0	-	-	-	-	0.9	-	-
Pedestrians	-	-	-	68	-	-	-	-	14	-	-	-	-	433	-	-
% Pedestrians	-	-	-	97.1	-	-	-	-	100.0	-	-	-	-	99.1	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Lester Street & Seagram Drive
Site Code: 240494
Start Date: 09/17/2025
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Lester Street & Seagram Drive
Site Code: 240494
Start Date: 09/17/2025
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

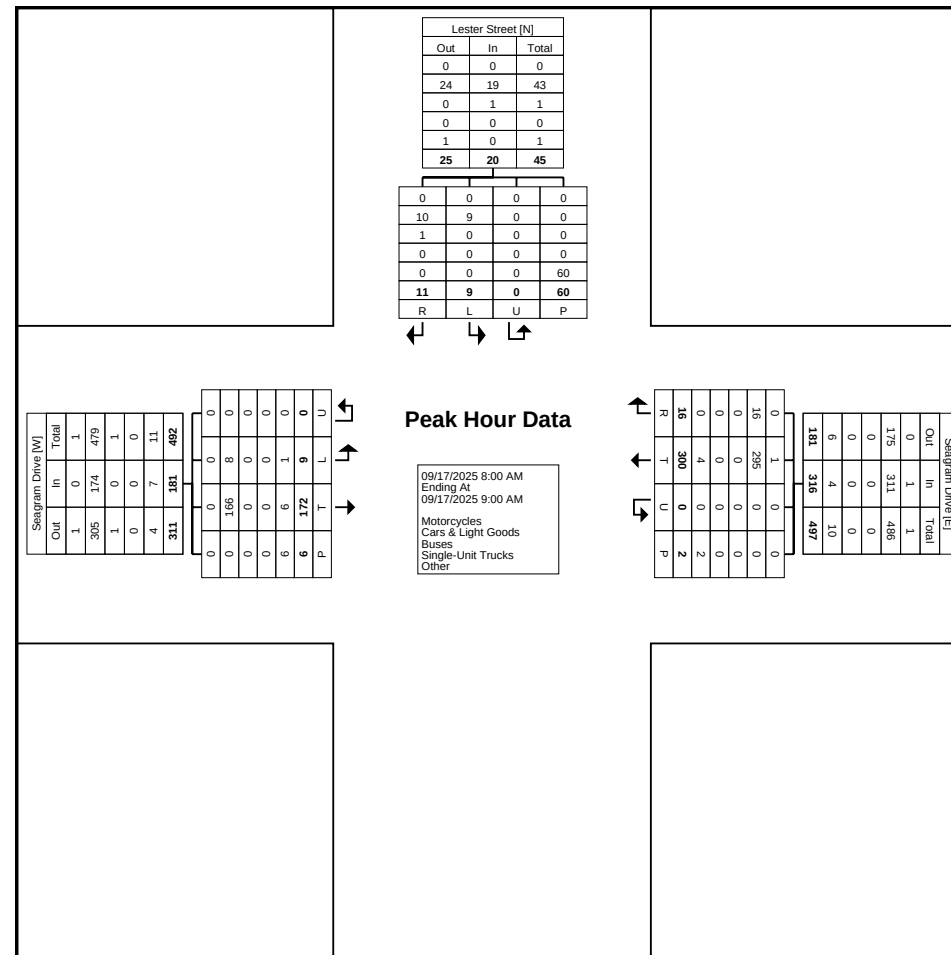
Start Time	Seagram Drive Eastbound					Seagram Drive Westbound					Lester Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
8:00 AM	0	40	0	1	40	92	5	0	0	97	1	3	0	27	4	141
8:15 AM	4	58	0	2	62	90	2	0	1	92	1	2	0	18	3	157
8:30 AM	3	36	0	2	39	70	6	0	1	76	4	4	0	9	8	123
8:45 AM	2	38	0	1	40	48	3	0	0	51	3	2	0	6	5	96
Total	9	172	0	6	181	300	16	0	2	316	9	11	0	60	20	517
Approach %	5.0	95.0	0.0	-	-	94.9	5.1	0.0	-	-	45.0	55.0	0.0	-	-	-
Total %	1.7	33.3	0.0	-	35.0	58.0	3.1	0.0	-	61.1	1.7	2.1	0.0	-	3.9	-
PHF	0.563	0.741	0.000	-	0.730	0.815	0.667	0.000	-	0.814	0.563	0.688	0.000	-	0.625	0.823
Motorcycles	0	0	0	-	0	1	0	0	-	1	0	0	0	-	0	1
% Motorcycles	0.0	0.0	-	-	0.0	0.3	0.0	-	-	0.3	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	8	166	0	-	174	295	16	0	-	311	9	10	0	-	19	504
% Cars & Light Goods	88.9	96.5	-	-	96.1	98.3	100.0	-	-	98.4	100.0	90.9	-	-	95.0	97.5
Buses	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	9.1	-	-	5.0	0.2
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	-	-	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	-	-	0.0	0.0
Bicycles on Road	1	6	0	-	7	4	0	0	-	4	0	0	0	-	0	11
% Bicycles on Road	11.1	3.5	-	-	3.9	1.3	0.0	-	-	1.3	0.0	0.0	-	-	0.0	2.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	1.7	-	-
Pedestrians	-	-	-	6	-	-	-	-	2	-	-	-	-	59	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	98.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Lester Street & Seagram Drive
Site Code: 240494
Start Date: 09/17/2025
Page No: 5



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



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Lester Street & Seagram Drive
Site Code: 240494
Start Date: 09/17/2025
Page No: 6

Turning Movement Peak Hour Data (12:15 PM)

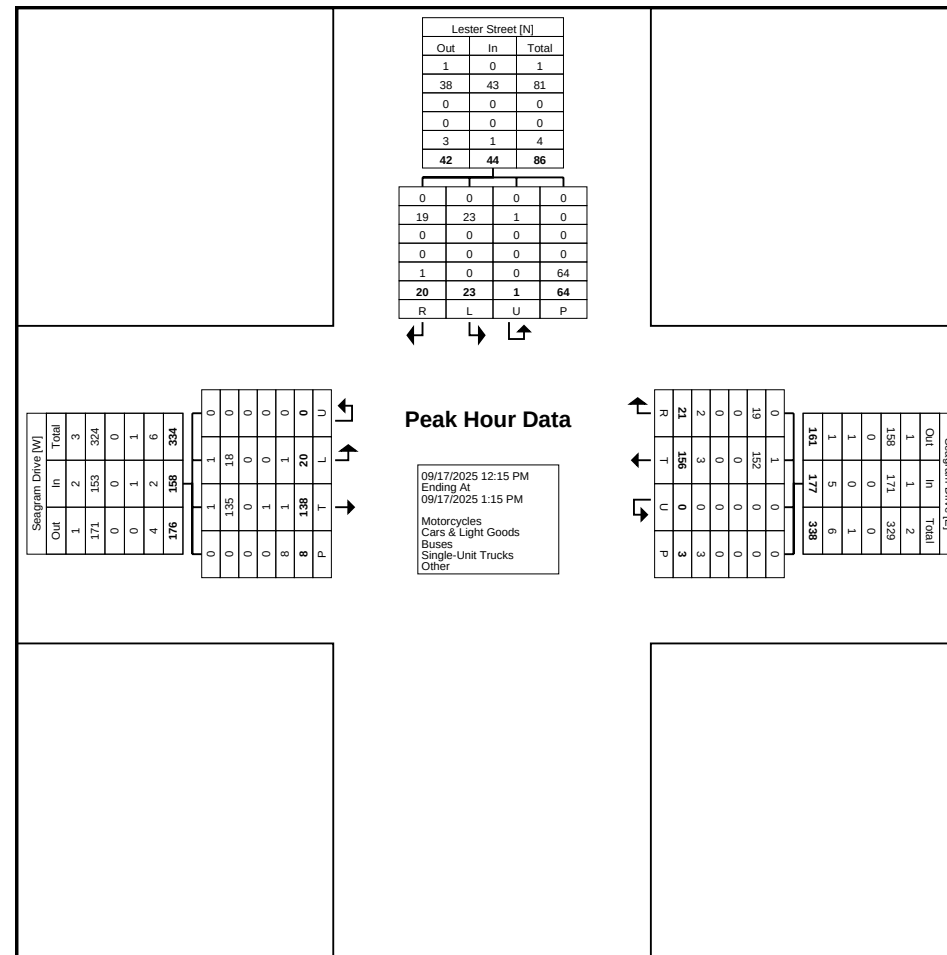
Start Time	Seagram Drive Eastbound					Seagram Drive Westbound					Lester Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
12:15 PM	4	28	0	3	32	42	4	0	3	46	2	6	1	14	9	87
12:30 PM	7	35	0	1	42	39	5	0	0	44	5	5	0	18	10	96
12:45 PM	5	30	0	3	35	43	7	0	0	50	4	6	0	14	10	95
1:00 PM	4	45	0	1	49	32	5	0	0	37	12	3	0	18	15	101
Total	20	138	0	8	158	156	21	0	3	177	23	20	1	64	44	379
Approach %	12.7	87.3	0.0	-	-	88.1	11.9	0.0	-	-	52.3	45.5	2.3	-	-	-
Total %	5.3	36.4	0.0	-	41.7	41.2	5.5	0.0	-	46.7	6.1	5.3	0.3	-	11.6	-
PHF	0.714	0.767	0.000	-	0.806	0.907	0.750	0.000	-	0.885	0.479	0.833	0.250	-	0.733	0.938
Motorcycles	1	1	0	-	2	1	0	0	-	1	0	0	0	-	0	3
% Motorcycles	5.0	0.7	-	-	1.3	0.6	0.0	-	-	0.6	0.0	0.0	0.0	-	0.0	0.8
Cars & Light Goods	18	135	0	-	153	152	19	0	-	171	23	19	1	-	43	367
% Cars & Light Goods	90.0	97.8	-	-	96.8	97.4	90.5	-	-	96.6	100.0	95.0	100.0	-	97.7	96.8
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	0.0	-	0.0	0.0
Single-Unit Trucks	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.7	-	-	0.6	0.0	0.0	-	-	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
% Articulated Trucks	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	1	1	0	-	2	3	2	0	-	5	0	1	0	-	1	8
% Bicycles on Road	5.0	0.7	-	-	1.3	1.9	9.5	-	-	2.8	0.0	5.0	0.0	-	2.3	2.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	8	-	-	-	-	3	-	-	-	-	64	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



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Count Name: Lester Street & Seagram Drive
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Start Date: 09/17/2025
Page No: 7



Turning Movement Peak Hour Data Plot (12:15 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Lester Street & Seagram Drive
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Page No: 8

Turning Movement Peak Hour Data (3:45 PM)

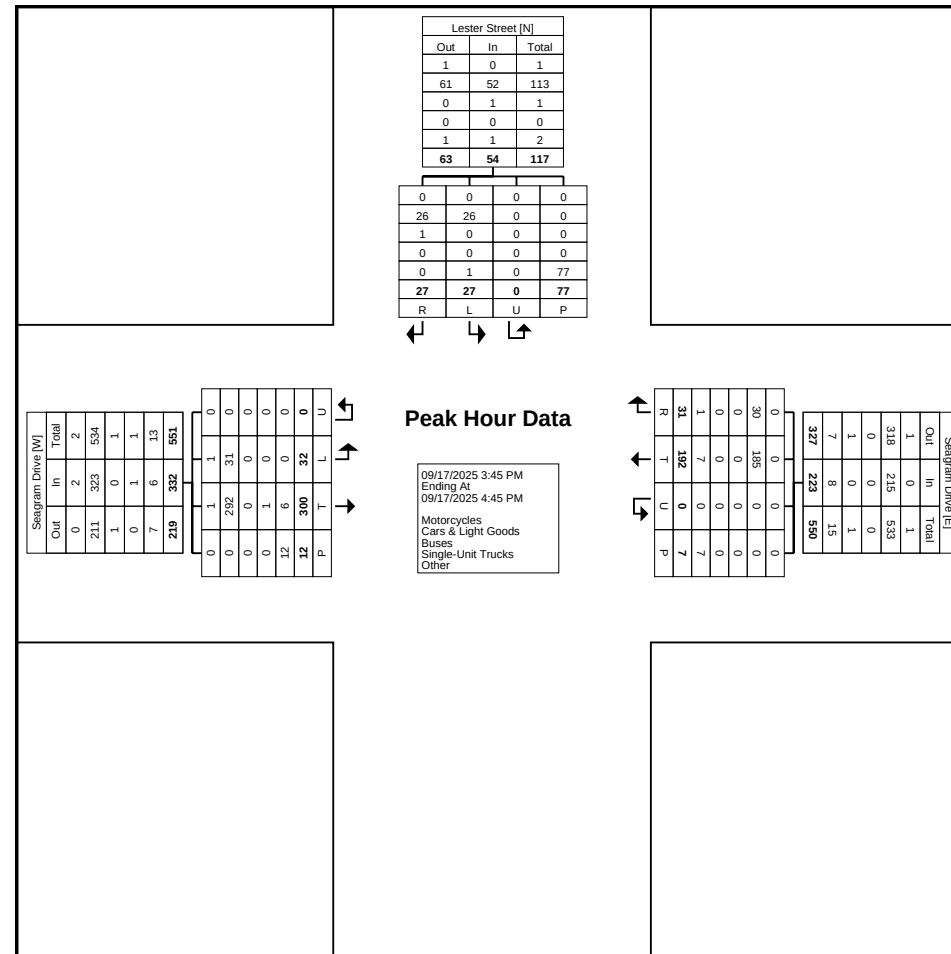
Start Time	Seagram Drive Eastbound					Seagram Drive Westbound					Lester Street Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
3:45 PM	8	71	0	2	79	45	10	0	1	55	6	7	0	34	13	147
4:00 PM	10	88	0	1	98	52	13	0	3	65	6	7	0	18	13	176
4:15 PM	7	65	0	4	72	39	4	0	1	43	7	6	0	15	13	128
4:30 PM	7	76	0	5	83	56	4	0	2	60	8	7	0	10	15	158
Total	32	300	0	12	332	192	31	0	7	223	27	27	0	77	54	609
Approach %	9.6	90.4	0.0	-	-	86.1	13.9	0.0	-	-	50.0	50.0	0.0	-	-	-
Total %	5.3	49.3	0.0	-	54.5	31.5	5.1	0.0	-	36.6	4.4	4.4	0.0	-	8.9	-
PHF	0.800	0.852	0.000	-	0.847	0.857	0.596	0.000	-	0.858	0.844	0.964	0.000	-	0.900	0.865
Motorcycles	1	1	0	-	2	0	0	0	-	0	0	0	0	-	0	2
% Motorcycles	3.1	0.3	-	-	0.6	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	31	292	0	-	323	185	30	0	-	215	26	26	0	-	52	590
% Cars & Light Goods	96.9	97.3	-	-	97.3	96.4	96.8	-	-	96.4	96.3	96.3	-	-	96.3	96.9
Buses	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	3.7	-	-	1.9	0.2
Single-Unit Trucks	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.3	-	-	0.3	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.2
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	0.0
Bicycles on Road	0	6	0	-	6	7	1	0	-	8	1	0	0	-	1	15
% Bicycles on Road	0.0	2.0	-	-	1.8	3.6	3.2	-	-	3.6	3.7	0.0	-	-	1.9	2.5
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	12	-	-	-	-	7	-	-	-	-	77	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



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Count Name: Lester Street & Seagram Drive
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Start Date: 09/17/2025
Page No: 9



Turning Movement Peak Hour Data Plot (3:45 PM)

Appendix C

Base Year Traffic Operations Reports



Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Base Year - 2025
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	168	233	321	250	83
Future Volume (vph)	13	168	233	321	250	83
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.966	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1442	1635	1789	1519	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1442	1635	1789	1519	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	209.6			441.7	230.2	
Travel Time (s)	18.9			39.8	20.7	
Confl. Peds. (#/hr)	117	2	44			44
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	5%	5%	0%
Adj. Flow (vph)	13	168	233	321	250	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	168	233	321	333	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	49.7%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

101: Albert St & Seagram Dr

Base Year - 2025
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	168	233	321	250	83
Future Volume (Veh/h)	13	168	233	321	250	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	168	233	321	250	83
Pedestrians	44			2	117	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	4			0	11	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1240	338	377			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1240	338	377			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	75	79			
cM capacity (veh/h)	132	673	1131			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	13	168	233	321	333	
Volume Left	13	0	233	0	0	
Volume Right	0	168	0	0	83	
cSH	132	673	1131	1700	1700	
Volume to Capacity	0.10	0.25	0.21	0.19	0.20	
Queue Length 95th (m)	2.4	7.5	5.9	0.0	0.0	
Control Delay (s/veh)	35.3	12.1	9.0	0.0	0.0	
Lane LOS	E	B	A			
Approach Delay (s/veh)	13.8		3.8		0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			49.7%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	168	233	321	250	83
Future Vol, veh/h	13	168	233	321	250	83
Conflicting Peds, #/hr	117	2	44	0	0	44
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	5	5	0
Mvmt Flow	13	168	233	321	250	83

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1240	338	377	0	-	0
Stage 1	336	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Critical Hdwy	6.4	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	195	705	1181	-	-	-
Stage 1	729	-	-	-	-	-
Stage 2	398	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	143	675	1133	-	-	-
Mov Cap-2 Maneuver	143	-	-	-	-	-
Stage 1	555	-	-	-	-	-
Stage 2	382	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.58	3.78	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1133	-	143	675	-	-
HCM Lane V/C Ratio	0.206	-	0.091	0.249	-	-
HCM Ctrl Dly (s/v)	9	-	32.7	12.1	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.8	-	0.3	1	-	-

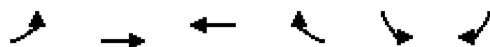
Lanes, Volumes, Timings
102: Seagram Dr & Lester St

Base Year - 2025
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	172	300	16	9	11
Future Volume (vph)	9	172	300	16	9	11
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.926	
Flt Protected		0.998			0.978	
Satd. Flow (prot)	0	1575	1605	0	1506	0
Flt Permitted		0.998			0.978	
Satd. Flow (perm)	0	1575	1605	0	1506	0
Link Speed (k/h)		40	40		40	
Link Distance (m)		321.1	209.6		269.0	
Travel Time (s)		28.9	18.9		24.2	
Confl. Peds. (#/hr)	60			60	2	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	11%	3%	1%	0%	0%	9%
Adj. Flow (vph)	9	172	300	16	9	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	181	316	0	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	31.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 102: Seagram Dr & Lester St

Base Year - 2025
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	172	300	16	9	11
Future Volume (Veh/h)	9	172	300	16	9	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	172	300	16	9	11
Pedestrians		6	2		60	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	0		6	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	376				560	374
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	376				560	374
tC, single (s)	4.2				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	99				98	98
cM capacity (veh/h)	1069				459	615
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	181	316	20			
Volume Left	9	0	9			
Volume Right	0	16	11			
cSH	1069	1700	534			
Volume to Capacity	0.01	0.19	0.04			
Queue Length 95th (m)	0.2	0.0	0.9			
Control Delay (s/veh)	0.5	0.0	12.0			
Lane LOS	A		B			
Approach Delay (s/veh)	0.5	0.0	12.0			
Approach LOS			B			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			31.3%	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	9	172	300	16	9	11
Future Vol, veh/h	9	172	300	16	9	11
Conflicting Peds, #/hr	60	0	0	60	2	6
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, %	11	3	1	0	0	9
Mvmt Flow	9	172	300	16	9	11
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	376	0	-	0	560	374
Stage 1	-	-	-	-	368	-
Stage 2	-	-	-	-	192	-
Critical Hdwy	4.21	-	-	-	6.4	6.29
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.299	-	-	-	3.5	3.381
Pot Cap-1 Maneuver	1135	-	-	-	493	657
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	845	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1071	-	-	-	435	617
Mov Cap-2 Maneuver	-	-	-	-	435	-
Stage 1	-	-	-	-	659	-
Stage 2	-	-	-	-	798	-
Approach	EB	WB		SB		
HCM Ctrl Dly, s/v	0.42	0		12.21		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	90	-	-	-	519	
HCM Lane V/C Ratio	0.008	-	-	-	0.039	
HCM Ctrl Dly (s/v)	8.4	0	-	-	12.2	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Base Year - 2025
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	61	266	162	379	394	61
Future Volume (vph)	61	266	162	379	394	61
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.982	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1471	1668	1879	1589	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1471	1668	1879	1589	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	209.6			441.7	230.2	
Travel Time (s)	18.9			39.8	20.7	
Confl. Peds. (#/hr)	236	4	70			70
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%
Adj. Flow (vph)	61	266	162	379	394	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	61	266	162	379	455	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	53.8%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 101: Albert St & Seagram Dr

Base Year - 2025
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	266	162	379	394	61
Future Volume (Veh/h)	61	266	162	379	394	61
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	61	266	162	379	394	61
Pedestrians	70			4	236	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	7			0	23	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1434	499	525			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1434	499	525			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	32	50	83			
cM capacity (veh/h)	89	535	980			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	61	266	162	379	455	
Volume Left	61	0	162	0	0	
Volume Right	0	266	0	0	61	
cSH	89	535	980	1700	1700	
Volume to Capacity	0.68	0.50	0.17	0.22	0.27	
Queue Length 95th (m)	25.3	20.9	4.5	0.0	0.0	
Control Delay (s/veh)	106.0	18.2	9.4	0.0	0.0	
Lane LOS	F	C	A			
Approach Delay (s/veh)	34.6		2.8		0.0	
Approach LOS	D					
Intersection Summary						
Average Delay			9.7			
Intersection Capacity Utilization			53.8%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	8.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	266	162	379	394	61
Future Vol, veh/h	61	266	162	379	394	61
Conflicting Peds, #/hr	236	4	70	0	0	70
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
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	1	0
Mvmt Flow	61	266	162	379	394	61
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1434	499	525	0	-	0
Stage 1	495	-	-	-	-	-
Stage 2	939	-	-	-	-	-
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	149	576	1052	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	109	536	983	-	-	-
Mov Cap-2 Maneuver	109	-	-	-	-	-
Stage 1	482	-	-	-	-	-
Stage 2	359	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	28.52	2.81		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	983	-	109	536	-	-
HCM Lane V/C Ratio	0.165	-	0.56	0.496	-	-
HCM Ctrl Dly (s/v)	9.4	-	73.8	18.1	-	-
HCM Lane LOS	A	-	F	C	-	-
HCM 95th %tile Q(veh)	0.6	-	2.7	2.7	-	-

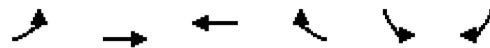
Lanes, Volumes, Timings
102: Seagram Dr & Lester St

Base Year - 2025
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	32	300	192	31	27	27
Future Volume (vph)	32	300	192	31	27	27
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.981		0.932	
Flt Protected		0.995			0.976	
Satd. Flow (prot)	0	1595	1541	0	1527	0
Flt Permitted		0.995			0.976	
Satd. Flow (perm)	0	1595	1541	0	1527	0
Link Speed (k/h)		40	40		40	
Link Distance (m)		321.1	209.6		269.0	
Travel Time (s)		28.9	18.9		24.2	
Confl. Peds. (#/hr)	77			77	12	7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	4%	3%	4%	4%
Adj. Flow (vph)	32	300	192	31	27	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	332	223	0	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.5%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 102: Seagram Dr & Lester St

Base Year - 2025
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	300	192	31	27	27
Future Volume (Veh/h)	32	300	192	31	27	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	32	300	192	31	27	27
Pedestrians		7	12		77	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	1		7	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	300				661	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	300				661	292
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				93	96
cM capacity (veh/h)	1177				378	683
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	332	223	54			
Volume Left	32	0	27			
Volume Right	0	31	27			
cSH	1177	1700	486			
Volume to Capacity	0.03	0.13	0.11			
Queue Length 95th (m)	0.6	0.0	2.8			
Control Delay (s/veh)	1.0	0.0	13.3			
Lane LOS	A		B			
Approach Delay (s/veh)	1.0	0.0	13.3			
Approach LOS			B			
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			50.5%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	32	300	192	31	27	27
Future Vol, veh/h	32	300	192	31	27	27
Conflicting Peds, #/hr	77	0	0	77	12	7
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	4	3	4	4
Mvmt Flow	32	300	192	31	27	27

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	300	0	0 661 292
Stage 1	-	-	- 285 -
Stage 2	-	-	- 376 -
Critical Hdwy	4.1	-	- 6.44 6.24
Critical Hdwy Stg 1	-	-	- 5.44 -
Critical Hdwy Stg 2	-	-	- 5.44 -
Follow-up Hdwy	2.2	-	- 3.536 3.336
Pot Cap-1 Maneuver	1273	-	- 425 743
Stage 1	-	-	- 759 -
Stage 2	-	-	- 690 -
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1181	-	- 354 685
Mov Cap-2 Maneuver	-	-	- 354 -
Stage 1	-	-	- 682 -
Stage 2	-	-	- 640 -

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.78	0	13.72
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	173	-	-	-	467
HCM Lane V/C Ratio	0.027	-	-	-	0.116
HCM Ctrl Dly (s/v)	8.1	0	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Appendix D

Eight-Hour Traffic Control Signal Justification



Signal Justification Calculation (OTM Book 12 - Justifications 1, 2, 3)



Horizon Year: Base Year - 2025
Municipality: Waterloo, ON

Project number: 240494

Major Street: Albert Street
Minor Street: Seagram Drive

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street						Minor Street						Peds Crossing
	Albert Street						Seagram Drive						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
7:30 - 8:30	164	273	0	0	201	56	6	0	100	0	0	0	122
8:30 - 9:30	174	252	0	0	228	45	11	0	89	0	0	0	119
9:30 - 10:30	126	215	0	0	192	41	20	0	99	0	0	0	194
12:00 - 13:00	125	303	0	0	278	34	31	0	92	0	0	0	257
13:00 - 14:00	105	275	0	0	236	29	34	0	102	0	0	0	210
15:00 - 16:00	138	358	0	0	281	46	43	0	122	0	0	0	331
16:00 - 17:00	180	370	0	0	346	52	51	0	213	0	0	0	289
17:00 - 18:00	168	362	0	0	388	63	38	0	170	0	0	0	312

Hour	1A All Approach Lanes	1B Minor Street Both Approaches	2A Major Street Both Approaches	2B Traffic Crossing Major Street
Threshold	720	255	720	75
1	800	100%	106	42%
2	799	100%	100	39%
3	693	96%	119	47%
4	863	100%	123	48%
5	781	100%	136	53%
6	988	100%	165	65%
7	1212	100%	264	100%
8	1189	100%	208	82%

8 Hours 100% Fulfilled? No
8 Hours 80% Fulfilled? Yes

Justification Results

Justification 1 (Minimum Vehicle Volume) No
Justification 2 (Delay To Cross Traffic) No
Justification 3 (Volume/Delay Combination) No

Is A Signal Justified? No

Appendix E

ITE Trip Generation Manual Excerpts



Multifamily Housing (High-Rise)

Close to Rail Transit (222)

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: Dense Multi-Use Urban

Number of Studies: 12

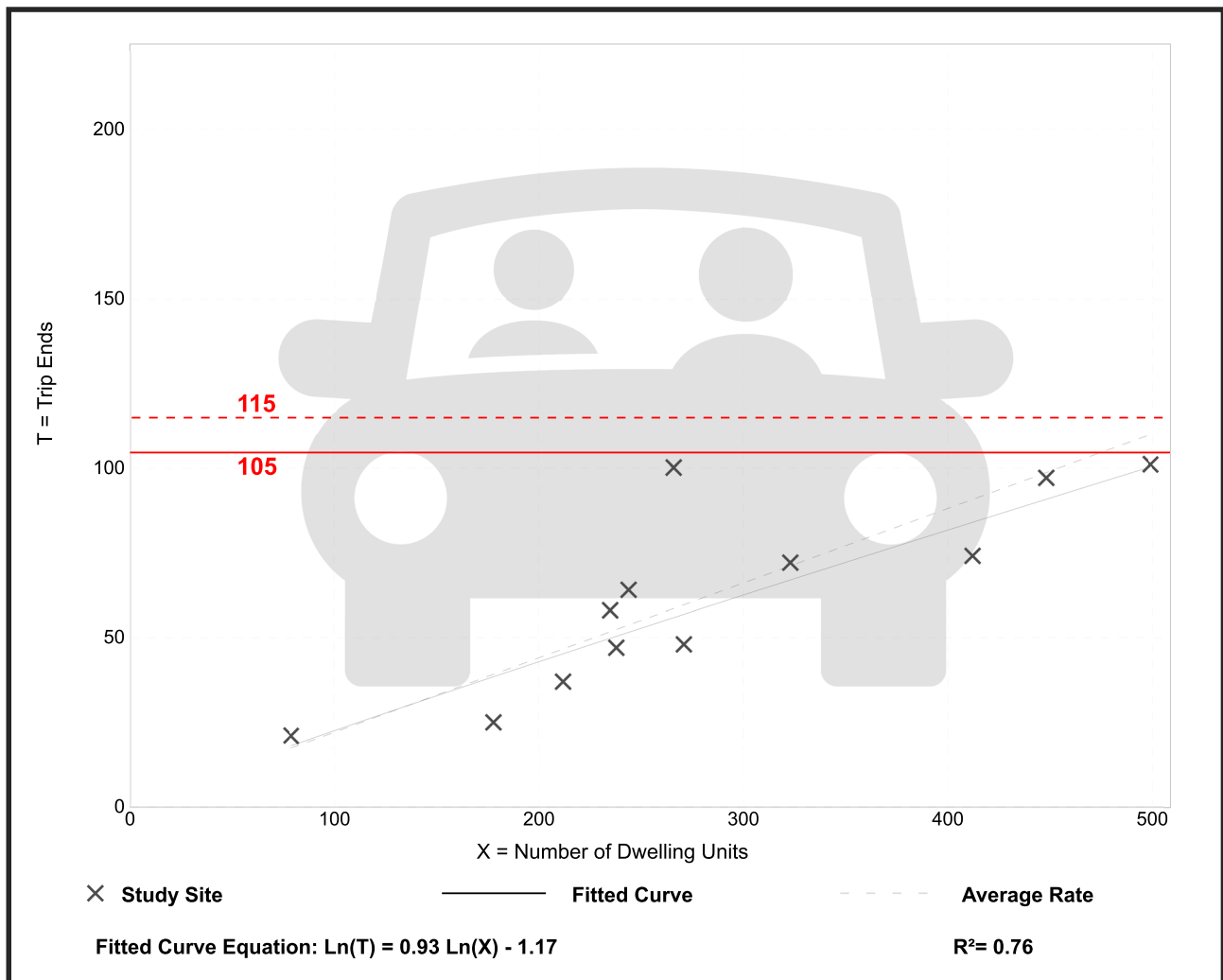
Avg. Num. of Dwelling Units: 284

Directional Distribution: 11% entering, 89% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.22	0.14 - 0.38	0.06

Data Plot and Equation



Multifamily Housing (High-Rise) Close to Rail Transit (222)

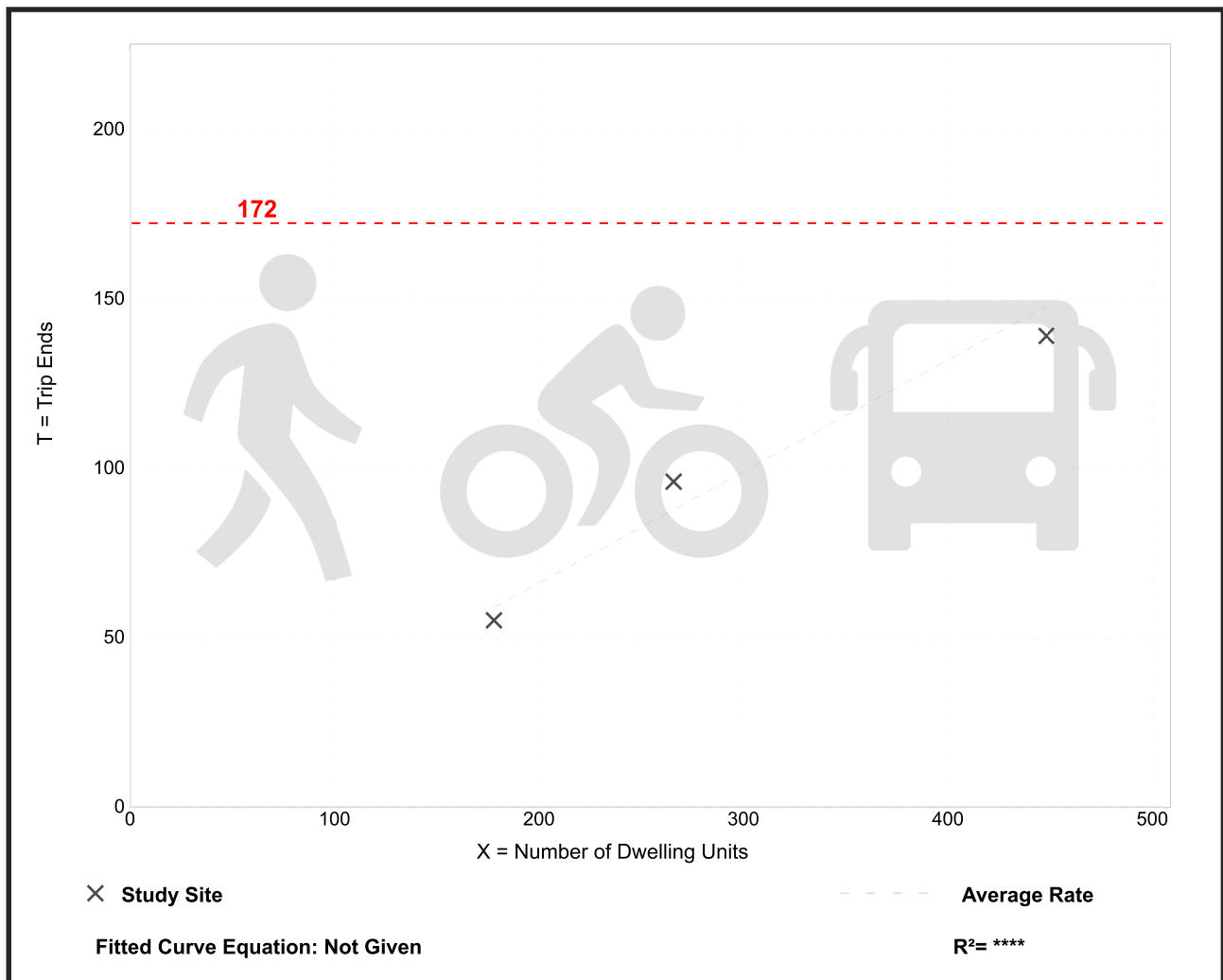
Walk+Bike+Transit Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: Dense Multi-Use Urban
Number of Studies: 3
Avg. Num. of Dwelling Units: 297
Directional Distribution: 25% entering, 75% exiting

Walk+Bike+Transit Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.33	0.31 - 0.36	0.03

Data Plot and Equation

Caution – Small Sample Size



Multifamily Housing (High-Rise) Close to Rail Transit (222)

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: Dense Multi-Use Urban

Number of Studies: 10

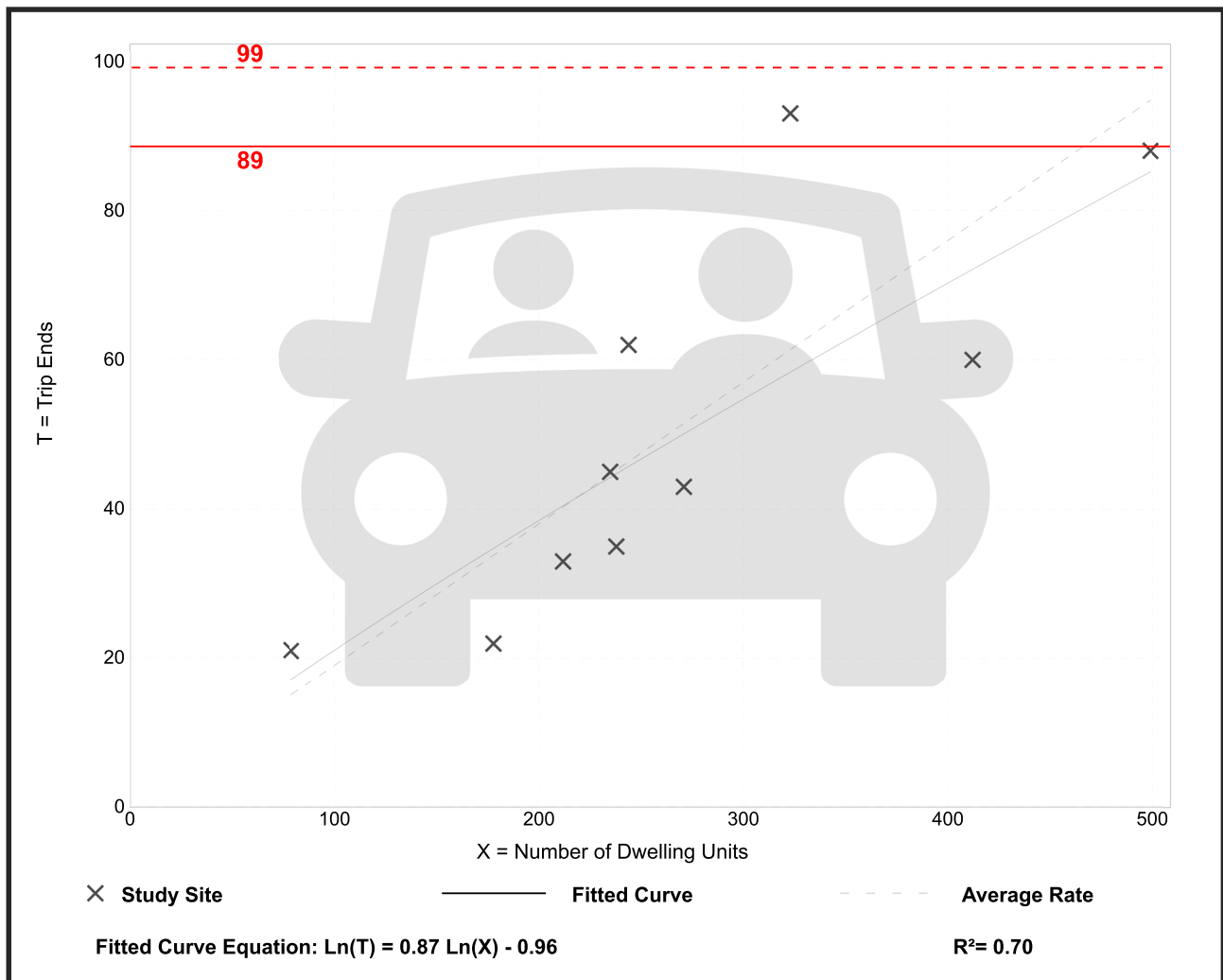
Avg. Num. of Dwelling Units: 269

Directional Distribution: 69% entering, 31% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.19	0.12 - 0.29	0.05

Data Plot and Equation



Multifamily Housing (High-Rise) Close to Rail Transit (222)

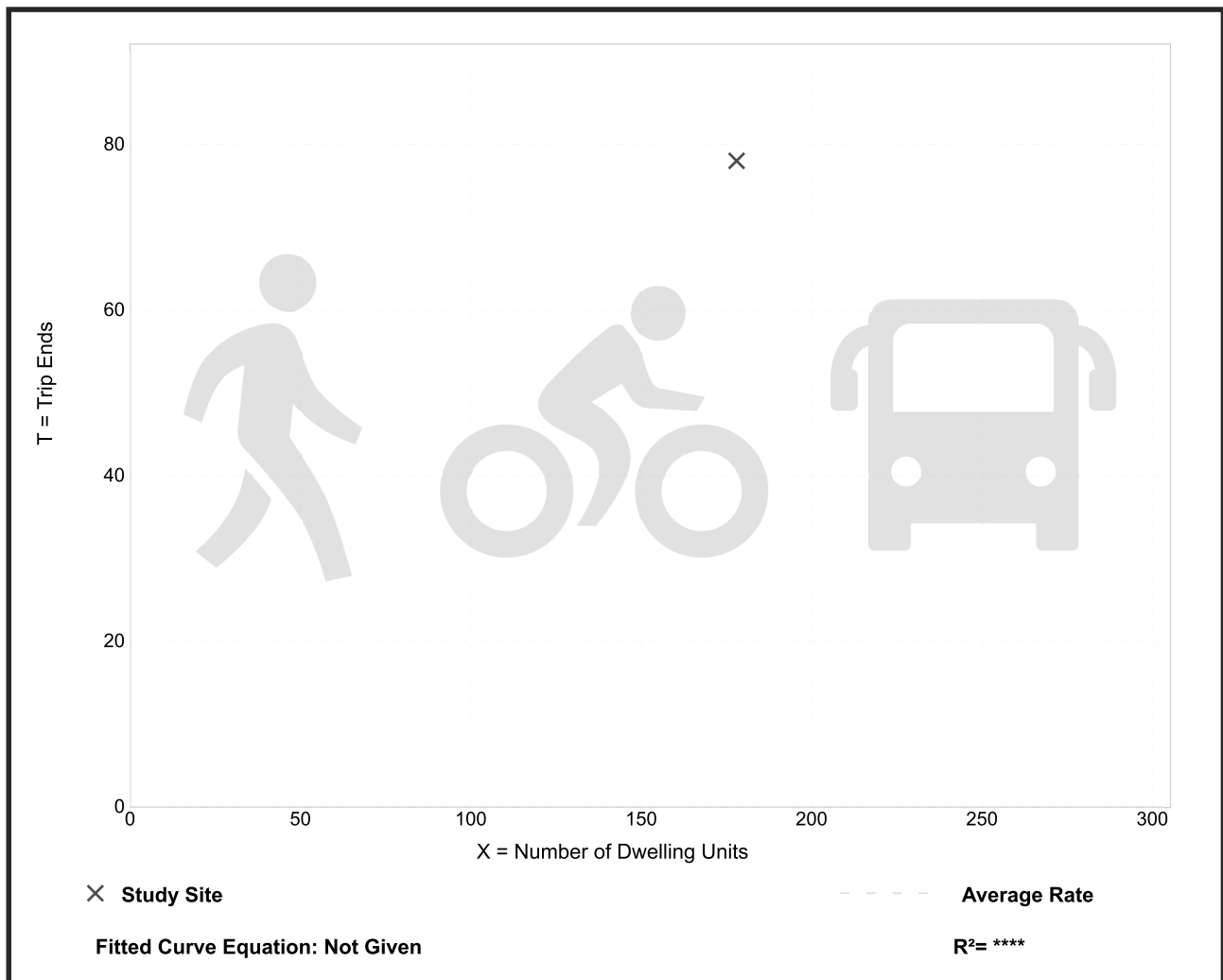
Walk+Bike+Transit Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: Dense Multi-Use Urban
 Number of Studies: 1
 Avg. Num. of Dwelling Units: 178
 Directional Distribution: 54% entering, 46% exiting

Walk+Bike+Transit Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.44 - 0.44	*

Data Plot and Equation

Caution – Small Sample Size



Strip Retail Plaza (<40k)

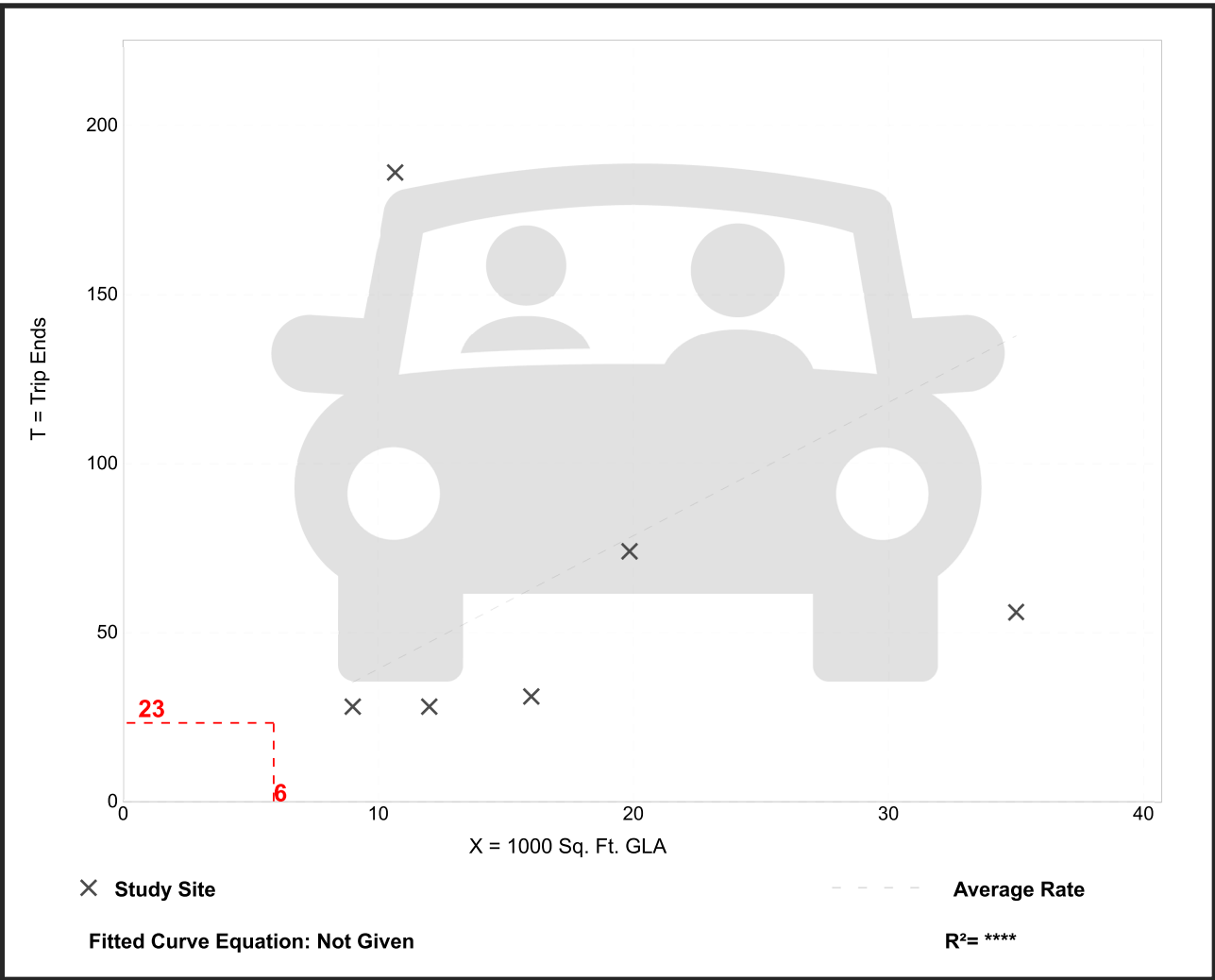
(822)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
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: 6
Avg. 1000 Sq. Ft. GLA: 17
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.93	1.60 - 17.44	5.12

Data Plot and Equation



Strip Retail Plaza (<40k)

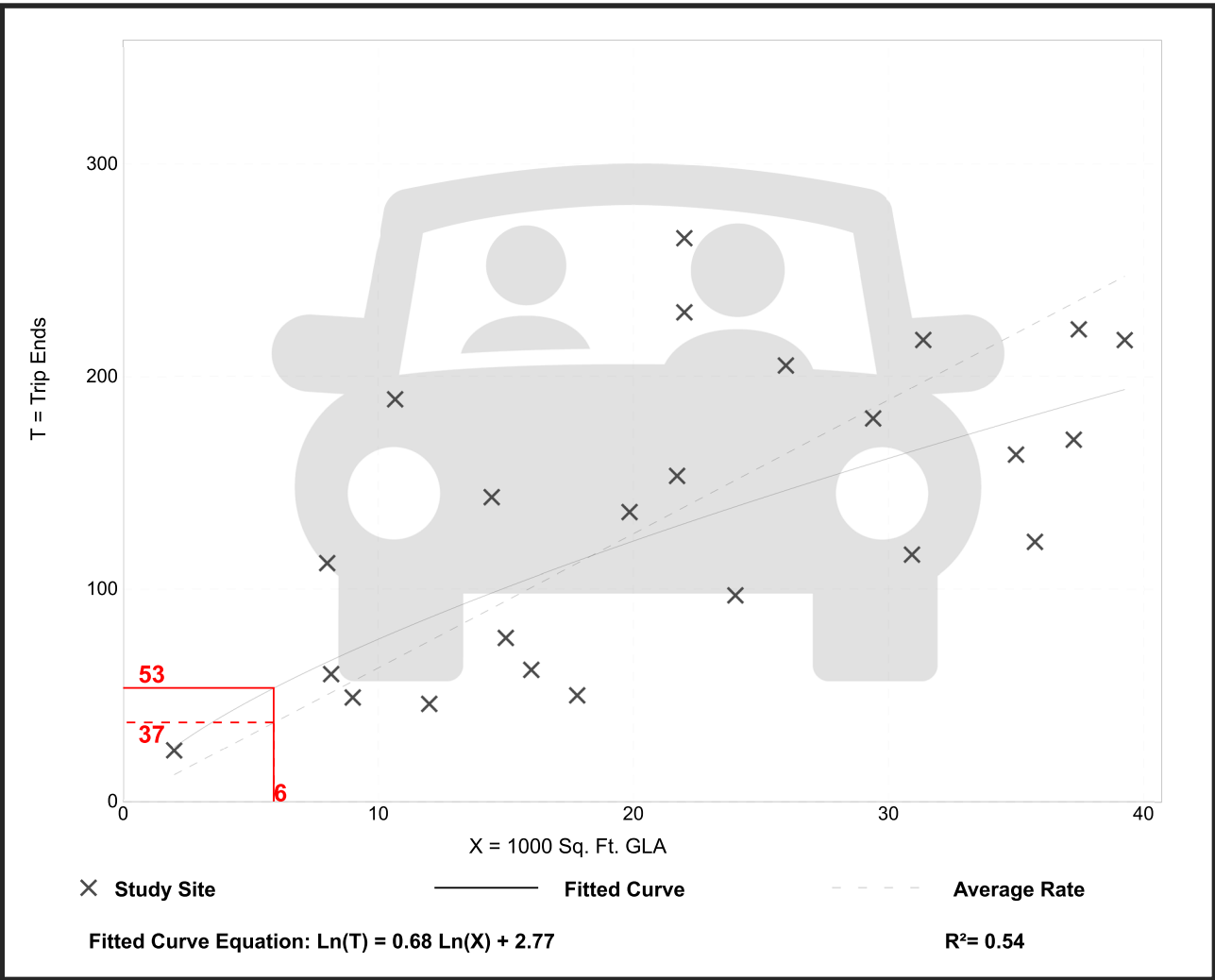
(822)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
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: 24
Avg. 1000 Sq. Ft. GLA: 22
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.29	2.81 - 17.72	3.02

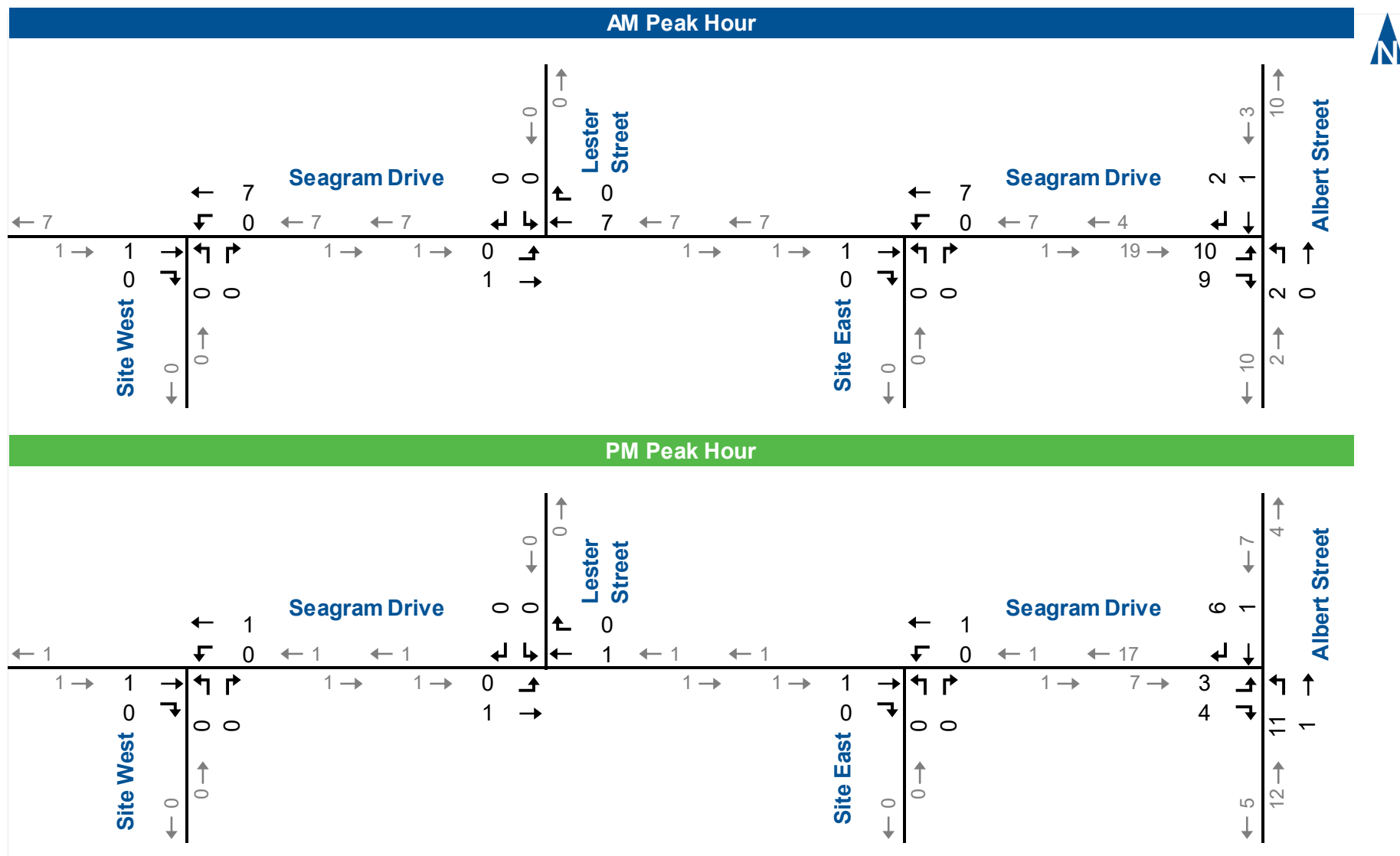
Data Plot and Equation



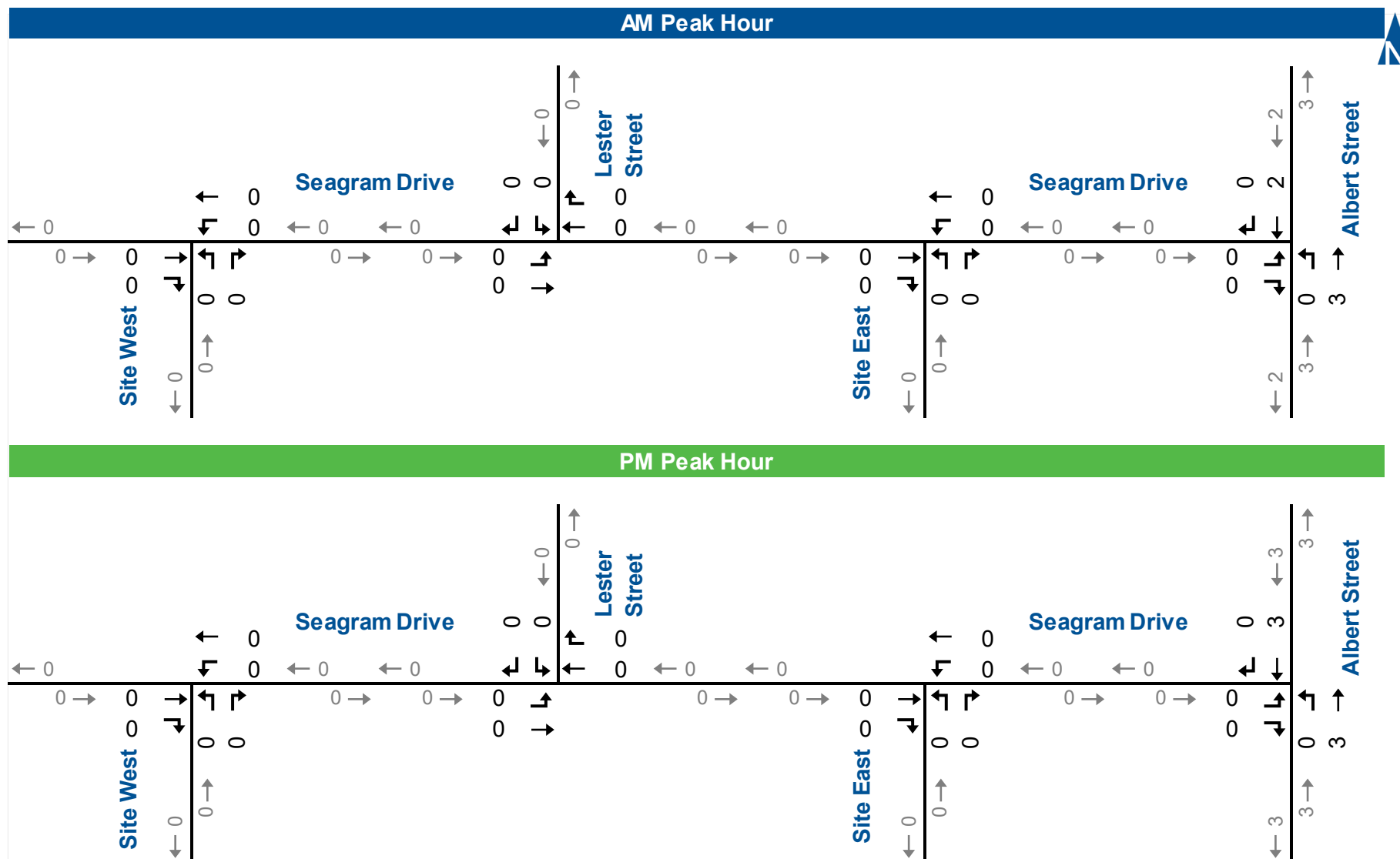
Appendix F

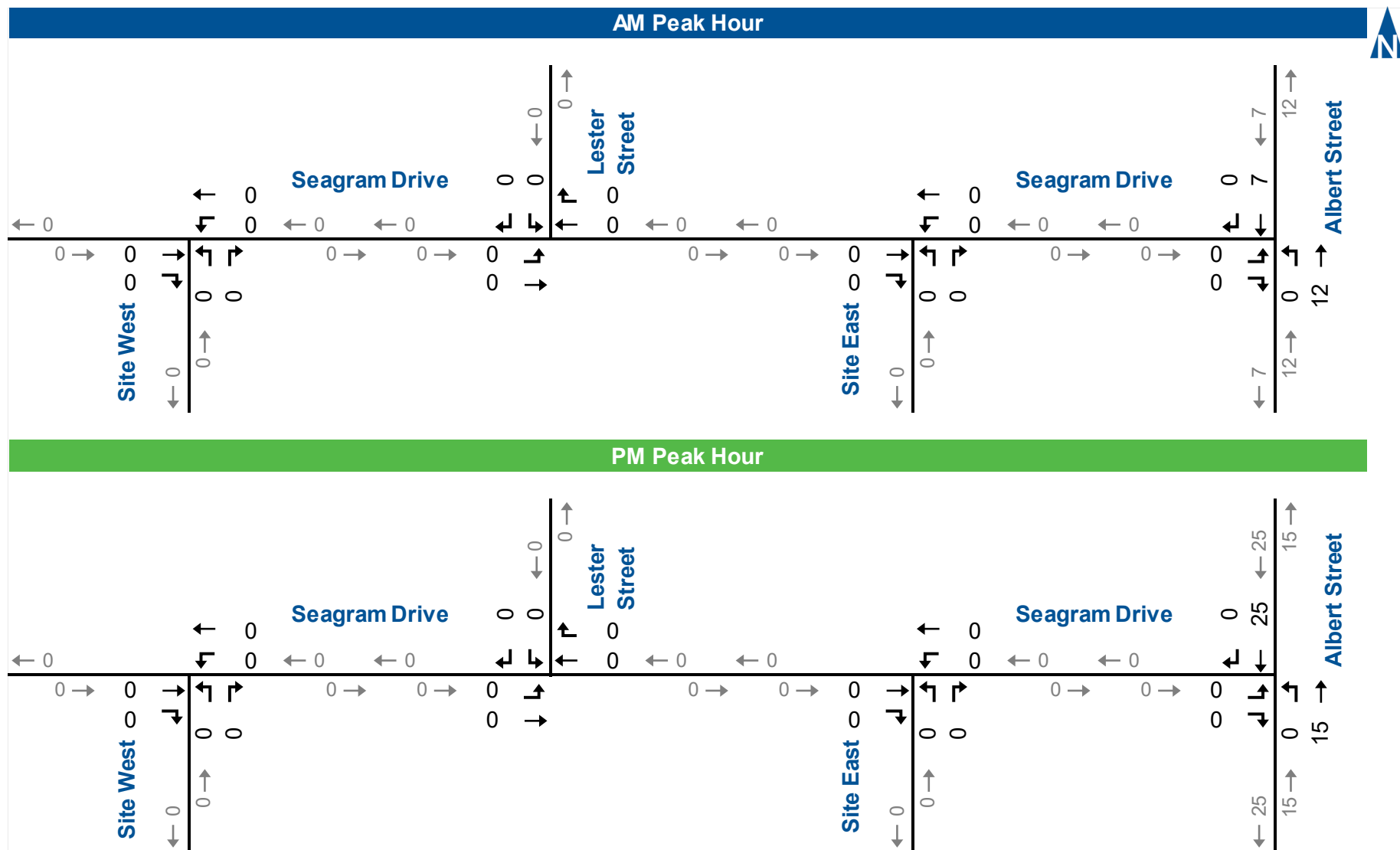
Background Development Traffic Volumes

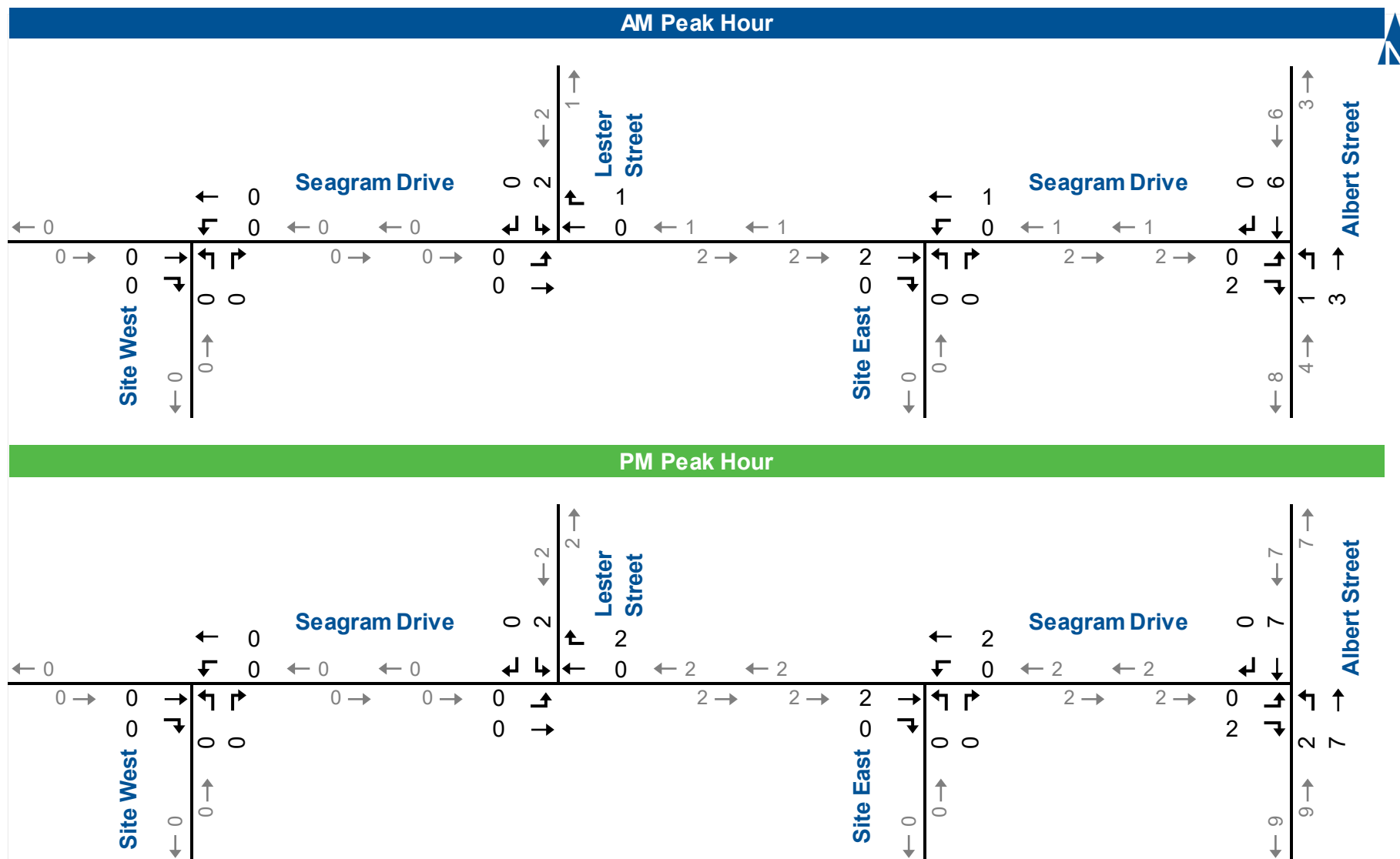




177-179 Albert







Appendix G

Background Traffic Operations Reports



Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Background - 2033
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	208	276	394	309	99
Future Volume (vph)	25	208	276	394	309	99
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.967	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1442	1635	1789	1520	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1442	1635	1789	1520	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	209.6			441.7	230.2	
Travel Time (s)	18.9			39.8	20.7	
Confl. Peds. (#/hr)	117	2	44			44
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	5%	5%	0%
Adj. Flow (vph)	25	208	276	394	309	99
Shared Lane Traffic (%)						
Lane Group Flow (vph)	25	208	276	394	408	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	56.9%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 101: Albert St & Seagram Dr

Background - 2033
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	208	276	394	309	99
Future Volume (Veh/h)	25	208	276	394	309	99
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	208	276	394	309	99
Pedestrians	44			2	117	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	4			0	11	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1466	405	452			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1466	405	452			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	66	74			
cM capacity (veh/h)	89	617	1061			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	25	208	276	394	408	
Volume Left	25	0	276	0	0	
Volume Right	0	208	0	0	99	
cSH	89	617	1061	1700	1700	
Volume to Capacity	0.28	0.34	0.26	0.23	0.24	
Queue Length 95th (m)	7.8	11.3	7.9	0.0	0.0	
Control Delay (s/veh)	60.1	13.8	9.6	0.0	0.0	
Lane LOS	F	B	A			
Approach Delay (s/veh)	18.7		3.9		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			56.9%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	208	276	394	309	99
Future Vol, veh/h	25	208	276	394	309	99
Conflicting Peds, #/hr	117	2	44	0	0	44
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	5	5	0
Mvmt Flow	25	208	276	394	309	99

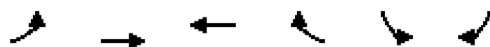
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1466	405	452	0	-	0
Stage 1	403	-	-	-	-	-
Stage 2	1063	-	-	-	-	-
Critical Hdwy	6.4	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	143	646	1109	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	335	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	97	619	1063	-	-	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	483	-	-	-	-	-
Stage 2	321	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	18.11	3.94	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1063	-	97	619	-	-
HCM Lane V/C Ratio	0.26	-	0.258	0.336	-	-
HCM Ctrl Dly (s/v)	9.6	-	54.5	13.7	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	1	-	0.9	1.5	-	-

Lanes, Volumes, Timings
102: Seagram Dr & Lester St

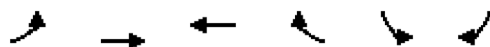
Background - 2033
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	11	203	358	20	13	13
Future Volume (vph)	11	203	358	20	13	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.932	
Flt Protected		0.997			0.976	
Satd. Flow (prot)	0	1573	1605	0	1519	0
Flt Permitted		0.997			0.976	
Satd. Flow (perm)	0	1573	1605	0	1519	0
Link Speed (k/h)		40	40		40	
Link Distance (m)		321.1	209.6		269.0	
Travel Time (s)		28.9	18.9		24.2	
Confl. Peds. (#/hr)	60			60	2	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	11%	3%	1%	0%	0%	9%
Adj. Flow (vph)	11	203	358	20	13	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	214	378	0	26	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	35.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 102: Seagram Dr & Lester St

Background - 2033
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	203	358	20	13	13
Future Volume (Veh/h)	11	203	358	20	13	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	203	358	20	13	13
Pedestrians		6	2		60	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	0		6	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	438				655	434
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	438				655	434
tC, single (s)	4.2				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	99				97	98
cM capacity (veh/h)	1013				403	569
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	214	378	26			
Volume Left	11	0	13			
Volume Right	0	20	13			
cSH	1013	1700	472			
Volume to Capacity	0.01	0.22	0.06			
Queue Length 95th (m)	0.3	0.0	1.3			
Control Delay (s/veh)	0.5	0.0	13.1			
Lane LOS	A		B			
Approach Delay (s/veh)	0.5	0.0	13.1			
Approach LOS			B			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			35.1%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	203	358	20	13	13
Future Vol, veh/h	11	203	358	20	13	13
Conflicting Peds, #/hr	60	0	0	60	2	6
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, %	11	3	1	0	0	9
Mvmt Flow	11	203	358	20	13	13

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	438	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.21	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.299	-	-
Pot Cap-1 Maneuver	1076	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1015	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.44	0	13.34
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	93	-	-	-	458
HCM Lane V/C Ratio	0.011	-	-	-	0.057
HCM Ctrl Dly (s/v)	8.6	0	-	-	13.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Background - 2033
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	74	318	203	470	498	77
Future Volume (vph)	74	318	203	470	498	77
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.982	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1471	1668	1879	1589	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1471	1668	1879	1589	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	209.6			441.7	230.2	
Travel Time (s)	18.9			39.8	20.7	
Confl. Peds. (#/hr)	236	4	70			70
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%
Adj. Flow (vph)	74	318	203	470	498	77
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	318	203	470	575	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	64.7%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 101: Albert St & Seagram Dr

Background - 2033
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	318	203	470	498	77
Future Volume (Veh/h)	74	318	203	470	498	77
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	74	318	203	470	498	77
Pedestrians	70			4	236	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	7			0	23	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1719	611	645			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1719	611	645			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	31	77			
cM capacity (veh/h)	55	462	885			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	74	318	203	470	575	
Volume Left	74	0	203	0	0	
Volume Right	0	318	0	0	77	
cSH	55	462	885	1700	1700	
Volume to Capacity	1.34	0.69	0.23	0.28	0.34	
Queue Length 95th (m)	50.0	39.1	6.7	0.0	0.0	
Control Delay (s/veh)	359.6	28.3	10.3	0.0	0.0	
Lane LOS	F	D	B			
Approach Delay (s/veh)	90.8		3.1		0.0	
Approach LOS	F					
Intersection Summary						
Average Delay	23.0					
Intersection Capacity Utilization	64.7%			ICU Level of Service		C
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	17.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	318	203	470	498	77
Future Vol, veh/h	74	318	203	470	498	77
Conflicting Peds, #/hr	236	4	70	0	0	70
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
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	1	0
Mvmt Flow	74	318	203	470	498	77

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1719	611	645	0	-	0
Stage 1	607	-	-	-	-	-
Stage 2	1112	-	-	-	-	-
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	100	498	950	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	317	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 67	464	888	-	-	-
Mov Cap-2 Maneuver	~ 67	-	-	-	-	-
Stage 1	395	-	-	-	-	-
Stage 2	297	-	-	-	-	-

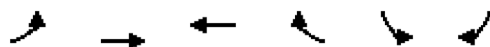
Approach	EB	NB	SB
HCM Ctrl Dly, s/v	69.15	3.09	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	888	-	67	464	-	-
HCM Lane V/C Ratio	0.229	-	1.101	0.686	-	-
HCM Ctrl Dly (s/v)	10.3	-	245.7	28.1	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	0.9	-	5.7	5.1	-	-

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

Lanes, Volumes, Timings
102: Seagram Dr & Lester St

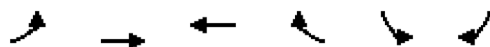
Background - 2033
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	352	226	38	34	32
Future Volume (vph)	37	352	226	38	34	32
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.981			0.935
Flt Protected	0.995				0.975	
Satd. Flow (prot)	0	1595	1541	0	1530	0
Flt Permitted	0.995				0.975	
Satd. Flow (perm)	0	1595	1541	0	1530	0
Link Speed (k/h)	40		40		40	
Link Distance (m)	321.1		209.6		269.0	
Travel Time (s)	28.9		18.9		24.2	
Confl. Peds. (#/hr)	77			77	12	7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	4%	3%	4%	4%
Adj. Flow (vph)	37	352	226	38	34	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	389	264	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 57.1%				ICU Level of Service B		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis 102: Seagram Dr & Lester St

Background - 2033
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	37	352	226	38	34	32
Future Volume (Veh/h)	37	352	226	38	34	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	37	352	226	38	34	32
Pedestrians		7	12		77	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	1		7	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	341				760	329
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341				760	329
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				90	95
cM capacity (veh/h)	1137				328	650
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	389	264	66			
Volume Left	37	0	34			
Volume Right	0	38	32			
cSH	1137	1700	432			
Volume to Capacity	0.03	0.16	0.15			
Queue Length 95th (m)	0.8	0.0	4.1			
Control Delay (s/veh)	1.1	0.0	14.8			
Lane LOS	A		B			
Approach Delay (s/veh)	1.1	0.0	14.8			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			57.1%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	37	352	226	38	34	32
Future Vol, veh/h	37	352	226	38	34	32
Conflicting Peds, #/hr	77	0	0	77	12	7
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	4	3	4	4
Mvmt Flow	37	352	226	38	34	32
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	341	0	-	0	760	329
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	438	-
Critical Hdwy	4.1	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.2	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1229	-	-	-	371	708
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1141	-	-	-	307	653
Mov Cap-2 Maneuver	-	-	-	-	307	-
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	600	-
Approach	EB	WB		SB		
HCM Ctrl Dly, s/v	0.79	0		15.37		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	171	-	-	-	413	
HCM Lane V/C Ratio	0.032	-	-	-	0.16	
HCM Ctrl Dly (s/v)	8.3	0	-	-	15.4	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6	

Appendix H

Total Traffic Operations Reports



Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Total - 2033
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	60	256	287	394	309	107
Future Volume (vph)	60	256	287	394	309	107
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.965	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1442	1635	1789	1518	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1442	1635	1789	1518	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	151.8			441.7	230.2	
Travel Time (s)	13.7			39.8	20.7	
Confl. Peds. (#/hr)	117	2	44			44
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	5%	5%	0%
Adj. Flow (vph)	60	256	287	394	309	107
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	256	287	394	416	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	58.4%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 101: Albert St & Seagram Dr

Total - 2033
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	256	287	394	309	107
Future Volume (Veh/h)	60	256	287	394	309	107
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	60	256	287	394	309	107
Pedestrians	44			2	117	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	4			0	11	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1492	409	460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1492	409	460			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	29	58	73			
cM capacity (veh/h)	85	614	1054			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	60	256	287	394	416	
Volume Left	60	0	287	0	0	
Volume Right	0	256	0	0	107	
cSH	85	614	1054	1700	1700	
Volume to Capacity	0.71	0.42	0.27	0.23	0.24	
Queue Length 95th (m)	26.1	15.6	8.4	0.0	0.0	
Control Delay (s/veh)	115.1	15.0	9.7	0.0	0.0	
Lane LOS	F	B	A			
Approach Delay (s/veh)	34.0		4.1		0.0	
Approach LOS	D					
Intersection Summary						
Average Delay			9.6			
Intersection Capacity Utilization			58.4%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	8.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	256	287	394	309	107
Future Vol, veh/h	60	256	287	394	309	107
Conflicting Peds, #/hr	117	2	44	0	0	44
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	5	5	0
Mvmt Flow	60	256	287	394	309	107
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1492	409	460	0	-	0
Stage 1	407	-	-	-	-	-
Stage 2	1085	-	-	-	-	-
Critical Hdwy	6.4	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	137	643	1101	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	327	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	615	1056	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	473	-	-	-	-	-
Stage 2	314	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	30.81	4.08		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1056	-	92	615	-	-
HCM Lane V/C Ratio	0.272	-	0.652	0.416	-	-
HCM Ctrl Dly (s/v)	9.7	-	98.5	15	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	1.1	-	3.1	2	-	-

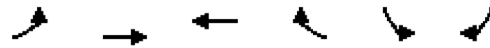
Lanes, Volumes, Timings
102: Seagram Dr & Lester St

Total - 2033
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	12	247	379	21	13	13
Future Volume (vph)	12	247	379	21	13	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.932	
Flt Protected		0.998			0.976	
Satd. Flow (prot)	0	1575	1605	0	1519	0
Flt Permitted		0.998			0.976	
Satd. Flow (perm)	0	1575	1605	0	1519	0
Link Speed (k/h)		40	40		40	
Link Distance (m)		27.7	57.8		269.0	
Travel Time (s)		2.5	5.2		24.2	
Confl. Peds. (#/hr)	60			60	2	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	11%	3%	1%	0%	0%	9%
Adj. Flow (vph)	12	247	379	21	13	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	259	400	0	26	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	38.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 102: Seagram Dr & Lester St

Total - 2033
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	247	379	21	13	13
Future Volume (Veh/h)	12	247	379	21	13	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	247	379	21	13	13
Pedestrians		6	2		60	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	0		6	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	460				723	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	460				723	456
tC, single (s)	4.2				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	99				96	98
cM capacity (veh/h)	994				368	553
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	259	400	26			
Volume Left	12	0	13			
Volume Right	0	21	13			
cSH	994	1700	442			
Volume to Capacity	0.01	0.24	0.06			
Queue Length 95th (m)	0.3	0.0	1.4			
Control Delay (s/veh)	0.5	0.0	13.7			
Lane LOS	A		B			
Approach Delay (s/veh)	0.5	0.0	13.7			
Approach LOS			B			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		38.0%		ICU Level of Service	A	
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	247	379	21	13	13
Future Vol, veh/h	12	247	379	21	13	13
Conflicting Peds, #/hr	60	0	0	60	2	6
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, %	11	3	1	0	0	9
Mvmt Flow	12	247	379	21	13	13
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	460	0	-	0	723	456
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	273	-
Critical Hdwy	4.21	-	-	-	6.4	6.29
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.299	-	-	-	3.5	3.381
Pot Cap-1 Maneuver	1055	-	-	-	396	590
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	996	-	-	-	348	554
Mov Cap-2 Maneuver	-	-	-	-	348	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	734	-
Approach	EB	WB		SB		
HCM Ctrl Dly, s/v	0.4	0		13.96		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	83	-	-	-	428	
HCM Lane V/C Ratio	0.012	-	-	-	0.061	
HCM Ctrl Dly (s/v)	8.7	0	-	-	14	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Lanes, Volumes, Timings
201: Site West & Seagram Dr

Total - 2033
AM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (vph)	217	3	7	385	13	41
Future Volume (vph)	217	3	7	385	13	41
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.897	
Flt Protected				0.999	0.988	
Satd. Flow (prot)	1596	0	0	1598	1516	0
Flt Permitted				0.999	0.988	
Satd. Flow (perm)	1596	0	0	1598	1516	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	293.4			27.7	42.2	
Travel Time (s)	26.4			2.5	3.8	
Confl. Peds. (#/hr)		150	150			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	217	3	7	385	13	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	0	392	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	40.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
201: Site West & Seagram Dr

Total - 2033
AM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↘↙	
Traffic Volume (veh/h)	217	3	7	385	13	41
Future Volume (Veh/h)	217	3	7	385	13	41
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	217	3	7	385	13	41
Pedestrians					150	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.0	
Percent Blockage					15	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			370	768		369
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			370	768		369
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			99	96		93
cM capacity (veh/h)			1015	314		578
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	220	392	54			
Volume Left	0	7	13			
Volume Right	3	0	41			
cSH	1700	1015	481			
Volume to Capacity	0.13	0.01	0.11			
Queue Length 95th (m)	0.0	0.2	2.9			
Control Delay (s/veh)	0.0	0.2	13.4			
Lane LOS			A B			
Approach Delay (s/veh)	0.0	0.2	13.4			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			40.0%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	217	3	7	385	13	41
Future Vol, veh/h	217	3	7	385	13	41
Conflicting Peds, #/hr	0	150	150	0	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, %	2	2	2	2	2	2
Mvmt Flow	217	3	7	385	13	41
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	370	0	768	369
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	399	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1189	-	370	677
Stage 1	-	-	-	-	700	-
Stage 2	-	-	-	-	678	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1022	-	316	582
Mov Cap-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	672	-
Approach	EB		WB		NB	
HCM Ctrl Dly, s/v	0		0.15		13.37	
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	484	-	-	32	-	
HCM Lane V/C Ratio	0.112	-	-	0.007	-	
HCM Ctrl Dly (s/v)	13.4	-	-	8.5	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0	-	

Lanes, Volumes, Timings
202: Site East & Seagram Dr

Total - 2033
AM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (vph)	255	4	12	385	15	43
Future Volume (vph)	255	4	12	385	15	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.900	
Flt Protected				0.998	0.987	
Satd. Flow (prot)	1597	0	0	1597	1550	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1597	0	0	1597	1550	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	57.8			151.8	46.8	
Travel Time (s)	5.2			13.7	4.2	
Confl. Peds. (#/hr)		150	150			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	255	4	12	385	15	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	259	0	0	397	58	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	44.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
202: Site East & Seagram Dr

Total - 2033
AM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	255	4	12	385	15	43
Future Volume (Veh/h)	255	4	12	385	15	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	255	4	12	385	15	43
Pedestrians					150	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.0	
Percent Blockage					15	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			409		816	407
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			409		816	407
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	92
cM capacity (veh/h)			991		295	554
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	259	397	58			
Volume Left	0	12	15			
Volume Right	4	0	43			
cSH	1700	991	451			
Volume to Capacity	0.15	0.01	0.13			
Queue Length 95th (m)	0.0	0.3	3.3			
Control Delay (s/veh)	0.0	0.4	14.2			
Lane LOS		A	B			
Approach Delay (s/veh)	0.0	0.4	14.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			44.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	255	4	12	385	15	43
Future Vol, veh/h	255	4	12	385	15	43
Conflicting Peds, #/hr	0	150	150	0	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, %	2	0	0	2	0	0
Mvmt Flow	255	4	12	385	15	43
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	409	0	816	407
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	409	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1161	-	349	648
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	675	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	999	-	296	558
Mov Cap-2 Maneuver	-	-	-	-	296	-
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	665	-
Approach	EB	WB		NB		
HCM Ctrl Dly, s/v	0	0.26		14.09		
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	454	-	-	54	-	
HCM Lane V/C Ratio	0.128	-	-	0.012	-	
HCM Ctrl Dly (s/v)	14.1	-	-	8.6	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0	-	

Lanes, Volumes, Timings
101: Albert St & Seagram Dr

Total - 2033
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	88	336	235	470	498	103
Future Volume (vph)	88	336	235	470	498	103
Ideal Flow (vphpl)	1775	1750	1775	1900	1650	1650
Storage Length (m)	20.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1471	1668	1879	1581	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1668	1471	1668	1879	1581	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	153.9			441.7	230.2	
Travel Time (s)	13.9			39.8	20.7	
Confl. Peds. (#/hr)	236	4	70			70
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%
Adj. Flow (vph)	88	336	235	470	498	103
Shared Lane Traffic (%)						
Lane Group Flow (vph)	88	336	235	470	601	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.11	1.13	1.11	1.01	1.21	1.21
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	68.4%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 101: Albert St & Seagram Dr

Total - 2033
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	88	336	235	470	498	103
Future Volume (Veh/h)	88	336	235	470	498	103
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	88	336	235	470	498	103
Pedestrians	70			4	236	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	7			0	23	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1796	624	671			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1796	624	671			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	26	73			
cM capacity (veh/h)	47	454	866			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	88	336	235	470	601	
Volume Left	88	0	235	0	0	
Volume Right	0	336	0	0	103	
cSH	47	454	866	1700	1700	
Volume to Capacity	1.88	0.74	0.27	0.28	0.35	
Queue Length 95th (m)	67.4	46.0	8.4	0.0	0.0	
Control Delay (s/veh)	603.8	32.2	10.7	0.0	0.0	
Lane LOS	F	D	B			
Approach Delay (s/veh)	150.9		3.6		0.0	
Approach LOS	F					
Intersection Summary						
Average Delay			38.4			
Intersection Capacity Utilization			68.4%	ICU Level of Service		C
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	29.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	88	336	235	470	498	103
Future Vol, veh/h	88	336	235	470	498	103
Conflicting Peds, #/hr	236	4	70	0	0	70
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	30	-	-	-
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	1	0
Mvmt Flow	88	336	235	470	498	103

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1796	624	671	0	-	0
Stage 1	620	-	-	-	-	-
Stage 2	1176	-	-	-	-	-
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	89	489	929	-	-	-
Stage 1	541	-	-	-	-	-
Stage 2	296	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 57	456	868	-	-	-
Mov Cap-2 Maneuver	~ 57	-	-	-	-	-
Stage 1	369	-	-	-	-	-
Stage 2	277	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	115.33	3.56	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	868	-	57	456	-	-
HCM Lane V/C Ratio	0.271	-	1.545	0.737	-	-
HCM Ctrl Dly (s/v)	10.7	-	\$ 433.6	32	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	1.1	-	8	6	-	-

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

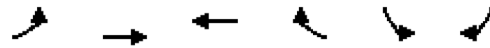
Lanes, Volumes, Timings
102: Seagram Dr & Lester St

Total - 2033
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	38	375	258	39	36	34
Future Volume (vph)	38	375	258	39	36	34
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.982		0.934	
Flt Protected		0.995			0.975	
Satd. Flow (prot)	0	1595	1543	0	1528	0
Flt Permitted		0.995			0.975	
Satd. Flow (perm)	0	1595	1543	0	1528	0
Link Speed (k/h)		40	40		40	
Link Distance (m)		22.0	55.6		269.0	
Travel Time (s)		2.0	5.0		24.2	
Confl. Peds. (#/hr)	77			77	12	7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	4%	3%	4%	4%
Adj. Flow (vph)	38	375	258	39	36	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	413	297	0	70	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	60.7%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
102: Seagram Dr & Lester St

Total - 2033
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	375	258	39	36	34
Future Volume (Veh/h)	38	375	258	39	36	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	38	375	258	39	36	34
Pedestrians		7	12		77	
Lane Width (m)		3.5	3.5		3.5	
Walking Speed (m/s)		1.0	1.0		1.0	
Percent Blockage		1	1		7	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	374				818	362
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	374				818	362
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				88	95
cM capacity (veh/h)	1106				303	624
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	413	297	70			
Volume Left	38	0	36			
Volume Right	0	39	34			
cSH	1106	1700	404			
Volume to Capacity	0.03	0.17	0.17			
Queue Length 95th (m)	0.8	0.0	4.7			
Control Delay (s/veh)	1.1	0.0	15.8			
Lane LOS	A		C			
Approach Delay (s/veh)	1.1	0.0	15.8			
Approach LOS			C			
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		60.7%		ICU Level of Service		B
Analysis Period (min)		15				

Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	38	375	258	39	36	34
Future Vol, veh/h	38	375	258	39	36	34
Conflicting Peds, #/hr	77	0	0	77	12	7
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	4	3	4	4
Mvmt Flow	38	375	258	39	36	34
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	374	0	-	0	818	362
Stage 1	-	-	-	-	355	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.1	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.2	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1196	-	-	-	343	679
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1110	-	-	-	283	626
Mov Cap-2 Maneuver	-	-	-	-	283	-
Stage 1	-	-	-	-	627	-
Stage 2	-	-	-	-	584	-
Approach	EB	WB		SB		
HCM Ctrl Dly, s/v	0.77	0		16.4		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	166	-	-	-	385	
HCM Lane V/C Ratio	0.034	-	-	-	0.182	
HCM Ctrl Dly (s/v)	8.4	0	-	-	16.4	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7	

Lanes, Volumes, Timings
201: Site West & Seagram Dr

Total - 2033
PM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (vph)	399	8	29	263	4	15
Future Volume (vph)	399	8	29	263	4	15
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.997				0.893	
Flt Protected				0.995	0.990	
Satd. Flow (prot)	1595	0	0	1595	1543	0
Flt Permitted				0.995	0.990	
Satd. Flow (perm)	1595	0	0	1595	1543	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	299.1			22.0	37.3	
Travel Time (s)	26.9			2.0	3.4	
Confl. Peds. (#/hr)		150	150			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	399	8	29	263	4	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	407	0	0	292	19	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	53.8%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
201: Site West & Seagram Dr

Total - 2033
PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	399	8	29	263	4	15
Future Volume (Veh/h)	399	8	29	263	4	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	399	8	29	263	4	15
Pedestrians					150	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.0	
Percent Blockage					15	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			557		874	553
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			557		874	553
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	97
cM capacity (veh/h)			874		267	458
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	407	292	19			
Volume Left	0	29	4			
Volume Right	8	0	15			
cSH	1700	874	398			
Volume to Capacity	0.24	0.03	0.05			
Queue Length 95th (m)	0.0	0.8	1.1			
Control Delay (s/veh)	0.0	1.2	14.5			
Lane LOS		A	B			
Approach Delay (s/veh)	0.0	1.2	14.5			
Approach LOS			B			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			53.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	399	8	29	263	4	15
Future Vol, veh/h	399	8	29	263	4	15
Conflicting Peds, #/hr	0	150	150	0	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, %	2	0	0	2	0	0
Mvmt Flow	399	8	29	263	4	15

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	557	0	874
Stage 1	-	-	-	-	553
Stage 2	-	-	-	-	321
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1024	-	323
Stage 1	-	-	-	-	580
Stage 2	-	-	-	-	740
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	881	-	267
Mov Cap-2 Maneuver	-	-	-	-	267
Stage 1	-	-	-	-	499
Stage 2	-	-	-	-	711

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.92	14.44
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	400	-	-	179	-
HCM Lane V/C Ratio	0.047	-	-	0.033	-
HCM Ctrl Dly (s/v)	14.4	-	-	9.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lanes, Volumes, Timings
202: Site East & Seagram Dr

Total - 2033
PM Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	396	15	34	288	9	22
Future Volume (vph)	396	15	34	288	9	22
Ideal Flow (vphpl)	1650	1650	1650	1650	1765	1765
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.995			0.904		
Flt Protected				0.995	0.986	
Satd. Flow (prot)	1593	0	0	1595	1556	0
Flt Permitted				0.995	0.986	
Satd. Flow (perm)	1593	0	0	1595	1556	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	55.6			153.9	45.2	
Travel Time (s)	5.0			13.9	4.1	
Confl. Peds. (#/hr)	150		150			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	396	15	34	288	9	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	411	0	0	322	31	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.21	1.21	1.21	1.21	1.12	1.12
Turning Speed (k/h)	14		24	24		14
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	58.3%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Site East & Seagram Dr

Total - 2033
PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	396	15	34	288	9	22
Future Volume (Veh/h)	396	15	34	288	9	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	396	15	34	288	9	22
Pedestrians					150	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.0	
Percent Blockage					15	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			561		910	554
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			561		910	554
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		96	95
cM capacity (veh/h)			871		252	458
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	411	322	31			
Volume Left	0	34	9			
Volume Right	15	0	22			
cSH	1700	871	370			
Volume to Capacity	0.24	0.04	0.08			
Queue Length 95th (m)	0.0	0.9	2.1			
Control Delay (s/veh)	0.0	1.4	15.6			
Lane LOS		A	C			
Approach Delay (s/veh)	0.0	1.4	15.6			
Approach LOS			C			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			58.3%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	396	15	34	288	9	22
Future Vol, veh/h	396	15	34	288	9	22
Conflicting Peds, #/hr	0	150	150	0	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, %	2	0	0	2	0	0
Mvmt Flow	396	15	34	288	9	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	561
Stage 1	-	-	554
Stage 2	-	-	356
Critical Hdwy	-	4.1	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	1020	308
Stage 1	-	-	580
Stage 2	-	-	713
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	878	252
Mov Cap-2 Maneuver	-	-	252
Stage 1	-	-	499
Stage 2	-	-	680

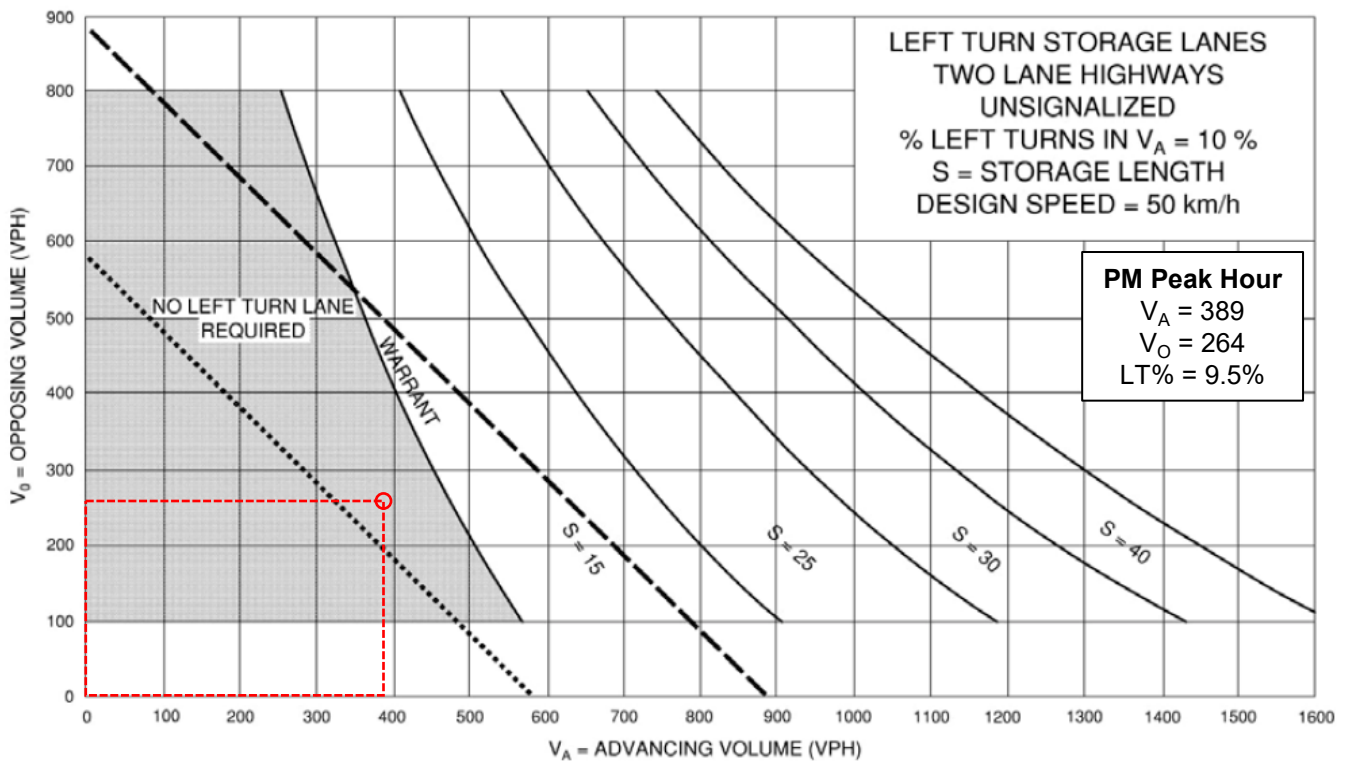
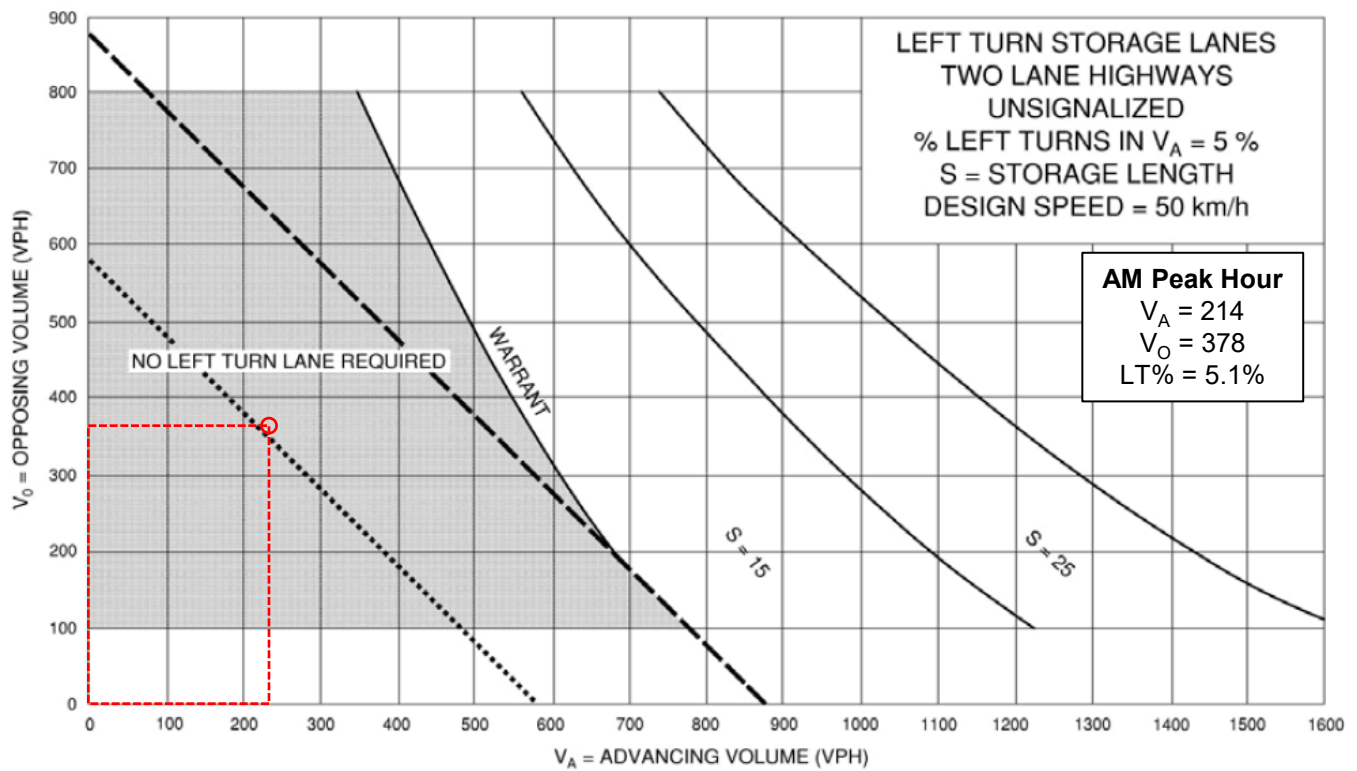
Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.98	15.56
HCM LOS			C

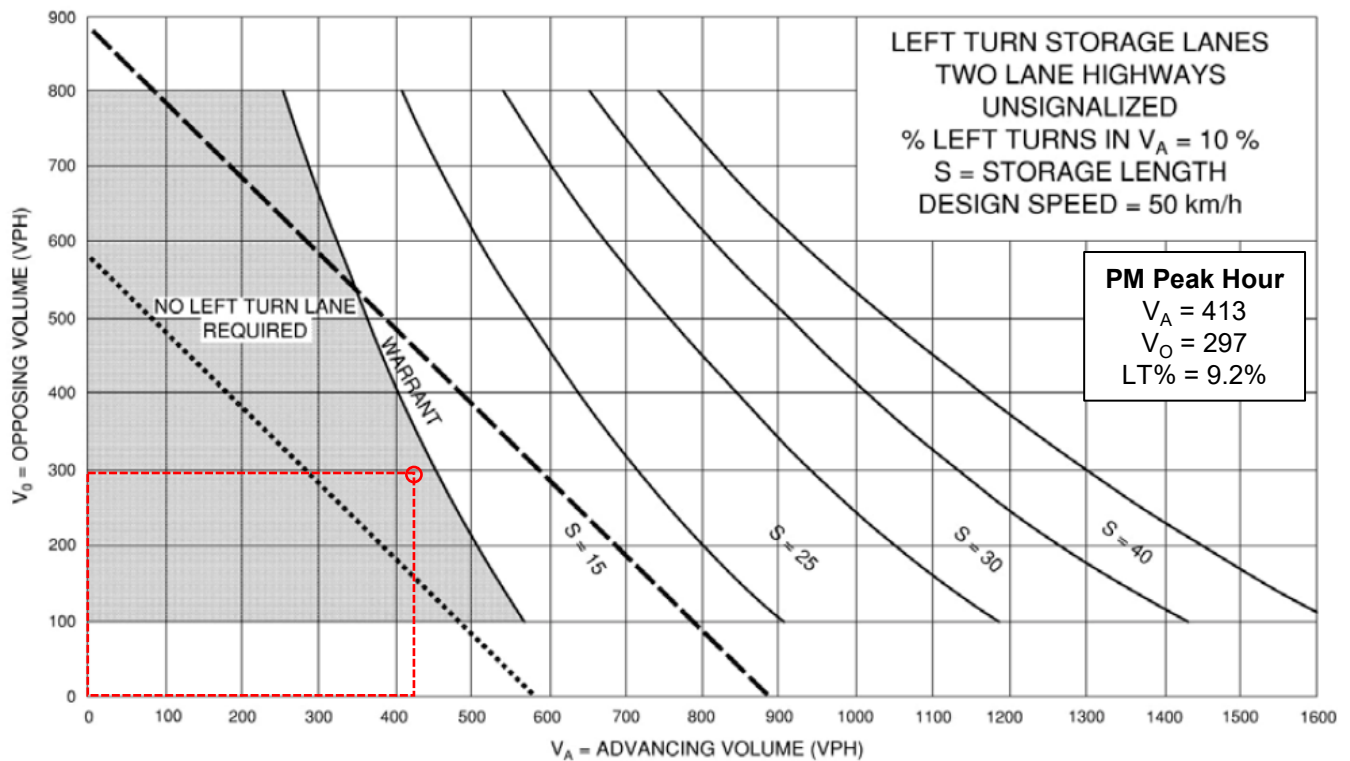
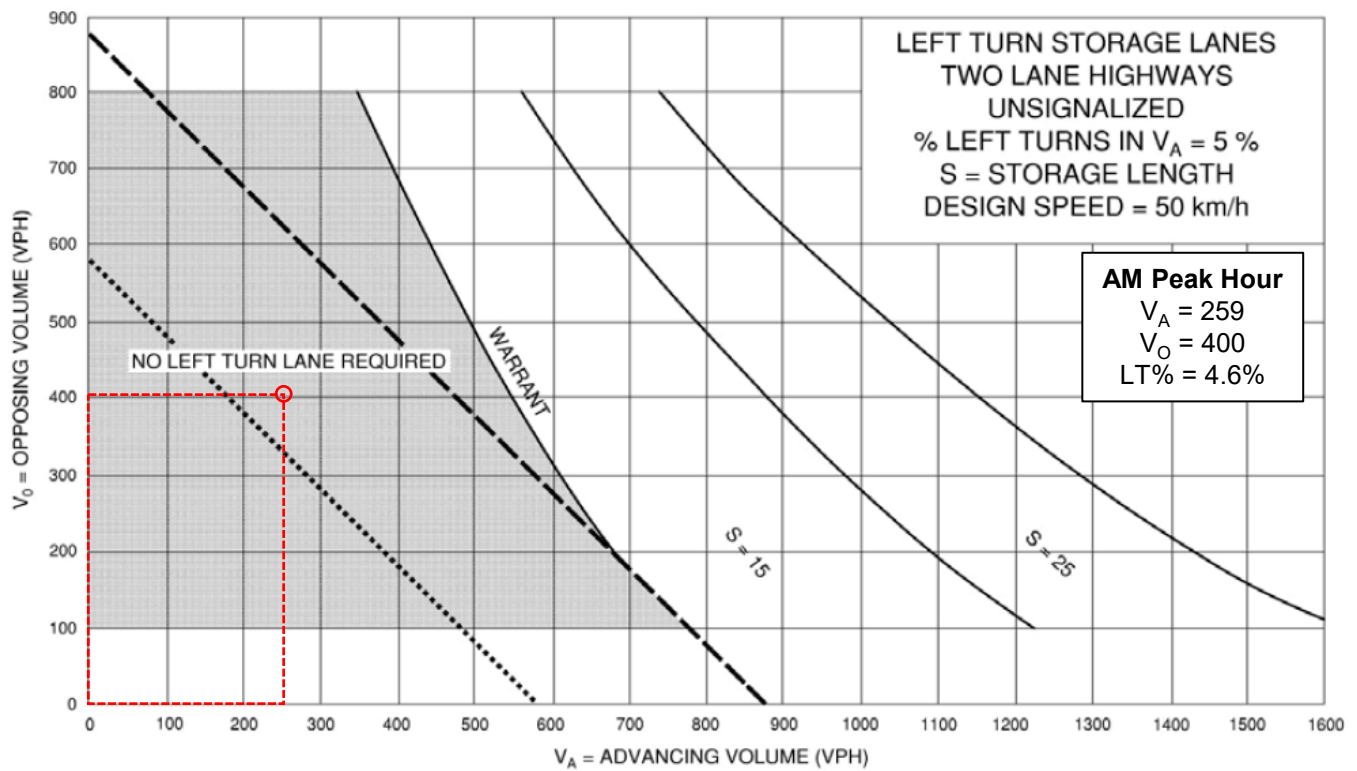
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	372	-	-	190	-
HCM Lane V/C Ratio	0.083	-	-	0.039	-
HCM Ctrl Dly (s/v)	15.6	-	-	9.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

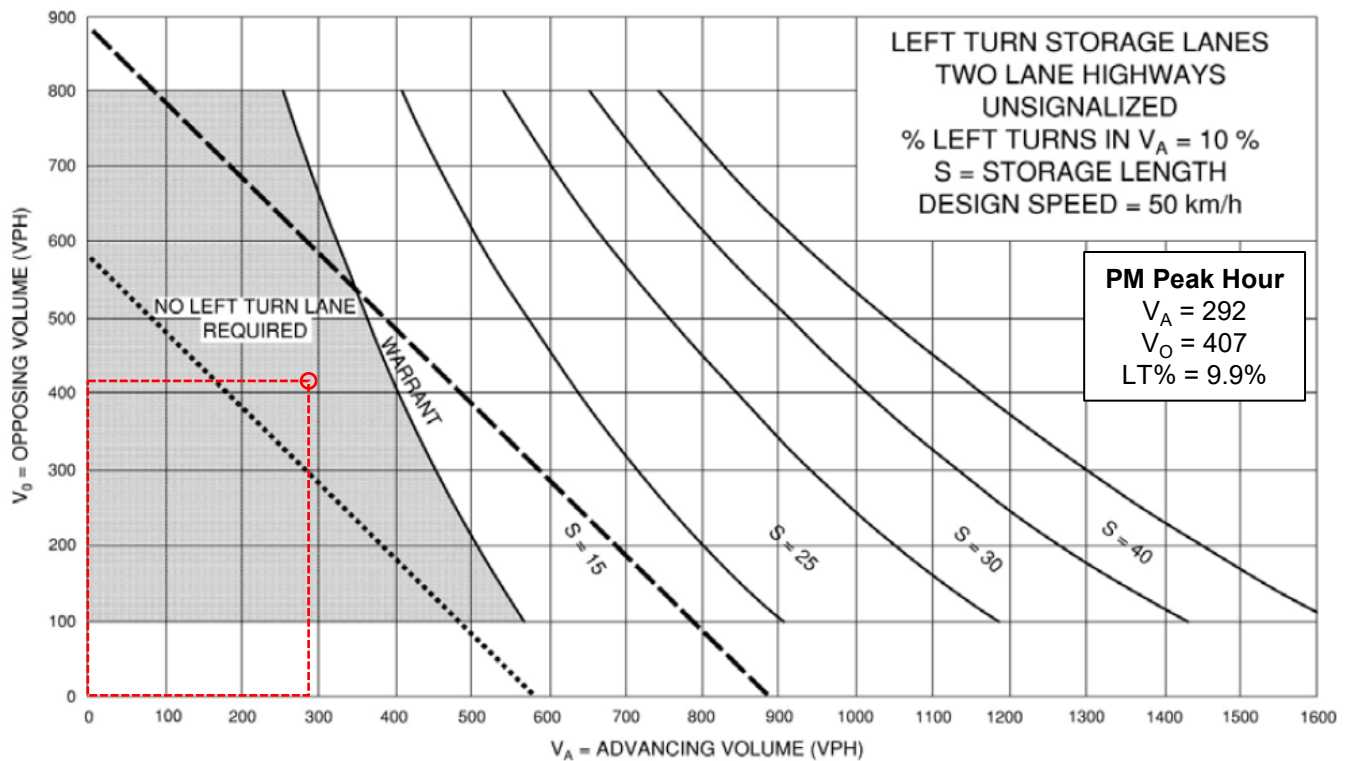
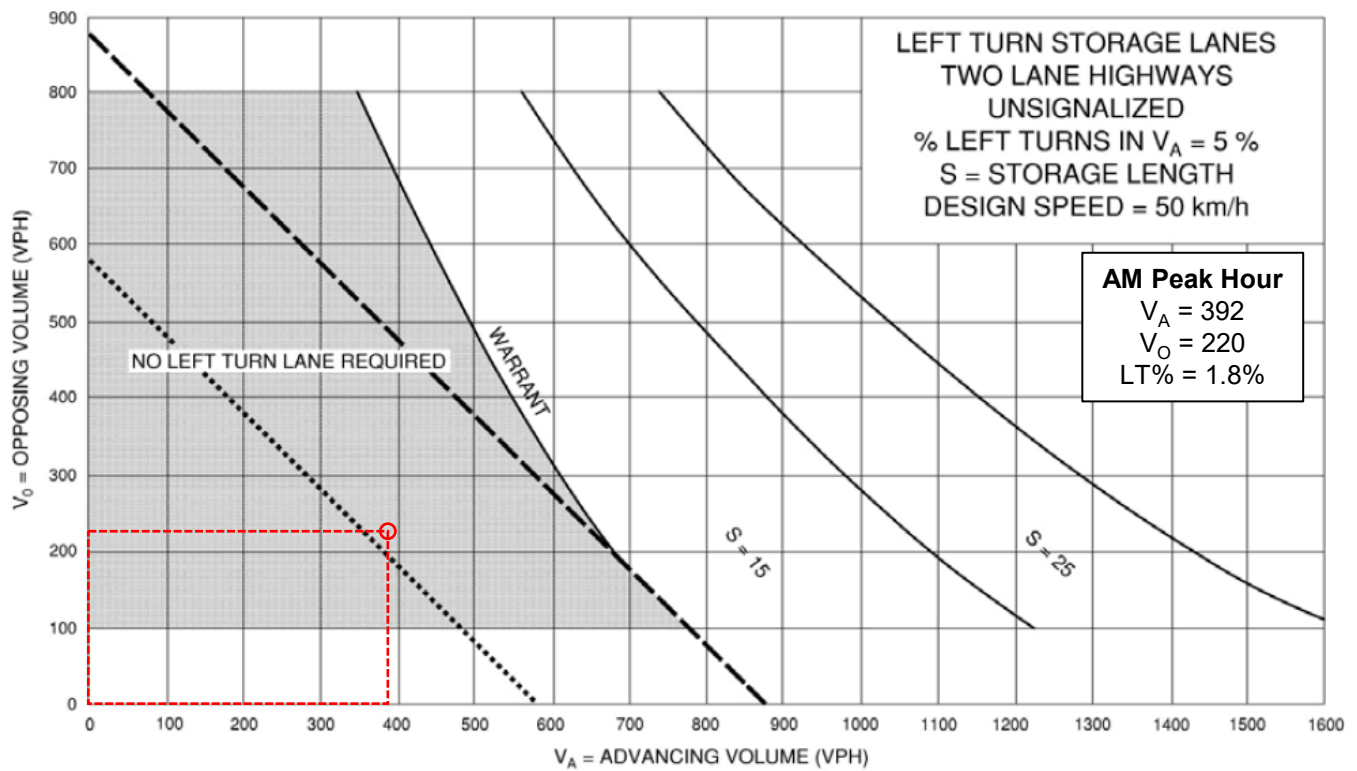
Appendix I

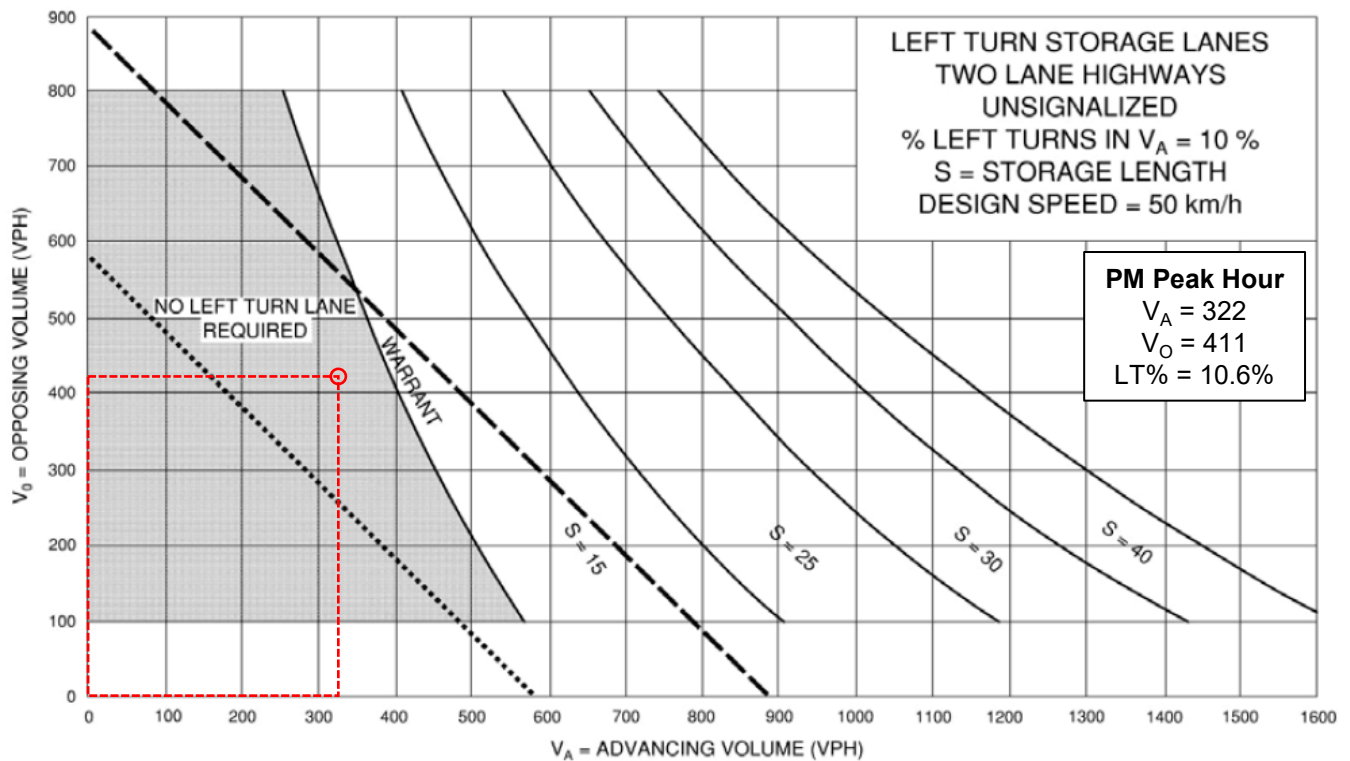
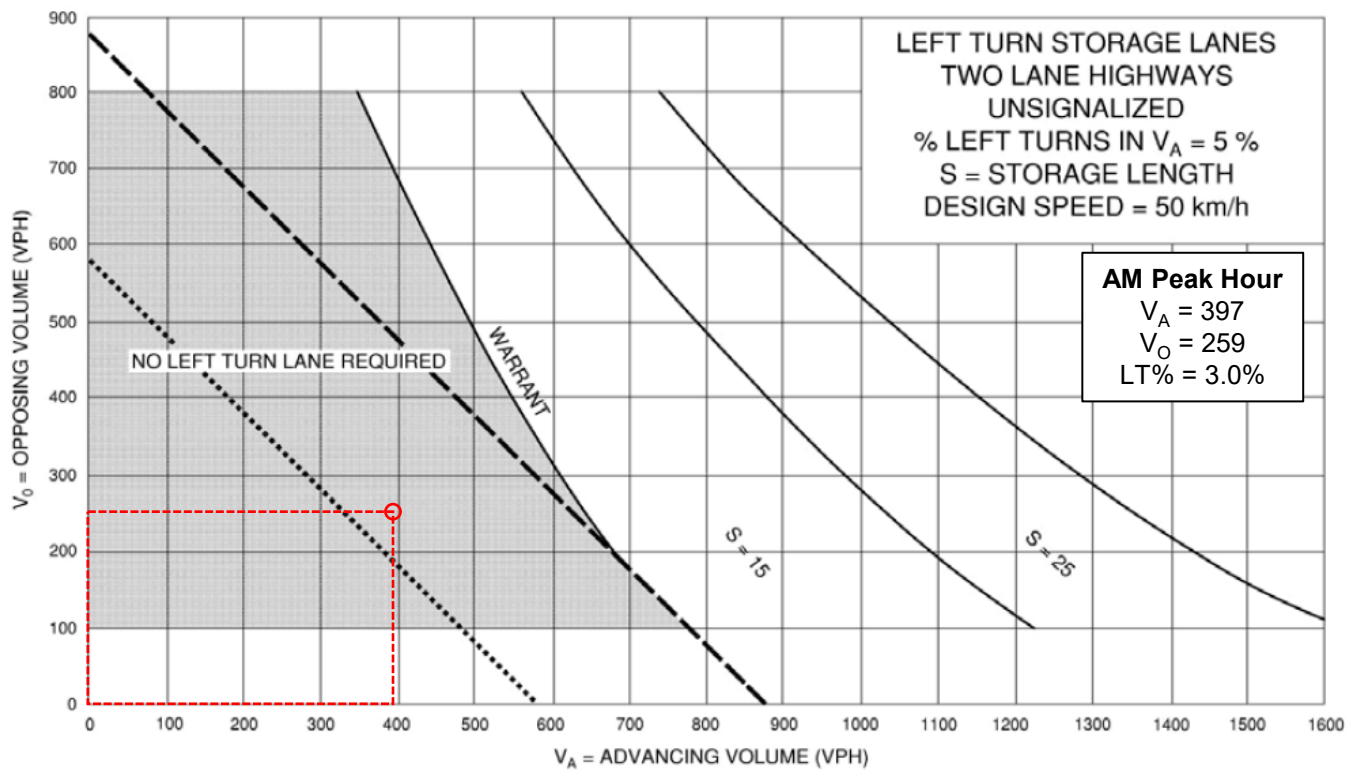
Left-Turn Lane Warrant Nomographs











Appendix J

Traffic Control Signal Justifications



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



Horizon Year: Background - 2033
Municipality: Waterloo, ON

Project number: 240494

Major Street: Albert Street
Minor Street: Seagram Drive

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Restricted

PM Forecast Only? N

Justification Result			
200% Satisfied	No	Case 1: Signal is undoubtedly warranted	
100% Satisfied	No	Case 2: Signal might be warranted	
< 100% Satisfied		Case 3: Signal warrant is unlikely	

Time Period	Major Street Albert Street						Minor Street Seagram Drive						Peds Crossing
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	276	394			309	99	25		208				250
PM Peak Hour	203	470			498	77	74		318				250
Average Hourly Volume	120	216	0	0	202	44	25	0	132	0	0	0	125

Warrant	AHV
1A - All	738
1B - Minor	156
2A - Major	582
2B - Cross	150

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	
% Fulfilled						102.5%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	
% Fulfilled						61.3%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	
% Fulfilled						80.8%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						199.7%

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



Horizon Year: Total - 2033
Municipality: Waterloo, ON

Project number: 240494

Major Street: Albert Street
Minor Street: Seagram Drive

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results			
200% Satisfied	No	Case 1: Signal is undoubtedly warranted	
100% Satisfied	No	Case 2: Signal might be warranted	
< 100% Satisfied		Case 3: Signal warrant is unlikely	

Time Period	Major Street Albert Street						Minor Street Seagram Drive						Peds Crossing
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	287	394			309	107	60		256				250
PM Peak Hour	235	470			498	103	88		336				250
Average Hourly Volume	131	216	0	0	202	53	37	0	148	0	0	0	125

Warrant	AHV
1A - All	786
1B - Minor	185
2A - Major	601
2B - Cross	162

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	
% Fulfilled						109.1%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	
% Fulfilled						72.5%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	
% Fulfilled						83.4%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						216.0%