paradigm
TRANSPORTATION SOLUTIONS LIMITED

25 YEARS

Employee-owned | Client-centric | Solution-focused

309, 329 & 333 Albert Street and 318 & 320 Batavia Place (330 Albert Street) Waterloo, ON Transportation Impact Study

Paradigm Transportation Solutions Limited

April 2023
230150

ptsl.com

Great Place To Work. Certified NOV 2022 - OCT 2023 CANADA

Project Summary

Project Number
230150

Date: April 2023
Version 1.0.0

Client
333 Albert Inc.
156 Columbia Street West
Waterloo, ON N2L 3L3

Client Contact
Drazen Prica
Vice President

333 Albert Street, Waterloo, ON
Transportation Impact Study



Erica Bayley, P.Eng.

Consultant Project Team
Erica Bayley, P.Eng.
Andrew Orr, EIT
Jim Mallett, M.A.Sc., P.Eng.

Disclaimer

This document has been prepared for the titled project or named part thereof (the “project”) and except for approval and commenting municipalities and agencies in their review and approval of this project, should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authorization of Paradigm Transportation Solutions Limited being obtained. Paradigm Transportation Solutions Limited accepts no responsibility or liability for the consequence of this document being used for a purpose other than the project for which it was commissioned. Any person using or relying on the document for such other purpose agrees and will by such use or reliance be taken to confirm their agreement to indemnify Paradigm Transportation Solutions Limited for all loss or damage resulting there from. Paradigm Transportation Solutions Limited accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned and the approval and commenting municipalities and agencies for the project.

To the extent that this report is based on information supplied by other parties, Paradigm Transportation Solutions Limited accepts no liability for any loss or damage suffered by the client, whether through contract or tort, stemming from any conclusions based on data supplied by parties other than Paradigm Transportation Solutions Limited and used by Paradigm Transportation Solutions Limited in preparing this report.

Copyright Notice

This report is protected by Canadian and International copyright laws. Reproduction and/or distribution of the report without the written permission of Paradigm Transportation Solutions Limited is prohibited.

© 2023 Paradigm Transportation Solutions Limited. All rights reserved

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684
www.ptsl.com

Executive Summary

Content

333 Albert Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study for a proposed mixed-use development located at 309, 329 & 333 Albert Street and 318 & 320 Batavia Place (330 Albert Street) in Waterloo, Ontario.

This Transportation Impact Study (TIS) includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for a five-year horizon from the date of full occupancy, and any recommendations required to manage future traffic conditions.

Development Concept

The subject site is proposed to be developed into a six-storey apartment building with 85, one-bedroom units and 365 m^2 of ground floor commercial space.

Vehicle access is proposed via a single all-moves access to Albert Street, north of Hickory Street West.

The full occupancy is assumed to occur by 2024.

Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service with the following critical movements:
  - The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
  - The eastbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
  - The westbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the PM peak hour; and
  - The southbound through movement at University Avenue West and Albert Street is forecast to have a queue length

that blocks the southbound left-turn lane during the AM and PM peak hours.

- **Development Trip Generation:** The development is forecast to generate approximately 36 and 44 trips during the AM and PM peak hours respectively.
- **2029 Background Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to existing traffic conditions with the following additional critical movements:
  - The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the AM peak hour;
  - The westbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the AM and PM peak hours; and
  - The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the northbound left-turn lane during the PM peak hour.
- **2029 Total Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to background traffic conditions with the following additional critical movement noted:
  - The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the northbound left-turn lane during the AM peak hour.

  The addition of the site generated traffic increases the approach delays at the study area intersections by one second or less during the AM and PM peak hours.
- **Remedial Measures:** A northbound left-turn lane at the intersection of Albert Street and the Site Driveway is not warranted under total traffic conditions.

Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval with no requirement for off site transportation network improvements.

Based on background traffic conditions and unrelated to the development of the subject site, it is recommended that the City review the need to extend:

- The eastbound left-turn lane at the intersection of Columbia Street West and Albert Street from 30 m to 65 m;
- The westbound left-turn lane at the intersection of Columbia Street West and Albert Street from 35 m to 50 m;
- The northbound left-turn lane at the intersection of Columbia Street West and Albert Street from 25 m to 45 m;
- The southbound left-turn lane at the intersection of University Avenue West and Albert Street from 15 m to 30 m.

Contents

1 Introduction 1

1.1 Overview 1
1.2 Study Area 1

2 Existing Conditions 3

2.1 Road Characteristics 3
2.2 Active Transportation 5
2.3 Transit Service 9
2.4 Traffic Volumes 12
2.5 Traffic Operations 14

3 Development Concept 17

3.1 Development Description 17
3.2 Site Trip Generation 19

4 Evaluation of Future Traffic Conditions 21

4.1 2029 Background Horizon 22
4.1.1 2029 Background Traffic Growth 22
4.1.2 2029 Background Traffic Operations 22
4.2 2029 Total Traffic Horizon 26
4.2.1 2029 Total Traffic Volumes 26
4.2.2 2029 Total Traffic Operations 26

5 Remedial Measures 29

5.1 Critical Movements 29
5.2 Left-Turn Lanes 30

6 Conclusions and Recommendations 31

6.1 Conclusions 31
6.2 Recommendations 32

Appendices

Appendix A Pre-Study Material
Appendix B Traffic Data
Appendix C Base Year Operations
Appendix D Background Development Material
Appendix E 2029 Background Traffic Operations
Appendix F 2029 Total Traffic Operations

Figures

Figure 1.1: Location of Subject Site 2
Figure 2.1: Existing Lane Configuration & Traffic Control 4
Figure 2.2: Existing Trail Network 6
Figure 2.3: Existing Cycling Network 7
Figure 2.4: Main Active Transportation Routes 8
Figure 2.5: Transit Network 11
Figure 2.6: Base Year Traffic Volumes 13
Figure 3.1: Concept Plan 18
Figure 3.2: Site Generated Traffic Volumes 20
Figure 4.1: 2029 Background Traffic Volumes 24
Figure 4.2: 2029 Total Traffic Volumes 27

Tables

Table 2.1: Base Year Operations 16
Table 3.1: Forecast Site-Generated Trips 19
Table 3.2: Trip Assignment 19
Table 4.1: 2029 Background Operations 25
Table 4.2: 2029 Total Operations 28
Table 5.1: Left-Turn Lane Warrant Summary – Albert Street 30

1 Introduction

1.1 Overview

333 Albert Inc. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study for a mixed development located at 309, 329 & 333 Albert Street and 318 & 320 Batavia Place (330 Albert Street) in Waterloo, Ontario. **Figure 1.1** illustrates the location of the subject site.

This study reviews the forecast impacts of the site-generated traffic on the surrounding road network and identifies any required remedial measures. The scope of the study includes:

- Assessing current traffic and site conditions within the study area;
- Forecasting future non-development (background) traffic growth;
- Forecasting site-generated traffic;
- Analysing future traffic impacts on the surrounding road network for five-years after full occupancy; and
- Recommending any necessary mitigation.

The study scope was developed in consultation with the City of Waterloo in March 2023. **Appendix A** contains the pre-study consultation material and response from the City.

1.2 Study Area

The intersections assessed in this study include:

- Columbia Street West and Albert Street (signalized);
- Albert Street and Hickory Street West (unsignalized);
- University Avenue West and Albert Street (signalized); and
- Driveway connection to Albert Street (assumed unsignalized).



NTS
Image Source: "City Map," City of Waterloo, https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.91236505.2002252440.1678887690-1641158142.1665493570.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Location of Subject Site

2 Existing Conditions

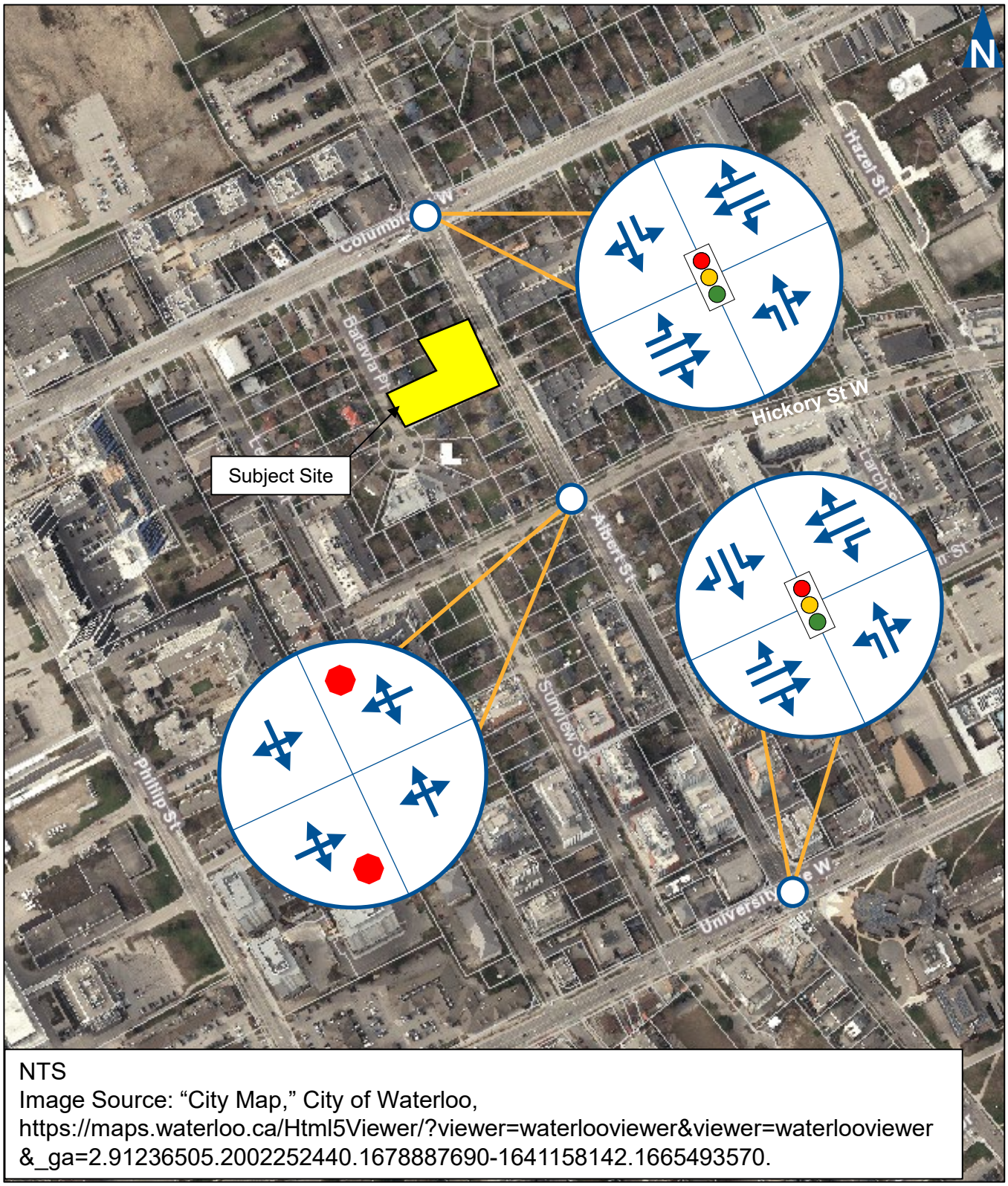
2.1 Road Characteristics

The roadways of interest within the study area include Region of Waterloo governed[1] University Avenue West and City of Waterloo streets Columbia Street West, Albert Street, and Hickory Street West. The roadways are generally described as follows:

- **University Avenue West** is a four-lane, 50 km/h regional arterial road within the study area. Sidewalks are provided on both sides of the roadway.
- **Columbia Street West** is a four-lane, city arterial road within the study area. Sidewalks are provided on both sides of the roadway. West of Phillip Street, the speed limit is 60 km/h and east of Phillip Street, the speed limit is 50 km/h.
- **Albert Street** is a two-lane, major collector road within the study area. Sidewalks are provided on both sides of the roadway. North of Columbia Street West, the speed limit is 60 km/h and South of Columbia Street West, the speed limit is 50 km/h.
- **Hickory Street West** is a two-lane, 50 km/h local roadway within the study area. Sidewalks are provided on both sides of the roadway.

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

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



NTS
Image Source: “City Map,” City of Waterloo, https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.91236505.2002252440.1678887690-1641158142.1665493570.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Lane Configuration & Traffic Control

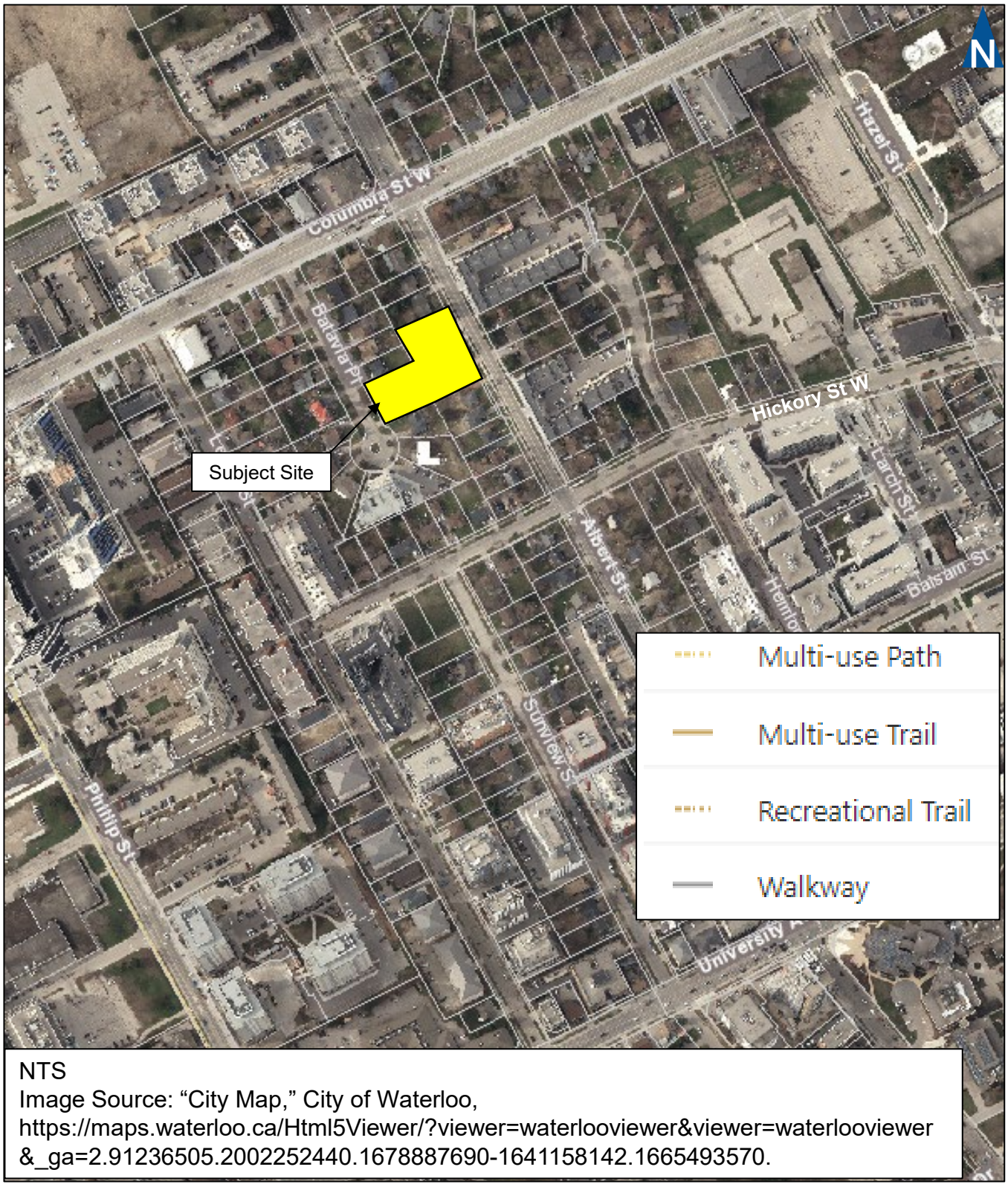
2.2 Active Transportation

Sidewalks are provided on all sides of all study area roadways.

Figure 2.2, **Figure 2.3**, and **Figure 2.4** illustrate the active transportation network in the vicinity of the subject site.

The active transportation network infrastructure includes:

- A multi-use path running along the west side of Phillip Street;
- Cycles lanes running along Albert Street north of Columbia Street West;
- Cycle lanes running along Albert Street south of University Avenue West;
- Cycles lanes running along University Avenue West, Columbia Street West, and Phillip Street; and
- An active transportation route along Columbia Street West.



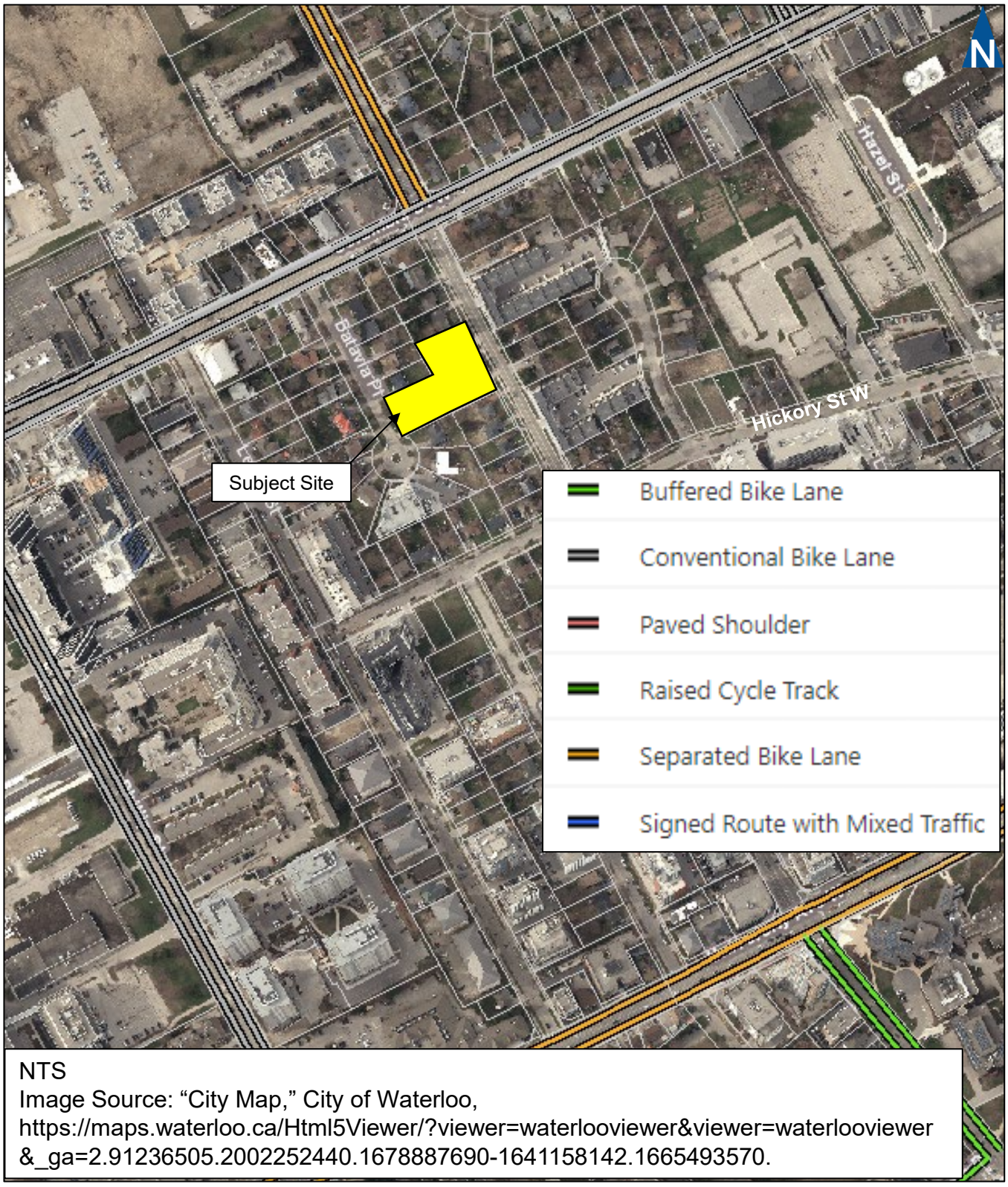
NTS
Image Source: "City Map," City of Waterloo, https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.91236505.2002252440.1678887690-1641158142.1665493570.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Trail Network

333 Albert Street, Waterloo TIS
230150

Figure 2.2



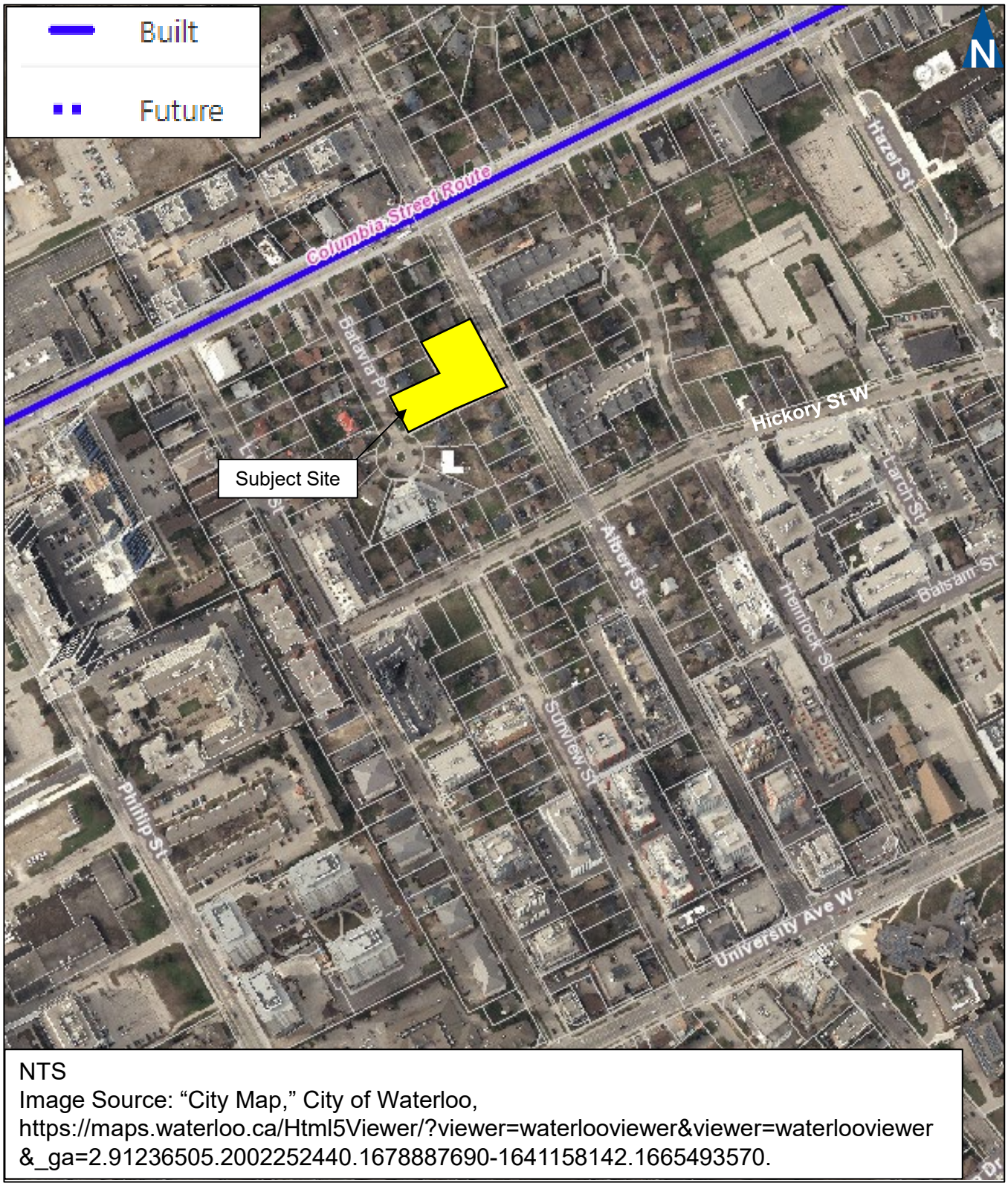
NTS
Image Source: “City Map,” City of Waterloo, https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.91236505.2002252440.1678887690-1641158142.1665493570.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Cycling Network

333 Albert Street, Waterloo TIS
230150

Figure 2.3



NTS
Image Source: “City Map,” City of Waterloo, https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.91236505.2002252440.1678887690-1641158142.1665493570.

Main Active Transportation Routes

333 Albert Street, Waterloo TIS
230150

Figure 2.4

2.3 Transit Service

Grand River Transit[2] operates eight routes near the study area:

- **Route 9 (Lakeshore)** travels between Conestoga Mall and the University of Waterloo. This route operates Monday to Friday from 5:45 AM to 12:05 AM with headways between 15 to 30 minutes. On Saturday, the route operates from 6:50 AM to 12:20 AM with headways every 30 minutes. On Sunday, the route operates from 7:40 AM to 12:20 AM with headways every 30 minutes;
- **Route 12 (Westmount)** travels between the intersection of King Street and University Avenue in Waterloo and Fairview Park Mall in Kitchener. This route operates Monday to Friday from 5:30 AM to 1:00 AM with headways between 7 to 30 minutes. On Saturday, the route operates from 6:20 AM to 12:50 AM with headways every 30 minutes. On Sunday, the route operates from 7:20 AM to 12:50 AM with headways every 30 minutes;
- **Route 13 (Laurelwood)** travels between the Boardwalk and the University of Waterloo. This route operates Monday to Friday from 5:30 AM to 12:10 AM with headways between 6 to 30 minutes. On Saturday, the route operates from 6:50 AM to 12:30 AM with headways every 30 minutes. On Sunday, the route operates from 7:50 AM to 12:20 AM with headways every 30 minutes;
- **Route 19 (Hazel)** travels between St. Jacobs/north end of Waterloo and the University of Waterloo. This route operates Monday to Friday from 5:35 AM to 12:00 AM with headways between 7 to 30 minutes. On Saturday, the route operates from 6:25 AM to 12:20 AM with headways between 30 minutes to an hour. On Sunday, the route operates from 7:55 AM to 12:05 AM with headways between 30 minutes to an hour;
- **Route 29 (Keats-University)** travels between the Boardwalk and Conestoga Mall. This route operates Monday to Friday from 5:35 AM to 12:25 AM with headways between 4 to 33 minutes. On Saturday, the route operates from 6:55 AM to 1:05 AM with headways every 30 minutes. On Sunday, the route operates from 8:10 AM to 1:05 AM with headways every 30 minutes;
- **Route 31 (Columbia)** operates between Conestoga Mall and the west end of Waterloo. This route operates Monday to Friday

[2] "Grand River Transit System Map," Region of Waterloo, 2017, https://www.grt.ca/en/schedules-maps/system-map.aspx.

from 5:35 AM to 11:20 PM with headways generally between 30 to 50 minutes;

- **Route 201 (iXpress Fischer-Hallman)** travels between the Doon Campus (Conestoga College) in Kitchener and Conestoga Mall in Waterloo. This route operates Monday to Friday from 5:15 AM to 12:50 AM with headways between 7 to 30 minutes. On Saturday, the route operates from 6:20 AM to 12:50 AM with headways approximately every 30 minutes. On Sunday, the route operates from 6:50 AM to 12:50 AM with headways approximately every 30 minutes; and
- **Route 202 (iXpress University)** travels between the Boardwalk and Conestoga Mall. This route operates Monday to Friday from 5:50 AM to 12:25 AM with headways between 10 to 30 minutes. On Saturday, the route operates from 6:15 AM to 12:40 AM with headways approximately every 30 minutes. On Sunday, the route operates from 7:15 AM to 12:40 AM with headways approximately every 30 minutes.

The closest transit stops to the subject site are located at the intersection of Columbia Street West and Albert Street approximately 110 m to 120 m (1-minute to 2-miunte walk) from the subject site.

Figure 2.5 illustrates the existing transit network.



NTS
Image Source: “Grand River Transit System Map,” Region of Waterloo, 2023, https://www.grt.ca/en/schedules-maps/resources/2023-system-map-for-website-routes.pdf.

paradigm TRANSPORTATION SOLUTIONS LIMITED

Transit Network

333 Albert Street, Waterloo TIS
230150

Figure 2.5

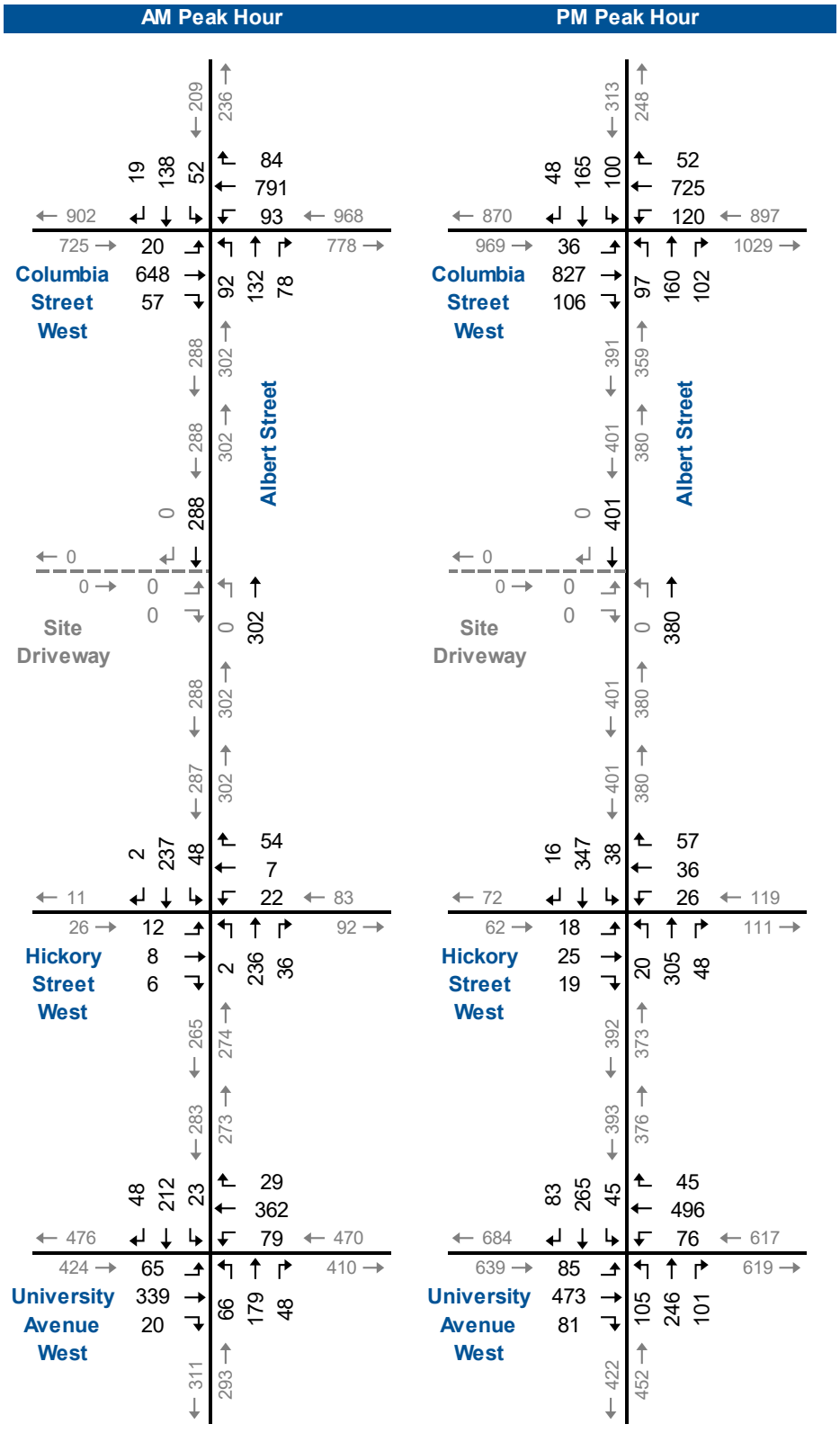
2.4 Traffic Volumes

Paradigm undertook turning movement counts at the study area intersections in March 2023.

Appendix B contains the observed traffic counts for the study area intersections.

Figure 2.6 illustrate the base year weekday AM and PM peak hour traffic volumes.





Base Year Traffic Volumes

333 Albert Street, Waterloo TIS
230150

Figure 2.6

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers 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 intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

The operations of the study intersections were evaluated using the existing lane configurations, traffic controls, and the base year traffic peak hour volumes.

The level of service conditions on the existing road network have been assessed using Synchro 11. As noted in the Region of Waterloo TIS guidelines[3], movements are considered critical under the following conditions:

- Estimated 95th percentile queue length for an exclusive movement exceeds the available storage space;
- Exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes;
- Estimated 95th percentile queue length for an individual movement will block an existing access; and
- The average control delay for individual movements is greater that 55 seconds.

Intersections are considered critical under the following conditions:

- An unsignalized intersection has an average control delay larger than 35 seconds (LOS E or F); and

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



- A signalized intersection has an average control delay larger than 55 seconds (LOS E or F).

Table 2.1 summarizes the existing intersection operations. The entries in the table indicating the AM and PM peak hour level of service (LOS), volume to capacity ratios (V/C), and 95th percentile queues experienced.

All study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hour with the following critical movements noted:

- The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
- The eastbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
- The westbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the PM peak hour; and
- The southbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the southbound left-turn lane during the AM and PM peak hours.

Appendix C contains the detailed Synchro reports.



TABLE 2.1: BASE YEAR 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 & Columbia Street West	TCS	LOS	B	C	C	**C**	B	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	18	24	24	**23**	17	24	24	**23**	21	24	>	**23**	21	24	>	**23**	**23**
			V/C	0.08	0.53	0.53		0.30	0.61	0.61		0.22	0.42	>		0.14	0.32	>		
			Q	2	28	28		4	34	34		6	17	>		3	11	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		31	-	-		19	-	>		27	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	<	B	>	**B**	<	B	>	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	<	15	>	**15**	<	13	>	**13**	8	0	0	**0**	8	0	0	**1**	
			V/C	<	0.07	>		<	0.15	>		0.00	0.00	0.00		0.04	0.00	0.00		
			Q	<	2	>		<	4	>		0	0	0		1	0	0		
	Albert Street & University Avenue West	TCS	LOS	B	B	B	**B**	B	B	B	**B**	C	C	>	**C**	C	B	B	**B**	**B**
			Delay	16	20	20	**19**	16	20	20	**19**	24	21	>	**22**	25	20	18	**20**	**20**
			V/C	0.15	0.27	0.27		0.18	0.29	0.29		0.16	0.36	>		0.06	0.28	0.09		
			Q	4	14	14		4	15	15		6	17	>		2	16	3		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	21	-	-		21	-	-		34	-	>		13	-	22		
PM Peak Hour	Albert Street & Columbia Street West	TCS	LOS	B	C	C	**C**	C	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	18	31	31	**30**	20	23	23	**23**	21	27	>	**26**	22	25	>	**24**	**26**
			V/C	0.13	0.72	0.72		0.47	0.56	0.56		0.26	0.55	>		0.30	0.43	>		
			Q	2	46	46		7	30	31		7	23	>		7	16	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		28	-	-		18	-	>		23	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	<	C	>	**C**	<	C	>	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	<	21	>	**21**	<	21	>	**21**	8	0	0	**0**	8	0	0	**1**	
			V/C	<	0.22	>		<	0.35	>		0.02	0.00	0.00		0.03	0.00	0.00		
			Q	<	6	>		<	12	>		1	0	0		1	0	0		
	Albert Street & University Avenue West	TCS	LOS	C	C	C	**C**	C	C	C	**C**	C	B	>	**C**	C	B	B	**B**	**C**
			Delay	23	30	32	**30**	24	30	30	**29**	23	20	>	**20**	26	17	16	**18**	**26**
			V/C	0.29	0.51	0.53		0.27	0.47	0.48		0.24	0.48	>		0.12	0.29	0.13		
			Q	8	35	32		7	32	32		10	28	>		4	19	5		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	17	-	-		18	-	-		30	-	>		11	-	20		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
< / > - Shared with through movement

3 Development Concept

3.1 Development Description

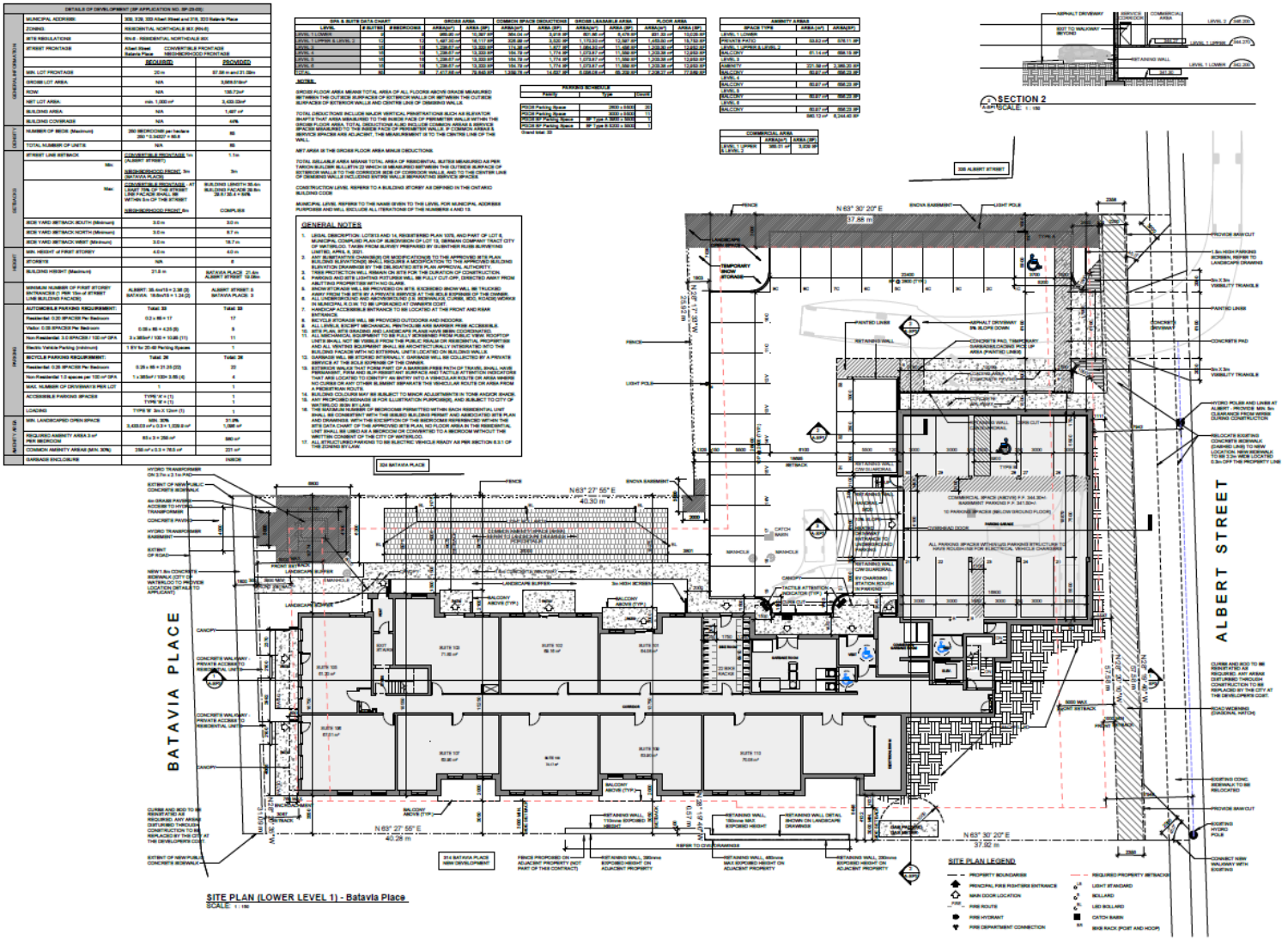
The subject site is located at 309, 329 & 333 Albert Street and 318 & 320 Batavia Place (330 Albert Street) in Waterloo, Ontario.

The subject site is proposed to be developed into a six-storey apartment building with 85, one-bedroom units and 365 m^2 of ground floor commercial space.

Vehicle access is proposed via a single all-moves access to Albert Street, north of Hickory Street West.

The full occupancy is assumed to occur by 2024.

Figure 3.1 shows the proposed development concept.



NTS

Concept Plan

333 Albert Street, Waterloo TIS
230150

Figure 3.1

3.2 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation manual[4] methods forecast site-generated trips. The following Land Use Codes (LUC) were used to estimate the site trip generation:

- LUC 221 (Multi-family Housing, Mid-Rise, Dense Multi-Use Urban, and Not Close to Rail Transit); and
- LUC 822 (Strip Retail Plaza, <40k).

Table 3.1 summarizes the forecast site-generated trips indicating 36 AM peak hour and 44 PM peak hour trips.

TABLE 3.1: FORECAST SITE-GENERATED TRIPS

Land Use	Units/GFA	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 221 - Multi-Family Housing (Mid-Rise)	85 Units	Eq	4	23	27	Eq	14	4	18
LUC 822 - Strip Retail Plaza (<40k)	3.93 ft^2/1000	Avg	6	3	9	Avg	13	13	26
Total Trip Generation			**10**	**26**	**36**		**27**	**17**	**44**

LUC 221 - AM: T = 0.25(X) + 5.35 | PM: T = 0.29(X) - 6.26
LUC 822 - AM: Average Rate = 2.36 | PM: Average Rate = 6.59

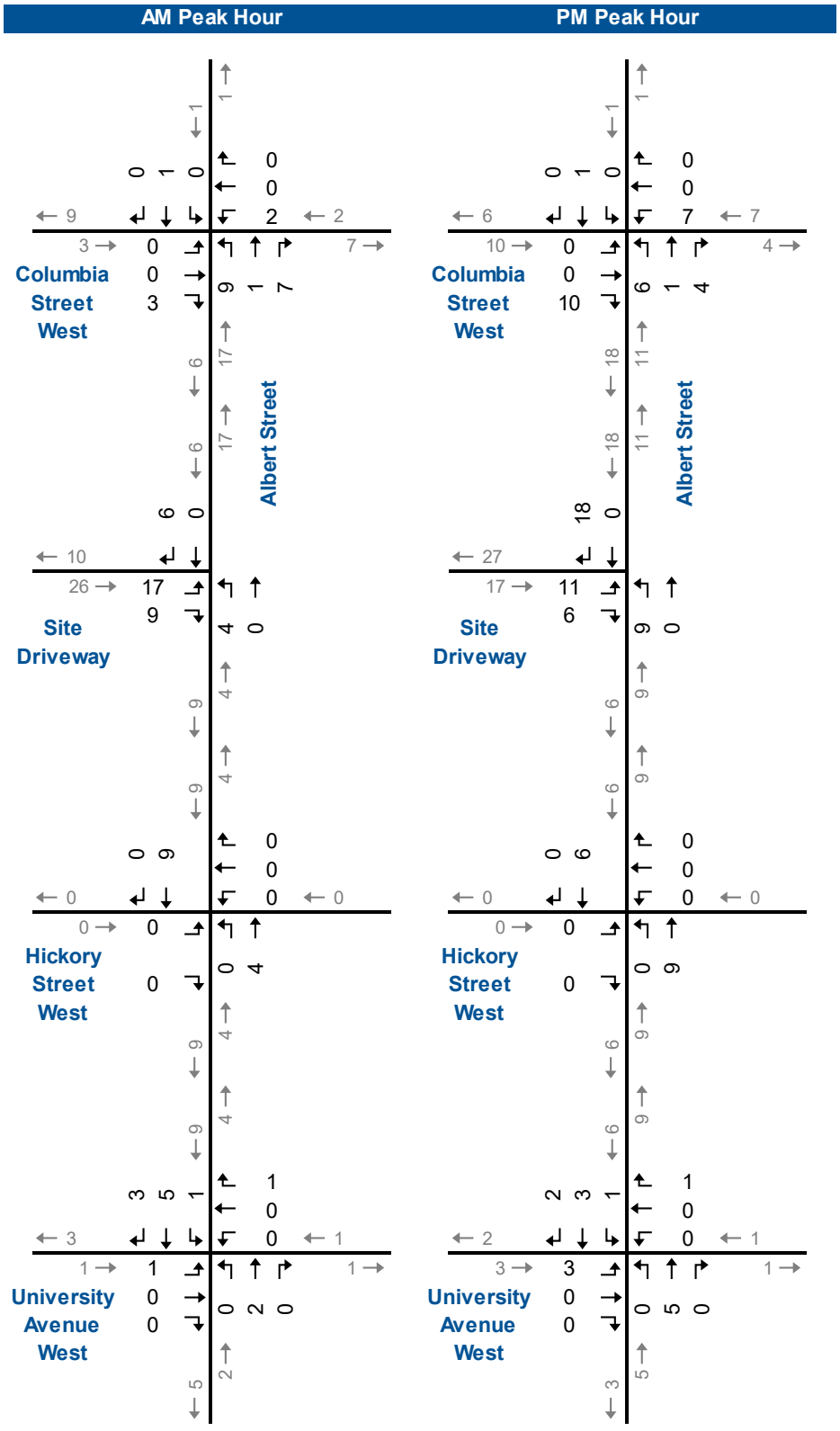
The trip assignment used for this study was based on the existing distribution and 2016 Transportation Tomorrow Survey (TTS) data[5]. The trip assignment is appropriate for this study because all travel directions head towards urbanized development. The trip assignment is shown in **Table 3.2.**

TABLE 3.2: TRIP ASSIGNMENT

Origin/Destination	In/Out
North via Albert Street	5%
South via Albert Street	20%
East via University Avenue West	5%
East via Columbia Street West	25%
West via University Avenue West	10%
West via Columbia Street West	35%
Total	**100%**

Figure 3.2 illustrates the AM and PM peak hour trip assignment.

[4] Institute of Transportation Engineers, *Trip Generation Manual,* 11th ed., (Washington DC: ITE, 2021).
[5] Data Management Group, *Transportation Tomorrow Survey 2016,* University of Toronto, 2016, http://www.transportationtomorrow.on.ca/



Site-Generated Traffic Volumes

333 Albert Street, Waterloo TIS
230150

Figure 3.2

4 Evaluation of Future Traffic Conditions

The assessment of the future traffic conditions contained in this section includes the future traffic forecasts as an intersection operational analysis. A five-year horizon following the anticipated full occupancy (2024) of the subject site has been assessed to determine the impact of the subject site.

The background traffic volumes reflect an annual growth rate of 2.0% per annum applied to the existing volumes.

In addition, the following developments were included in the background traffic volumes:

- 290-298 Hemlock Street[6]: The development is located east of the subject site in the northeast corner of the intersection of Hickory Street West and Hemlock Street. The development consists of 92 residential units and is forecast to generate 15 and 25 trips during the AM and PM peak hours, respectively.
- 314-316 Batavia Place and 295-297 Albert Street[7]: The development is located south of the subject site at the southern end of Batavia Place. The development consists of 100 residential units and is forecast to generate 13 and 28 trips during the AM and PM peak hours, respectively;
- 262-268, 274, 276, and 280 Albert Street[8]: The development is located south of the subject site in the southeast corner of the intersection of Albert Street and Hickory Street West. The development consists of 185 residential units and is forecast to generate 52 and 47 trips during the AM and PM peak hours, respectively. The Institute of Transportation Engineers (ITE) Trip Generation equation rates have been used to estimate the trip generation for the development. The trip assignment was based the trip assignment from **Section 3.2**; and
- 84, 86 Hickory Street West and 284, 286 Albert Street[9]: The development is located south of the subject site in the northeast corner of the intersection of Albert Street and Hickory Street. The development consists of 115 residential units and is

[6] Paradigm Transportation Solutions Limited, *290-298 Hemlock Waterloo, Ontario Transportation Impact Study,* (Cambridge: PTSL, 2021).

[7] Paradigm Transportation Solutions Limited, *314-316 Batavia Place Residential Development Waterloo, ON Transportation Impact Study,* (Cambridge: PTSL, 2020).

[8] "Current zone change applications:", City of Waterloo, https://city-of-waterloo.maps.arcgis.com/apps/dashboards/cd4e6c596406466994f23dd82439fc82.

[9] MHBC Planning Ltd, *Urban Design Brief: Proposed Residential Development – Updated March, 2019 84-86 Hickory Street West & 284-286 Albert Street, Waterloo,* (MHBC Planning Ltd, 2019).



forecast to generate 34 and 27 trips during the AM and PM peak hours, respectively. The Institute of Transportation Engineers (ITE) Trip Generation equation rates have been used to estimate the trip generation for the development. The trip assignment was based the trip assignment from **Section 3.2**.

Appendix D contains the background development traffic volumes.

Road improvements include Cycle lanes and a multi-use path running along Albert Street and Hickory Street West respectively and a conversion of Hickory Street West to a one-way street allowing westbound traffic only between Albert Street and Hazel Street[10]. Therefore, the following is assumed under future traffic conditions:

- Traffic entering Hickory Street West from Columbia Street West or Albert Street north of Columbia Street West use Hazel Street south of Columbia Street West;
- Traffic entering Hickory Street West from University Avenue West or Albert Street south of University Avenue West either use Hemlock Street or Hazel Street north of University Avenue West; and
- All previous eastbound through movements at the intersection of Albert Street and Hickory Street West are expected to travel along Albert Street, Columbia Street West, and Hazel Street to access Hickory Street West.

4.1 2029 Background Horizon

4.1.1 2029 Background Traffic Growth

Figure 4.1 illustrates the 2029 forecast background traffic volumes for the weekday AM and PM peak hours.

4.1.2 2029 Background Traffic Operations

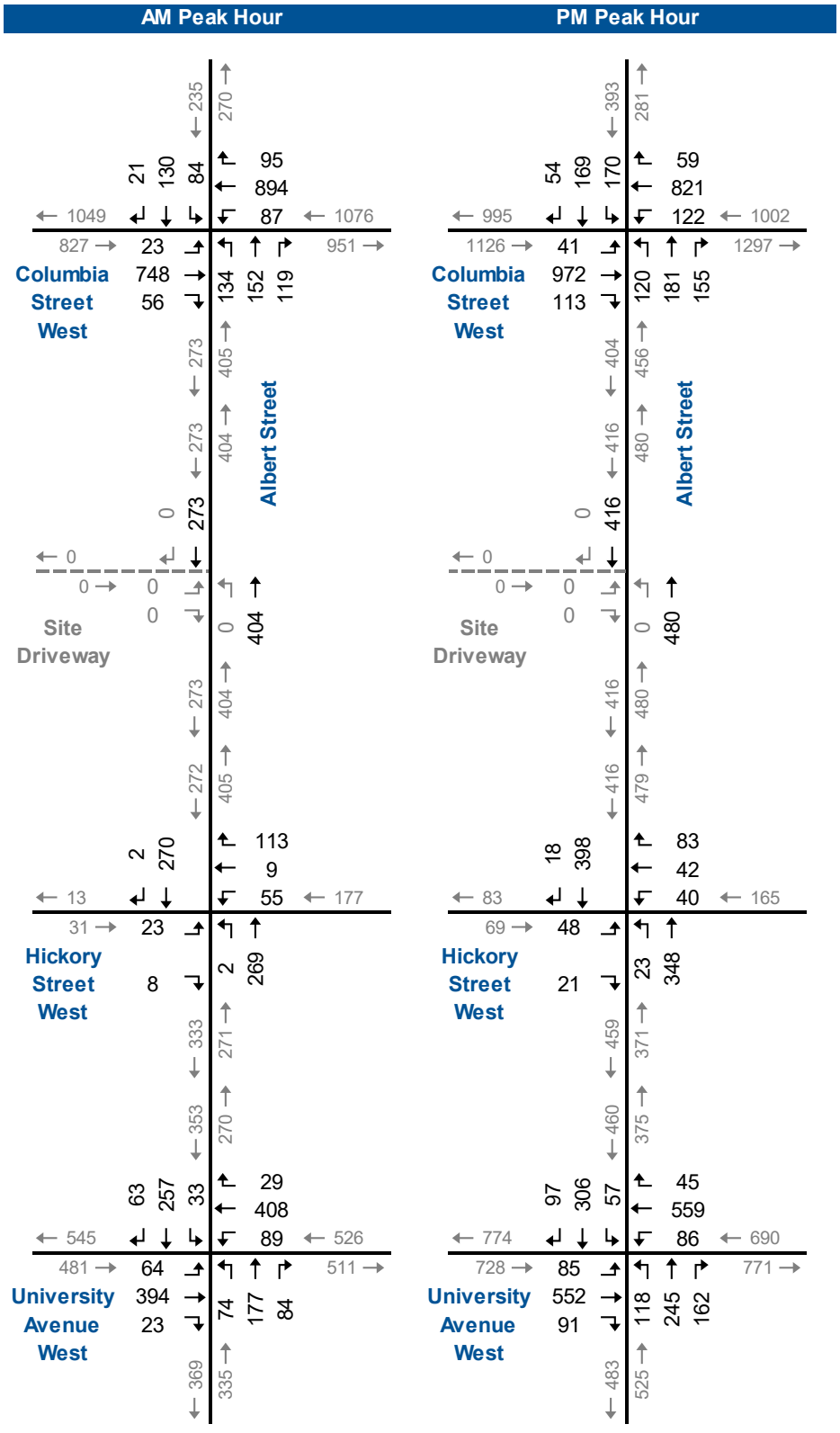
The study area intersection operations analysis for the forecast background traffic scenario followed the same methodology used for the existing traffic conditions. Although, the timing splits were optimized at all signalized intersections and no eastbound traffic is present on Hickory Street West between Albert Street and Hazel Street. **Table 4.1** details the level of service conditions.

[10] IBI Group, *Part A: Northdale Neighbourhood Streetscape Master Plan Class Environmental Assessment Schedule 'B',* (IBI Group, 2016).

All study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hour with the following critical movements noted:

- The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the AM and PM peak hours;
- The westbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the AM and PM peak hours;
- The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the northbound left-turn lane during the PM peak hour;
- The eastbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
- The westbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the PM peak hour; and
- The southbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the southbound left-turn lane during the AM and PM peak hours.

Appendix E contains the supporting detailed Synchro 11 reports.



2029 Background Traffic Volumes

333 Albert Street, Waterloo TIS
230150

Figure 4.1

TABLE 4.1: 2029 BACKGROUND 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 & Columbia Street West	TCS	LOS	B	C	C	**C**	B	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	19	25	25	**25**	18	27	27	**26**	22	27	>	**25**	22	24	>	**23**	**25**
			V/C	0.11	0.60	0.60		0.31	0.70	0.70		0.31	0.57	>		0.27	0.31	>		
			Q	2	33	34		4	42	43		10	25	>		5	11	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		31	-	-		15	-	>		25	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	C		>	**C**	<	B	>	**B**	A	A		**A**		A	A	**A**	
			Delay	15		>	**15**	<	14	>	**14**	8	0		**0**		0	0	**0**	
			V/C	0.08		>		<	0.30	>		0.00	0.00				0.00	0.00		
			Q	2		>		<	9	>		0	0				0	0		
	Albert Street & University Avenue West	TCS	LOS	B	C	C	**B**	B	C	C	**B**	C	C	>	**C**	C	C	B	**C**	**C**
			Delay	17	20	21	**20**	17	20	20	**20**	26	22	>	**23**	27	20	18	**21**	**21**
			V/C	0.16	0.31	0.32		0.21	0.32	0.33		0.20	0.42	>		0.09	0.34	0.12		
			Q	4	16	16		5	16	17		7	21	>		3	20	4		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	21	-	-		20	-	-		33	-	>		12	-	21		
PM Peak Hour	Albert Street & Columbia Street West	TCS	LOS	B	D	D	**C**	C	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	18	35	35	**35**	25	25	25	**25**	22	33	>	**30**	32	25	>	**28**	**30**
			V/C	0.16	0.82	0.82		0.58	0.64	0.64		0.33	0.71	>		0.64	0.45	>		
			Q	2	58	58		8	36	37		8	35	>		14	17	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		27	-	-		17	-	>		16	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	D		>	**D**	<	C	>	**C**	A	A		**A**		A	A	**A**	
			Delay	26		>	**26**	<	21	>	**21**	8	0		**0**		0	0	**0**	
			V/C	0.28		>		<	0.42	>		0.02	0.00				0.00	0.00		
			Q	8		>		<	15	>		1	0				0	0		
	Albert Street & University Avenue West	TCS	LOS	C	C	C	**C**	C	C	C	**C**	C	C	>	**C**	C	B	B	**B**	**C**
			Delay	24	33	34	**32**	24	31	32	**30**	24	22	>	**22**	30	18	16	**19**	**27**
			V/C	0.30	0.59	0.60		0.32	0.52	0.53		0.29	0.58	>		0.18	0.34	0.15		
			Q	8	43	40		8	37	36		11	35	>		7	22	6		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	17	-	-		17	-	-		29	-	>		8	-	19		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
< / > - Shared with through movement

4.2 2029 Total Traffic Horizon

4.2.1 2029 Total Traffic Volumes

Figure 4.2 illustrates the forecast 2029 total (background + site traffic) traffic volumes.

4.2.2 2029 Total Traffic Operations

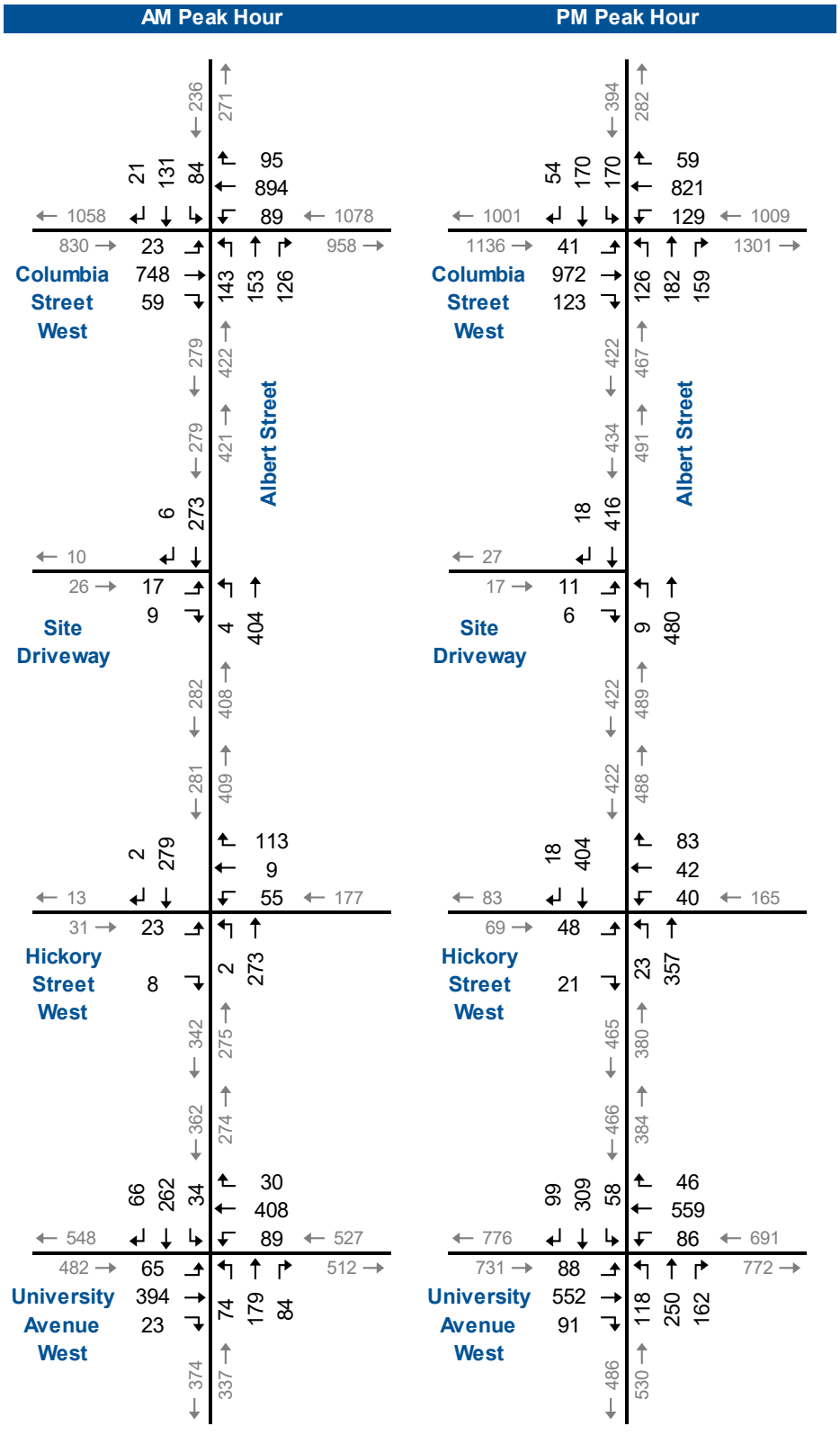
The study area intersection operations analysis for the future total traffic scenario followed the same methodology used for background traffic conditions. Although, the timing splits were optimized at all signalized intersections. **Table 4.2** details the level of service conditions for the weekday AM and PM peak hours.

All study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hour with the following critical movements noted:

- The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the AM and PM peak hours;
- The westbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the AM and PM peak hours;
- The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the northbound left-turn lane during the AM and PM peak hours;
- The eastbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
- The westbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the PM peak hour; and
- The southbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the southbound left-turn lane during the AM and PM peak hours.

With the addition of the site generated traffic volumes, the approach delays at the study area intersections increase by one second or less during the AM and PM peak hours.

Appendix F contains the supporting detailed Synchro 11 reports.



2029 Total Traffic Volumes

333 Albert Street, Waterloo TIS
230150

Figure 4.2

TABLE 4.2: 2029 TOTAL 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 & Columbia Street West	TCS	LOS	B	C	C	**C**	B	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	19	25	25	**25**	18	27	27	**26**	22	28	>	**26**	22	24	>	**23**	**26**
			V/C	0.11	0.60	0.60		0.32	0.70	0.70		0.34	0.59	>		0.28	0.31	>		
			Q	2	34	34		4	42	43		10	26	>		5	11	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		31	-	-		15	-	>		25	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	C		>	**C**	<	B	>	**B**	A	A		**A**		A	A	**A**	
			Delay	16		>	**16**	<	14	>	**14**	8	0		**0**		0	0	**0**	
			V/C	0.08		>		<	0.30	>		0.00	0.00				0.00	0.00		
			Q	2		>		<	10	>		0	0				0	0		
	Albert Street & University Avenue West	TCS	LOS	B	C	C	**B**	B	C	C	**B**	C	C	>	**C**	C	C	B	**C**	**C**
			Delay	17	20	21	**20**	17	20	20	**20**	26	22	>	**23**	27	20	18	**21**	**21**
			V/C	0.16	0.31	0.32		0.21	0.32	0.33		0.20	0.43	>		0.10	0.34	0.12		
			Q	4	16	16		5	16	17		7	21	>		3	20	4		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	21	-	-		20	-	-		33	-	>		12	-	21		
	Albert Street & Site Driveway	TWSC	LOS	B		>	**B**					A	A		**A**		A	A	**A**	
			Delay	13		>	**13**					8	0		**0**		0	0	**0**	
			V/C	0.06		>						0.00	0.00				0.00	0.00		
			Q	2		>						0	0				0	0		
PM Peak Hour	Albert Street & Columbia Street West	TCS	LOS	B	D	D	**D**	C	C	C	**C**	C	C	>	**C**	C	C	>	**C**	**C**
			Delay	18	36	36	**35**	26	25	25	**26**	22	33	>	**30**	33	26	>	**29**	**30**
			V/C	0.16	0.83	0.83		0.62	0.64	0.64		0.34	0.73	>		0.65	0.45	>		
			Q	2	59	60		9	36	37		9	37	>		14	17	>		
			Stor.	30	-	-		35	-	-		25	-	>		30	-	>		
			Avail.	28	-	-		26	-	-		16	-	>		16	-	>		
	Albert Street & Hickory Street West	TWSC	LOS	D		>	**D**	<	C	>	**C**	A	A		**A**		A	A	**A**	
			Delay	26		>	**26**	<	21	>	**21**	8	0		**0**		0	0	**0**	
			V/C	0.29		>		<	0.43	>		0.02	0.00				0.00	0.00		
			Q	9		>		<	16	>		1	0				0	0		
	Albert Street & University Avenue West	TCS	LOS	C	C	C	**C**	C	C	C	**C**	C	C	>	**C**	C	B	B	**B**	**C**
			Delay	24	33	34	**32**	24	31	32	**31**	25	22	>	**23**	31	18	16	**19**	**27**
			V/C	0.31	0.59	0.60		0.32	0.53	0.53		0.29	0.59	>		0.18	0.34	0.16		
			Q	8	43	40		8	38	37		11	36	>		7	22	7		
			Stor.	25	-	-		25	-	-		40	-	>		15	-	25		
			Avail.	17	-	-		17	-	-		29	-	>		8	-	18		
	Albert Street & Site Driveway	TWSC	LOS	C		>	**C**					A	A		**A**		A	A	**A**	
			Delay	15		>	**15**					8	0		**0**		0	0	**0**	
			V/C	0.05		>						0.01	0.00				0.00	0.00		
			Q	2		>						0	0				0	0		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
< / > - Shared with through movement

5 Remedial Measures

5.1 Critical Movements

Under existing and background traffic conditions, the eastbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks eastbound left-turn movement. To avoid blockage from the maximum eastbound through/right turn queue length of 59 m at the intersection of Columbia Street West and Albert Street under total traffic conditions, the eastbound left-turn lane should be extended to 65 m. Currently, a 30 m eastbound left-turn lane exists at the intersection of Columbia Street West and Albert Street.

Under background traffic conditions, the westbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks westbound left-turn movement. To avoid blockage from the maximum westbound through/right turn queue length of 42 m at the intersection of Columbia Street West and Albert Street under total traffic conditions, the westbound left-turn lane should be extended to 50 m. Currently, a 35 m westbound left-turn lane exists at the intersection of Columbia Street West and Albert Street.

Under background traffic conditions, the northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks northbound left-turn movement. To avoid blockage from the maximum northbound through/right turn queue length of 37 m at the intersection of Columbia Street West and Albert Street under total traffic conditions, the northbound left-turn lane should be extended to 45 m. Currently, a 25 m northbound left-turn lane exists at the intersection of Columbia Street West and Albert Street.

Under existing and background traffic conditions, the southbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks southbound left-turn movement. To avoid blockage from the maximum southbound through queue length of 22 m at the intersection of University Avenue West and Albert Street under total traffic conditions, the southbound left-turn lane should be extended to 30 m. Currently, a 15 m southbound left-turn lane exists at the intersection of University Avenue West and Albert Street.

5.2 Left-Turn Lanes

The intersection of Albert Street and the Site Driveway was assessed to determine if the projected traffic volumes warrant installation of a left-turn lane. The warrants for left-turn lanes follow the requirements in the Ministry of Transportation's (MTO) Geometric Design Standards[11]. A design speed of 60 km/h (10 km/h over the posted speed limit) was used for Albert Street.

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%.

Table 5.1 summarizes the left-turn lane warrant for the intersection of Albert Street and the Site Driveway. The warrant analysis suggests that a northbound left-turn lane is not warranted.

TABLE 5.1: LEFT-TURN LANE WARRANT SUMMARY – ALBERT STREET

Roadway	Albert Street	
Approach Direction	Northbound	
Design Speed	60 km/h	
Intersection	Site Driveway	
Horizon	2029 Total	
Peak Hour	AM	PM
Advancing Volume	408	489
Opposing Volume	279	434
Left Turning Traffic	4	9
% of Left Turning Traffic	1%	2%
Figure Used*	NA	NA
Warranted	No	No
Storage Length Required	-	-

*Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads,* (Toronto: Queens Printer for Ontario, 2020).

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

6 Conclusions and Recommendations

6.1 Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service with the following critical movements:
  - The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
  - The eastbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the PM peak hour;
  - The westbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the PM peak hour; and
  - The southbound through movement at University Avenue West and Albert Street is forecast to have a queue length that blocks the southbound left-turn lane during the AM and PM peak hours.
- **Development Trip Generation:** The development is forecast to generate approximately 36 and 44 trips during the AM and PM peak hours respectively.
- **2029 Background Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to existing traffic conditions with the following additional critical movements:
  - The eastbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the eastbound left-turn lane during the AM peak hour;
  - The westbound through movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the westbound left-turn lane during the AM and PM peak hours; and
  - The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue

length that blocks the northbound left-turn lane during the PM peak hour.

- **2029 Total Traffic Conditions:** The study area intersections are forecast to operate at acceptable levels of service similar to background traffic conditions with the following additional critical movement noted:
  - The northbound through/right-turn movement at Columbia Street West and Albert Street is forecast to have a queue length that blocks the northbound left-turn lane during the AM peak hour.

  The addition of the site generated traffic increases the approach delays at the study area intersections by one second or less during the AM and PM peak hours.

- **Remedial Measures:** A northbound left-turn lane at the intersection of Albert Street and the Site Driveway is not warranted under total traffic conditions.

6.2 Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval with no requirement for offsite transportation network improvements.

Based on background traffic conditions and unrelated to the development of the subject site, it is recommended that the City review the need to extend:

- The eastbound left-turn lane at the intersection of Columbia Street West and Albert Street from 30 m to 65 m;
- The westbound left-turn lane at the intersection of Columbia Street West and Albert Street from 35 m to 50 m;
- The northbound left-turn lane at the intersection of Columbia Street West and Albert Street from 25 m to 45 m;
- The southbound left-turn lane at the intersection of University Avenue West and Albert Street from 15 m to 30 m.

Appendix A

Pre-Study Material

From: Monirul Islam <MIslam@regionofwaterloo.ca>
Sent: March 20, 2023 2:16 PM
To: Erica Bayley
Cc: Andrew Orr
Subject: FW: Project 230150 333 Albert Street, Waterloo TIS
Attachments: 333 Albert_Site Plan.pdf

Hi Erica,

We don't see significant regional interests in being part of this TIS process.

Thanks for reaching out though!

Regards,

Monirul Islam, P.Eng.
Corridor Planning
Region of Waterloo | Planning, Development & Legislative Services
150 Frederick Street, Kitchener ON N2G 4J3
Cell: 226-753-1275
Please note that I am working from home due to COVID-19 and can be reached by email or on my cell.
Web: www.regionofwaterloo.ca

From: Erica Bayley <ebayley@ptsl.com>
Sent: March 14, 2023 10:46 AM
To: Monirul Islam <MIslam@regionofwaterloo.ca>
Cc: Andrew Orr <aorr@ptsl.com>
Subject: FW: Project 230150 333 Albert Street, Waterloo TIS

****EXTERNAL ALERT** This email originated from outside the Region of Waterloo.**

Hi Monirul – checking in to see if the Region is interested in being part of the TIS process for this development. It's on Albert street in Northdale but includes University and Columbia in study area.

Please let us know and if yes we will prepare the PSC form.
Thanks,

Erica Bayley, P.Eng.
Senior Project Manager, Associate
(She/Her)

Paradigm Transportation Solutions Limited
p: 519.896.3163 x202
m: 519.635.5349

From: Andrew Orr <aorr@ptsl.com>
Sent: Monday, March 13, 2023 2:03 PM
To: Ainsley Rego <Ainsley.Rego@waterloo.ca>

Cc: Erica Bayley <ebayley@ptsl.com>
Subject: Project 230150 333 Albert Street, Waterloo TIS

Hello Ainsley,

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study for a proposed development located at 333 Albert Street in Waterloo, Ontario. The subject site is proposed to be developed into a six-storey apartment building with 85, one-bedroom units and 400 square metres of ground floor commercial space (subject to final plans). Vehicle access is proposed via a single all-moves access to Albert Street, north of Hickory Street West (prelim concept attached).

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

PROPOSED TERMS OF REFERENCE

Study Area Intersections:
- Columbia Street West and Albert Street (Signalized);
- Albert Street and Hickory Street West (Unsignalized); and
- University Avenue West and Albert Street (Signalized).

Analysis Periods:
- Weekday AM peak hour
- Weekday PM peak hour

Existing Data:
- Existing 8-hour TMC data for the above noted intersections
- To be collected by Paradigm in March 2023

Horizon Year
- Five-years from the date of full occupancy (TBD)

Analysis
- Synchro 11, HCM 6 analysis

Background Traffic
- Background traffic annual growth rate **Please confirm**
- Other approved developments to include in background. **Please confirm**

Future Road Improvements:
- **Please confirm**

Trip Generation
- ITE Trip Generation Data 11th Edition with no modal split reductions.

Site Traffic Distribution
- Existing Traffic Patterns and Transportation Tomorrow Survey (TTS) Data.

Best Regards,

Andrew Orr, M.A.Sc., EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x210
m: 289-808-8997
e: aorr@ptsl.com
w: www.ptsl.com



This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

From: Ainsley Rego <Ainsley.Rego@waterloo.ca>
Sent: March 14, 2023 10:02 AM
To: Andrew Orr
Cc: Erica Bayley
Subject: RE: Project 230150 333 Albert Street, Waterloo TIS

Good morning Andrew,

Thank you for reaching out regarding the scope of work. Please see my response to your questions below in red.

Let me know if you have any questions or concerns.

Best Regards,

Ainsley Rego, BES (she/her)
Junior Transportation Project Coordinator
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

Upcoming vacation: March 20 - 24

From: Andrew Orr <aorr@ptsl.com>
Sent: March 13, 2023 2:03 PM
To: Ainsley Rego <Ainsley.Rego@waterloo.ca>
Cc: Erica Bayley <ebayley@ptsl.com>
Subject: [EXTERNAL] Project 230150 333 Albert Street, Waterloo TIS

Hello Ainsley,

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study for a proposed development located at 333 Albert Street in Waterloo, Ontario. The subject site is proposed to be developed into a six-storey apartment building with 85, one-bedroom units and 400 square metres of ground floor commercial space (subject to final plans). Vehicle access is proposed via a single all-moves access to Albert Street, north of Hickory Street West (prelim concept attached).

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

PROPOSED TERMS OF REFERENCE

Study Area Intersections:

- Columbia Street West and Albert Street (Signalized);
- Albert Street and Hickory Street West (Unsignalized); and
- University Avenue West and Albert Street (Signalized).

Analysis Periods:

- Weekday AM peak hour
- Weekday PM peak hour

Existing Data:

- Existing 8-hour TMC data for the above noted intersections
- To be collected by Paradigm in March 2023

Horizon Year

- Five-years from the date of full occupancy (TBD)

Analysis

- Synchro 11, HCM 6 analysis

Background Traffic

- Background traffic annual growth rate **Please use a 2% growth rate in Northdale.**
- Other approved developments to include in background. **Please visit the zone change website.**

Future Road Improvements:

- **Please review the Northdale Neighbourhood Study for future road improvements.**

Trip Generation

- ITE Trip Generation Data 11th Edition with no modal split reductions.

Site Traffic Distribution

- Existing Traffic Patterns and Transportation Tomorrow Survey (TTS) Data.

Best Regards,

Andrew Orr, M.A.Sc., EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 519.896.3163 x210
m: 289-808-8997
e: aorr@ptsl.com
w: www.ptsl.com



This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

Appendix B

Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023

Turning Movement Data

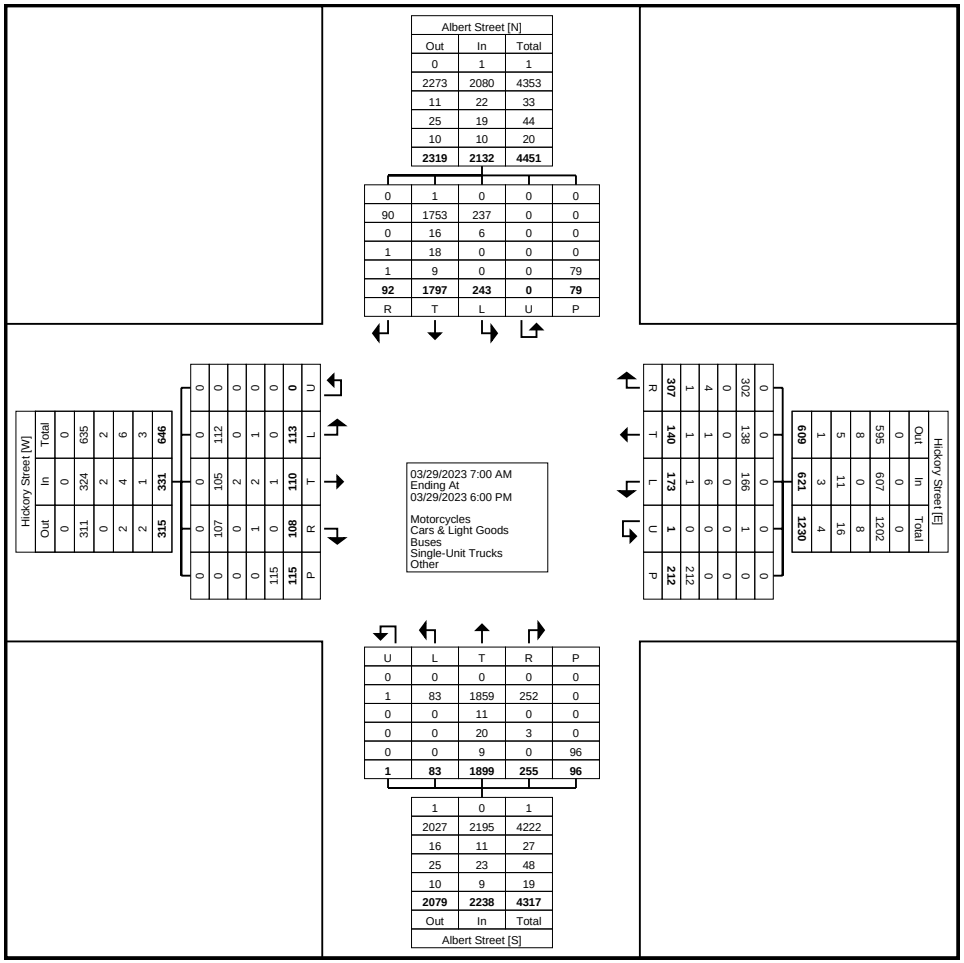
Start Time	Hickory Street Eastbound						Hickory Street Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	2	0	0	0	2	1	2	3	0	1	6	0	23	1	0	1	24	1	23	0	0	0	24	56
7:15 AM	0	2	2	0	0	4	0	2	0	0	1	2	0	21	1	0	2	22	3	20	2	0	0	25	53
7:30 AM	1	1	2	0	0	4	3	2	1	0	4	6	0	38	3	0	0	41	5	26	0	0	2	31	82
7:45 AM	1	4	3	0	3	8	3	3	8	0	3	14	0	66	9	0	2	75	6	49	1	0	3	56	153
Hourly Total	2	9	7	0	3	18	7	9	12	0	9	28	0	148	14	0	5	162	15	118	3	0	5	136	344
8:00 AM	3	2	1	0	7	6	6	2	30	0	8	38	1	45	20	0	3	66	22	64	1	0	4	87	197
8:15 AM	4	3	2	0	5	9	6	1	13	1	7	21	0	64	8	0	1	72	8	60	0	0	3	68	170
8:30 AM	2	1	1	0	2	4	4	2	4	0	2	10	1	57	3	0	0	61	6	57	0	0	2	63	138
8:45 AM	3	2	2	0	3	7	5	2	7	0	4	14	0	70	5	0	4	75	12	56	1	0	2	69	165
Hourly Total	12	8	6	0	17	26	21	7	54	1	21	83	2	236	36	0	8	274	48	237	2	0	11	287	670
9:00 AM	1	2	2	0	4	5	2	2	9	0	4	13	3	68	4	0	3	75	1	33	2	0	5	36	129
9:15 AM	4	3	3	0	0	10	4	0	6	0	3	10	1	58	7	0	2	66	2	46	5	0	1	53	139
9:30 AM	3	0	2	0	4	5	5	2	5	0	6	12	1	46	9	1	1	57	11	45	2	0	3	58	132
9:45 AM	1	0	6	0	3	7	8	1	5	0	9	14	2	44	4	0	4	50	9	35	2	0	2	46	117
Hourly Total	9	5	13	0	11	27	19	5	25	0	22	49	7	216	24	1	10	248	23	159	11	0	11	193	517
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	6	4	5	0	3	15	2	2	10	0	3	14	3	53	11	0	5	67	4	55	1	0	3	60	156
11:45 AM	5	6	3	0	0	14	6	3	9	0	8	18	1	57	8	0	3	66	15	51	5	0	3	71	169
Hourly Total	11	10	8	0	3	29	8	5	19	0	11	32	4	110	19	0	8	133	19	106	6	0	6	131	325
12:00 PM	6	1	4	0	8	11	6	7	7	0	4	20	3	53	8	0	0	64	7	60	4	0	1	71	166
12:15 PM	3	4	4	0	2	11	4	5	10	0	5	19	7	69	4	0	2	80	8	52	3	0	2	63	173
12:30 PM	7	2	4	0	5	13	4	6	5	0	7	15	4	41	8	0	0	53	8	62	5	0	0	75	156
12:45 PM	2	3	4	0	10	9	6	7	13	0	11	26	1	77	8	0	8	86	4	62	3	0	1	69	190
Hourly Total	18	10	16	0	25	44	20	25	35	0	27	80	15	240	28	0	10	283	27	236	15	0	4	278	685
1:00 PM	8	3	4	0	2	15	8	3	9	0	7	20	2	66	10	0	1	78	6	49	3	0	2	58	171
1:15 PM	4	4	4	0	5	12	8	6	14	0	5	28	3	49	8	0	6	60	7	56	2	0	1	65	165
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	12	7	8	0	7	27	16	9	23	0	12	48	5	115	18	0	7	138	13	105	5	0	3	123	336
3:00 PM	5	7	2	0	1	14	6	9	10	0	9	25	4	61	11	0	2	76	7	58	2	0	0	67	182
3:15 PM	7	3	1	0	2	11	4	5	8	0	6	17	5	49	7	0	7	61	6	53	6	0	0	65	154
3:30 PM	4	4	4	0	5	12	5	4	7	0	12	16	3	61	8	0	3	72	8	57	1	0	3	66	166
3:45 PM	3	8	5	0	6	16	12	5	15	0	17	32	0	70	13	0	4	83	9	59	9	0	4	77	208
Hourly Total	19	22	12	0	14	53	27	23	40	0	44	90	12	241	39	0	16	292	30	227	18	0	7	275	710
4:00 PM	1	1	7	0	3	9	9	5	10	0	7	24	3	81	8	0	2	92	9	54	5	0	2	68	193
4:15 PM	6	4	3	0	6	13	9	6	12	0	7	27	2	73	9	0	3	84	9	68	3	0	11	80	204

4:30 PM	3	4	4	0	1	11	4	4	12	0	9	20	6	74	7	0	9	87	5	69	5	0	2	79	197
4:45 PM	2	5	5	0	2	12	7	6	8	0	3	21	7	60	5	0	0	72	7	71	3	0	3	81	186
Hourly Total	12	14	19	0	12	45	29	21	42	0	26	92	18	288	29	0	14	335	30	262	16	0	18	308	780
5:00 PM	4	6	5	0	3	15	6	8	13	0	9	27	3	89	13	0	1	105	9	91	2	0	3	102	249
5:15 PM	5	8	3	0	10	16	6	13	21	0	13	40	6	72	12	0	5	90	12	100	7	0	1	119	265
5:30 PM	3	7	4	0	6	14	6	11	14	0	5	31	5	76	14	0	6	95	8	77	2	0	8	87	227
5:45 PM	6	4	7	0	4	17	8	4	9	0	13	21	6	68	9	0	6	83	9	79	5	0	2	93	214
Hourly Total	18	25	19	0	23	62	26	36	57	0	40	119	20	305	48	0	18	373	38	347	16	0	14	401	955
Grand Total	113	110	108	0	115	331	173	140	307	1	212	621	83	1899	255	1	96	2238	243	1797	92	0	79	2132	5322
Approach %	34.1	33.2	32.6	0.0	-	-	27.9	22.5	49.4	0.2	-	-	3.7	84.9	11.4	0.0	-	-	11.4	84.3	4.3	0.0	-	-	-
Total %	2.1	2.1	2.0	0.0	-	6.2	3.3	2.6	5.8	0.0	-	11.7	1.6	35.7	4.8	0.0	-	42.1	4.6	33.8	1.7	0.0	-	40.1	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	-	0.0	0.0
Cars & Light Goods	112	105	107	0	-	324	166	138	302	1	-	607	83	1859	252	1	-	2195	237	1753	90	0	-	2080	5206
% Cars & Light Goods	99.1	95.5	99.1	-	-	97.9	96.0	98.6	98.4	100.0	-	97.7	100.0	97.9	98.8	100.0	-	98.1	97.5	97.6	97.8	-	-	97.6	97.8
Buses	0	2	0	0	-	2	0	0	0	0	-	0	0	11	0	0	-	11	6	16	0	0	-	22	35
% Buses	0.0	1.8	0.0	-	-	0.6	0.0	0.0	0.0	0.0	-	0.0	0.0	0.6	0.0	0.0	-	0.5	2.5	0.9	0.0	-	-	1.0	0.7
Single-Unit Trucks	1	2	1	0	-	4	6	1	4	0	-	11	0	20	3	0	-	23	0	18	1	0	-	19	57
% Single-Unit Trucks	0.9	1.8	0.9	-	-	1.2	3.5	0.7	1.3	0.0	-	1.8	0.0	1.1	1.2	0.0	-	1.0	0.0	1.0	1.1	-	-	0.9	1.1
Articulated Trucks	0	0	0	0	-	0	1	0	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.6	0.0	0.0	0.0	-	0.2	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	1	0	0	-	1	0	1	1	0	-	2	0	8	0	0	-	8	0	9	1	0	-	10	21
% Bicycles on Road	0.0	0.9	0.0	-	-	0.3	0.0	0.7	0.3	0.0	-	0.3	0.0	0.4	0.0	0.0	-	0.4	0.0	0.5	1.1	-	-	0.5	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	1.9	-	-	-	-	-	0.0	-	-	-	-	-	2.5	-	-
Pedestrians	-	-	-	-	115	-	-	-	-	-	208	-	-	-	-	-	96	-	-	-	-	-	77	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	98.1	-	-	-	-	-	100.0	-	-	-	-	-	97.5	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023

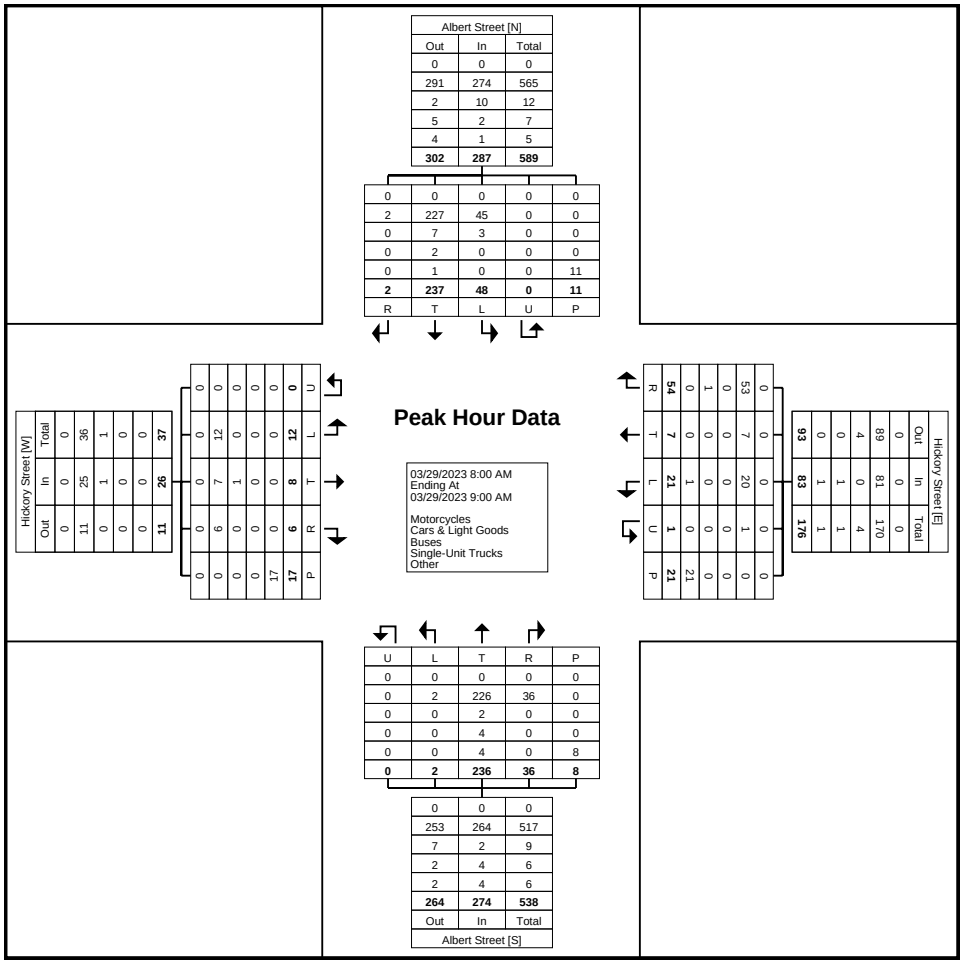
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Hickory Street Eastbound						Hickory Street Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	3	2	1	0	7	6	6	2	30	0	8	38	1	45	20	0	3	66	22	64	1	0	4	87	197
8:15 AM	4	3	2	0	5	9	6	1	13	1	7	21	0	64	8	0	1	72	8	60	0	0	3	68	170
8:30 AM	2	1	1	0	2	4	4	2	4	0	2	10	1	57	3	0	0	61	6	57	0	0	2	63	138
8:45 AM	3	2	2	0	3	7	5	2	7	0	4	14	0	70	5	0	4	75	12	56	1	0	2	69	165
Total	12	8	6	0	17	26	21	7	54	1	21	83	2	236	36	0	8	274	48	237	2	0	11	287	670
Approach %	46.2	30.8	23.1	0.0	-	-	25.3	8.4	65.1	1.2	-	-	0.7	86.1	13.1	0.0	-	-	16.7	82.6	0.7	0.0	-	-	-
Total %	1.8	1.2	0.9	0.0	-	3.9	3.1	1.0	8.1	0.1	-	12.4	0.3	35.2	5.4	0.0	-	40.9	7.2	35.4	0.3	0.0	-	42.8	-
PHF	0.750	0.667	0.750	0.000	-	0.722	0.875	0.875	0.450	0.250	-	0.546	0.500	0.843	0.450	0.000	-	0.913	0.545	0.926	0.500	0.000	-	0.825	0.850
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	12	7	6	0	-	25	20	7	53	1	-	81	2	226	36	0	-	264	45	227	2	0	-	274	644
% Cars & Light Goods	100.0	87.5	100.0	-	-	96.2	95.2	100.0	98.1	100.0	-	97.6	100.0	95.8	100.0	-	-	96.4	93.8	95.8	100.0	-	-	95.5	96.1
Buses	0	1	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	3	7	0	0	-	10	13
% Buses	0.0	12.5	0.0	-	-	3.8	0.0	0.0	0.0	0.0	-	0.0	0.0	0.8	0.0	-	-	0.7	6.3	3.0	0.0	-	-	3.5	1.9
Single-Unit Trucks	0	0	0	0	-	0	0	0	1	0	-	1	0	4	0	0	-	4	0	2	0	0	-	2	7
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.9	0.0	-	1.2	0.0	1.7	0.0	-	-	1.5	0.0	0.8	0.0	-	-	0.7	1.0
Articulated Trucks	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	4.8	0.0	0.0	0.0	-	1.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	4	0	0	-	4	0	1	0	0	-	1	5
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	1.7	0.0	-	-	1.5	0.0	0.4	0.0	-	-	0.3	0.7
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	17	-	-	-	-	-	21	-	-	-	-	-	8	-	-	-	-	-	11	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023

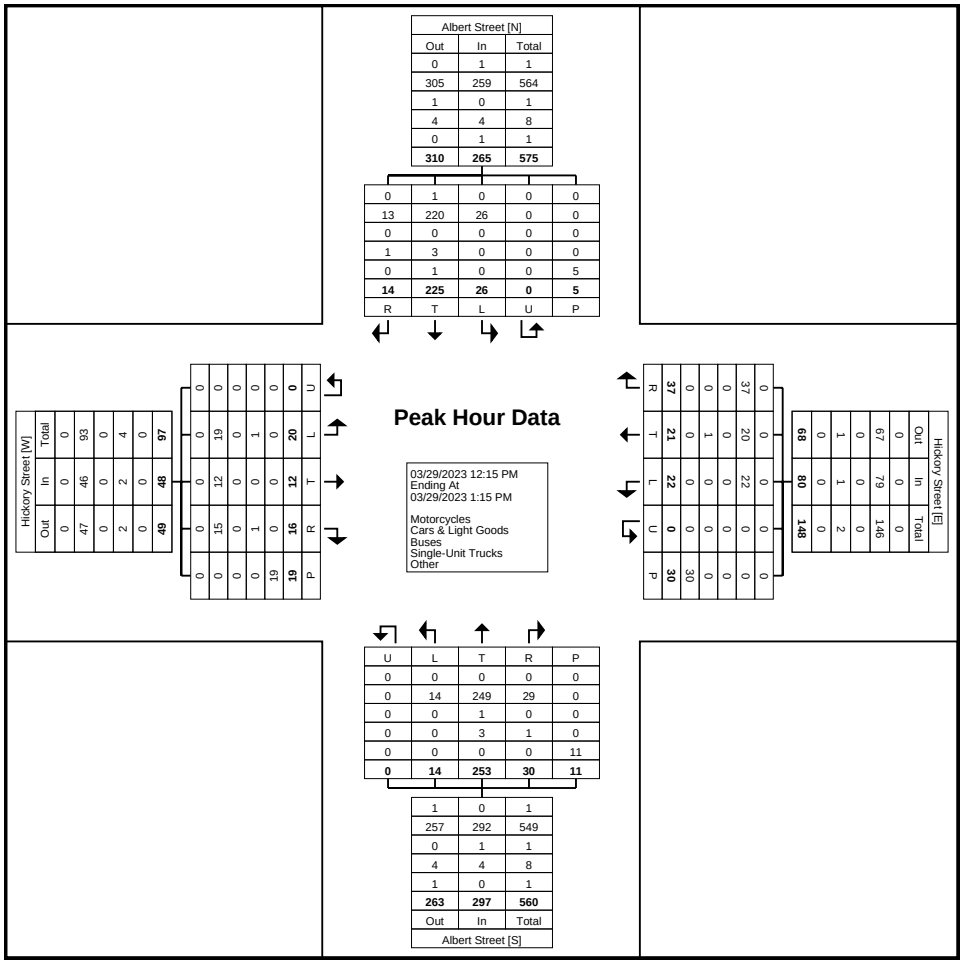
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Hickory Street Eastbound						Hickory Street Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:15 PM	3	4	4	0	2	11	4	5	10	0	5	19	7	69	4	0	2	80	8	52	3	0	2	63	173
12:30 PM	7	2	4	0	5	13	4	6	5	0	7	15	4	41	8	0	0	53	8	62	5	0	0	75	156
12:45 PM	2	3	4	0	10	9	6	7	13	0	11	26	1	77	8	0	8	86	4	62	3	0	1	69	190
1:00 PM	8	3	4	0	2	15	8	3	9	0	7	20	2	66	10	0	1	78	6	49	3	0	2	58	171
Total	20	12	16	0	19	48	22	21	37	0	30	80	14	253	30	0	11	297	26	225	14	0	5	265	690
Approach %	41.7	25.0	33.3	0.0	-	-	27.5	26.3	46.3	0.0	-	-	4.7	85.2	10.1	0.0	-	-	9.8	84.9	5.3	0.0	-	-	-
Total %	2.9	1.7	2.3	0.0	-	7.0	3.2	3.0	5.4	0.0	-	11.6	2.0	36.7	4.3	0.0	-	43.0	3.8	32.6	2.0	0.0	-	38.4	-
PHF	0.625	0.750	1.000	0.000	-	0.800	0.688	0.750	0.712	0.000	-	0.769	0.500	0.821	0.750	0.000	-	0.863	0.813	0.907	0.700	0.000	-	0.883	0.908
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.4	0.1
Cars & Light Goods	19	12	15	0	-	46	22	20	37	0	-	79	14	249	29	0	-	292	26	220	13	0	-	259	676
% Cars & Light Goods	95.0	100.0	93.8	-	-	95.8	100.0	95.2	100.0	-	-	98.8	100.0	98.4	96.7	-	-	98.3	100.0	97.8	92.9	-	-	97.7	98.0
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.1
Single-Unit Trucks	1	0	1	0	-	2	0	1	0	0	-	1	0	3	1	0	-	4	0	3	1	0	-	4	11
% Single-Unit Trucks	5.0	0.0	6.3	-	-	4.2	0.0	4.8	0.0	-	-	1.3	0.0	1.2	3.3	-	-	1.3	0.0	1.3	7.1	-	-	1.5	1.6
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.4	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	3.3	-	-	-	-	-	0.0	-	-	-	-	-	20.0	-	-
Pedestrians	-	-	-	-	19	-	-	-	-	-	29	-	-	-	-	-	11	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	96.7	-	-	-	-	-	100.0	-	-	-	-	-	80.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023

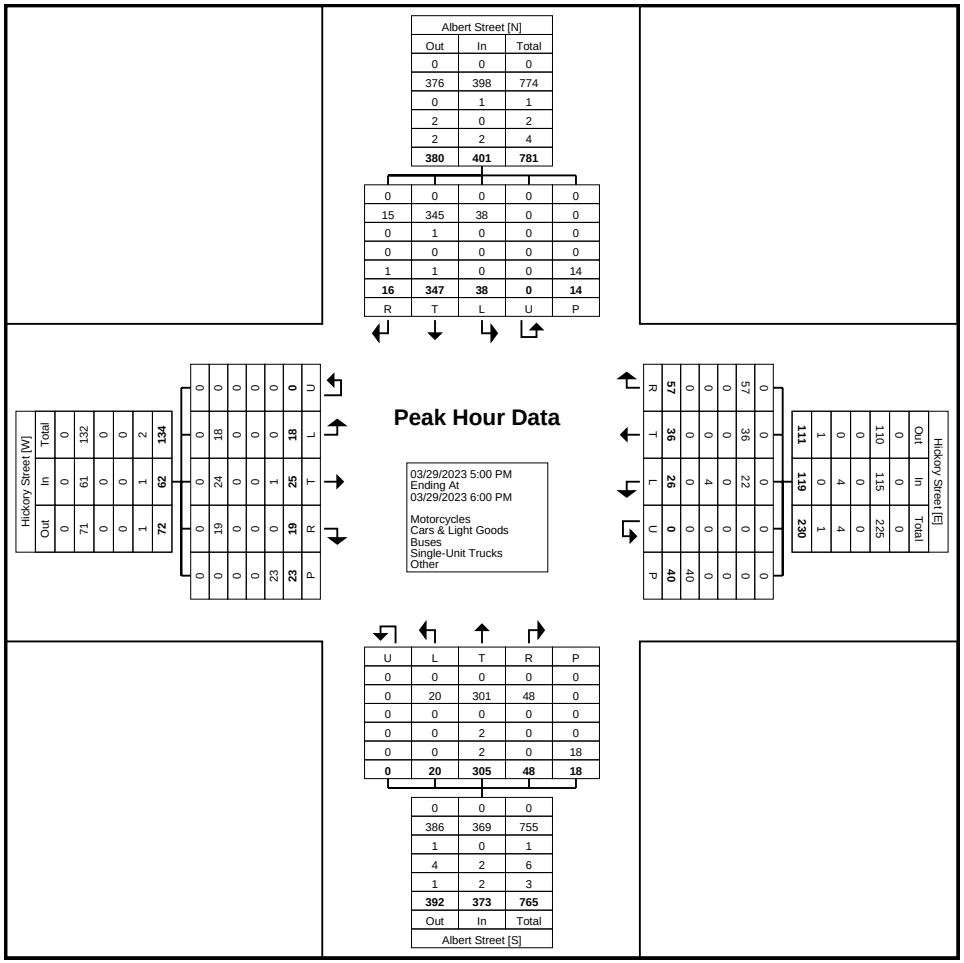
Turning Movement Peak Hour Data (5:00 PM)

Start Time	Hickory Street Eastbound						Hickory Street Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
5:00 PM	4	6	5	0	3	15	6	8	13	0	9	27	3	89	13	0	1	105	9	91	2	0	3	102	249
5:15 PM	5	8	3	0	10	16	6	13	21	0	13	40	6	72	12	0	5	90	12	100	7	0	1	119	265
5:30 PM	3	7	4	0	6	14	6	11	14	0	5	31	5	76	14	0	6	95	8	77	2	0	8	87	227
5:45 PM	6	4	7	0	4	17	8	4	9	0	13	21	6	68	9	0	6	83	9	79	5	0	2	93	214
Total	18	25	19	0	23	62	26	36	57	0	40	119	20	305	48	0	18	373	38	347	16	0	14	401	955
Approach %	29.0	40.3	30.6	0.0	-	-	21.8	30.3	47.9	0.0	-	-	5.4	81.8	12.9	0.0	-	-	9.5	86.5	4.0	0.0	-	-	-
Total %	1.9	2.6	2.0	0.0	-	6.5	2.7	3.8	6.0	0.0	-	12.5	2.1	31.9	5.0	0.0	-	39.1	4.0	36.3	1.7	0.0	-	42.0	-
PHF	0.750	0.781	0.679	0.000	-	0.912	0.813	0.692	0.679	0.000	-	0.744	0.833	0.857	0.857	0.000	-	0.888	0.792	0.868	0.571	0.000	-	0.842	0.901
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	18	24	19	0	-	61	22	36	57	0	-	115	20	301	48	0	-	369	38	345	15	0	-	398	943
% Cars & Light Goods	100.0	96.0	100.0	-	-	98.4	84.6	100.0	100.0	-	-	96.6	100.0	98.7	100.0	-	-	98.9	100.0	99.4	93.8	-	-	99.3	98.7
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.1
Single-Unit Trucks	0	0	0	0	-	0	4	0	0	0	-	4	0	2	0	0	-	2	0	0	0	0	-	0	6
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	15.4	0.0	0.0	-	-	3.4	0.0	0.7	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.6
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	0	1	1	0	-	2	5
% Bicycles on Road	0.0	4.0	0.0	-	-	1.6	0.0	0.0	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.5	0.0	0.3	6.3	-	-	0.5	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	23	-	-	-	-	-	40	-	-	-	-	-	18	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Albert Street & Hickory Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Peak Hour Data Plot (5:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

Turning Movement Data

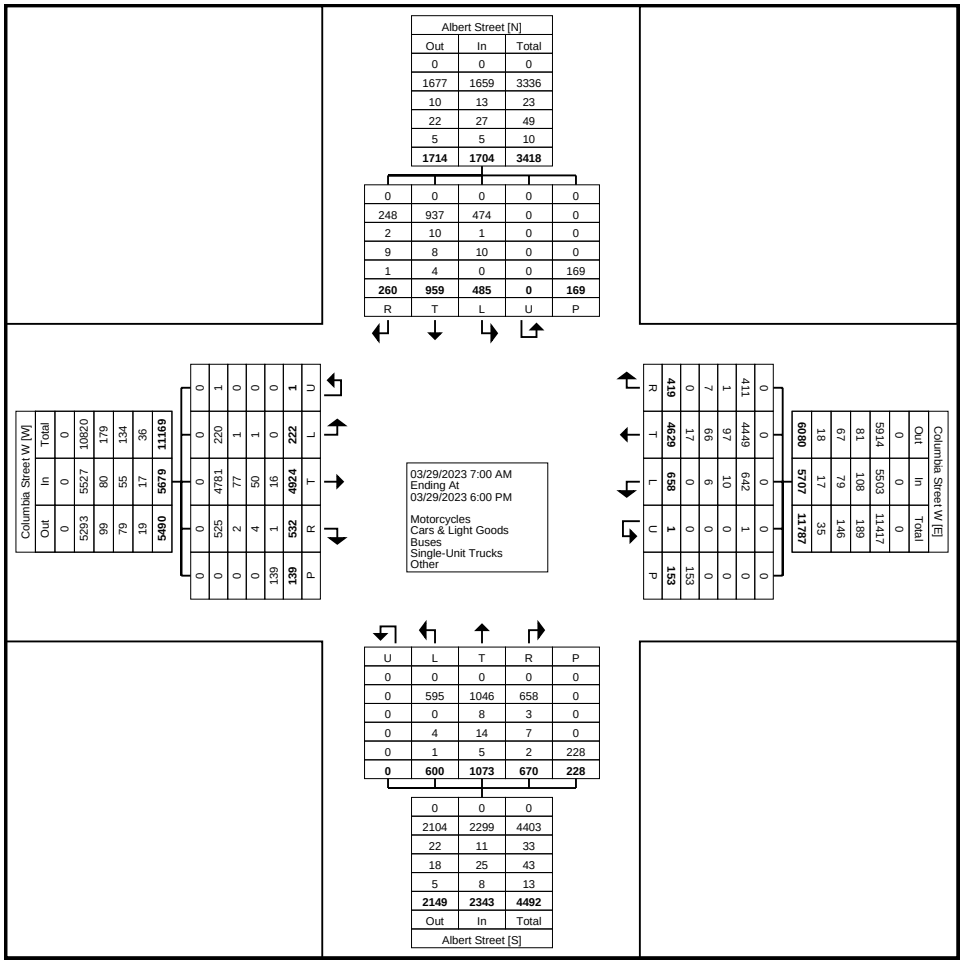
Start Time	Columbia Street W Eastbound						Columbia Street W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	4	69	7	0	0	80	6	66	5	0	1	77	6	15	7	0	1	28	5	13	0	0	0	18	203
7:15 AM	0	81	5	0	3	86	6	68	4	0	1	78	6	9	9	0	2	24	9	13	4	0	1	26	214
7:30 AM	6	104	6	0	1	116	5	99	14	0	1	118	11	12	18	0	3	41	9	21	2	0	2	32	307
7:45 AM	8	157	12	0	3	177	21	151	23	0	3	195	21	29	23	0	8	73	18	22	4	0	3	44	489
Hourly Total	18	411	30	0	7	459	38	384	46	0	6	468	44	65	57	0	14	166	41	69	10	0	6	120	1213
8:00 AM	2	151	19	0	4	172	25	182	25	0	8	232	32	34	16	0	11	82	14	43	1	0	5	58	544
8:15 AM	5	140	13	0	6	158	30	235	13	0	10	278	19	38	18	0	7	75	8	25	10	0	6	43	554
8:30 AM	9	178	10	0	4	197	16	180	23	0	4	219	15	30	23	0	9	68	14	37	4	0	7	55	539
8:45 AM	3	179	15	1	1	198	22	194	23	0	4	239	26	30	21	0	4	77	16	33	4	0	7	53	567
Hourly Total	19	648	57	1	15	725	93	791	84	0	26	968	92	132	78	0	31	302	52	138	19	0	25	209	2204
9:00 AM	2	127	4	0	0	133	15	139	13	0	3	167	24	39	16	0	8	79	4	12	5	0	5	21	400
9:15 AM	4	124	6	0	5	134	19	143	10	0	3	172	19	32	19	0	8	70	5	26	12	0	1	43	419
9:30 AM	7	122	10	0	4	139	21	130	12	0	8	163	17	35	11	0	10	63	14	23	6	0	12	43	408
9:45 AM	7	115	10	0	5	132	12	109	11	0	6	132	10	26	15	0	4	51	7	24	7	0	7	38	353
Hourly Total	20	488	30	0	14	538	67	521	46	0	20	634	70	132	61	0	30	263	30	85	30	0	25	145	1580
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	6	155	16	0	1	177	15	133	8	0	4	156	18	38	22	0	12	78	10	32	12	0	5	54	465
11:45 AM	10	130	20	0	5	160	28	107	10	0	3	145	16	32	20	0	4	68	10	25	10	0	6	45	418
Hourly Total	16	285	36	0	6	337	43	240	18	0	7	301	34	70	42	0	16	146	20	57	22	0	11	99	883
12:00 PM	4	122	14	0	7	140	20	119	17	0	6	156	13	32	22	0	7	67	16	38	9	0	3	63	426
12:15 PM	10	131	13	0	3	154	21	126	20	0	4	167	16	43	23	0	6	82	12	31	8	0	9	51	454
12:30 PM	10	155	27	0	3	192	21	136	9	0	5	166	17	24	24	0	13	65	18	34	7	0	6	59	482
12:45 PM	6	146	14	0	5	166	25	134	21	0	6	180	21	51	21	0	8	93	21	35	10	0	5	66	505
Hourly Total	30	554	68	0	18	652	87	515	67	0	21	669	67	150	90	0	34	307	67	138	34	0	23	239	1867
1:00 PM	11	137	12	0	7	160	18	129	12	0	3	159	24	35	25	0	10	84	16	30	13	0	6	59	462
1:15 PM	8	130	12	0	10	150	16	140	21	0	4	177	21	38	18	0	5	77	9	35	6	0	5	50	454
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	19	267	24	0	17	310	34	269	33	0	7	336	45	73	43	0	15	161	25	65	19	0	11	109	916
3:00 PM	7	204	27	0	3	238	19	139	8	0	6	166	14	40	24	0	5	78	29	31	10	0	6	70	552
3:15 PM	6	124	17	0	2	147	17	126	3	0	2	146	14	27	22	0	4	63	21	29	6	0	6	56	412
3:30 PM	7	200	19	0	1	226	21	159	5	0	10	185	19	25	27	0	13	71	14	28	8	0	8	50	532
3:45 PM	9	190	27	0	4	226	18	131	3	0	5	152	22	34	27	0	5	83	13	30	14	0	5	57	518
Hourly Total	29	718	90	0	10	837	75	555	19	0	23	649	69	126	100	0	27	295	77	118	38	0	25	233	2014
4:00 PM	6	197	27	0	6	230	13	170	11	0	1	194	19	44	28	0	8	91	16	26	7	0	9	49	564
4:15 PM	9	179	20	0	6	208	32	158	7	0	3	197	21	45	23	0	7	89	27	29	11	0	7	67	561

4:30 PM	9	184	17	0	5	210	25	145	23	1	5	194	24	37	26	0	2	87	16	36	11	0	4	63	554
4:45 PM	5	201	22	0	5	228	20	182	11	0	1	213	22	35	19	0	10	76	30	36	16	0	7	82	599
Hourly Total	29	761	86	0	22	876	90	655	52	1	10	798	86	161	96	0	27	343	89	127	45	0	27	261	2278
5:00 PM	11	229	31	0	5	271	29	156	11	0	2	196	23	46	24	0	6	93	26	45	3	0	3	74	634
5:15 PM	12	215	26	0	6	253	42	196	15	0	13	253	28	45	27	0	8	100	23	51	18	0	1	92	698
5:30 PM	8	182	27	0	12	217	29	191	15	0	7	235	24	34	32	0	11	90	21	33	11	0	4	65	607
5:45 PM	11	166	27	0	7	204	31	156	13	0	11	200	18	39	20	0	9	77	14	33	11	0	8	58	539
Hourly Total	42	792	111	0	30	945	131	699	54	0	33	884	93	164	103	0	34	360	84	162	43	0	16	289	2478
Grand Total	222	4924	532	1	139	5679	658	4629	419	1	153	5707	600	1073	670	0	228	2343	485	959	260	0	169	1704	15433
Approach %	3.9	86.7	9.4	0.0	-	-	11.5	81.1	7.3	0.0	-	-	25.6	45.8	28.6	0.0	-	-	28.5	56.3	15.3	0.0	-	-	-
Total %	1.4	31.9	3.4	0.0	-	36.8	4.3	30.0	2.7	0.0	-	37.0	3.9	7.0	4.3	0.0	-	15.2	3.1	6.2	1.7	0.0	-	11.0	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	220	4781	525	1	-	5527	642	4449	411	1	-	5503	595	1046	658	0	-	2299	474	937	248	0	-	1659	14988
% Cars & Light Goods	99.1	97.1	98.7	100.0	-	97.3	97.6	96.1	98.1	100.0	-	96.4	99.2	97.5	98.2	-	-	98.1	97.7	97.7	95.4	-	-	97.4	97.1
Buses	1	77	2	0	-	80	10	97	1	0	-	108	0	8	3	0	-	11	1	10	2	0	-	13	212
% Buses	0.5	1.6	0.4	0.0	-	1.4	1.5	2.1	0.2	0.0	-	1.9	0.0	0.7	0.4	-	-	0.5	0.2	1.0	0.8	-	-	0.8	1.4
Single-Unit Trucks	1	50	4	0	-	55	6	66	7	0	-	79	4	14	7	0	-	25	10	8	9	0	-	27	186
% Single-Unit Trucks	0.5	1.0	0.8	0.0	-	1.0	0.9	1.4	1.7	0.0	-	1.4	0.7	1.3	1.0	-	-	1.1	2.1	0.8	3.5	-	-	1.6	1.2
Articulated Trucks	0	12	0	0	-	12	0	13	0	0	-	13	0	1	0	0	-	1	0	0	0	0	-	0	26
% Articulated Trucks	0.0	0.2	0.0	0.0	-	0.2	0.0	0.3	0.0	0.0	-	0.2	0.0	0.1	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	0	4	1	0	-	5	0	4	0	0	-	4	1	4	2	0	-	7	0	4	1	0	-	5	21
% Bicycles on Road	0.0	0.1	0.2	0.0	-	0.1	0.0	0.1	0.0	0.0	-	0.1	0.2	0.4	0.3	-	-	0.3	0.0	0.4	0.4	-	-	0.3	0.1
Bicycles on Crosswalk	-	-	-	-	3	-	-	-	-	-	6	-	-	-	-	-	8	-	-	-	-	-	8	-	-
% Bicycles on Crosswalk	-	-	-	-	2.2	-	-	-	-	-	3.9	-	-	-	-	-	3.5	-	-	-	-	-	4.7	-	-
Pedestrians	-	-	-	-	136	-	-	-	-	-	147	-	-	-	-	-	220	-	-	-	-	-	161	-	-
% Pedestrians	-	-	-	-	97.8	-	-	-	-	-	96.1	-	-	-	-	-	96.5	-	-	-	-	-	95.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

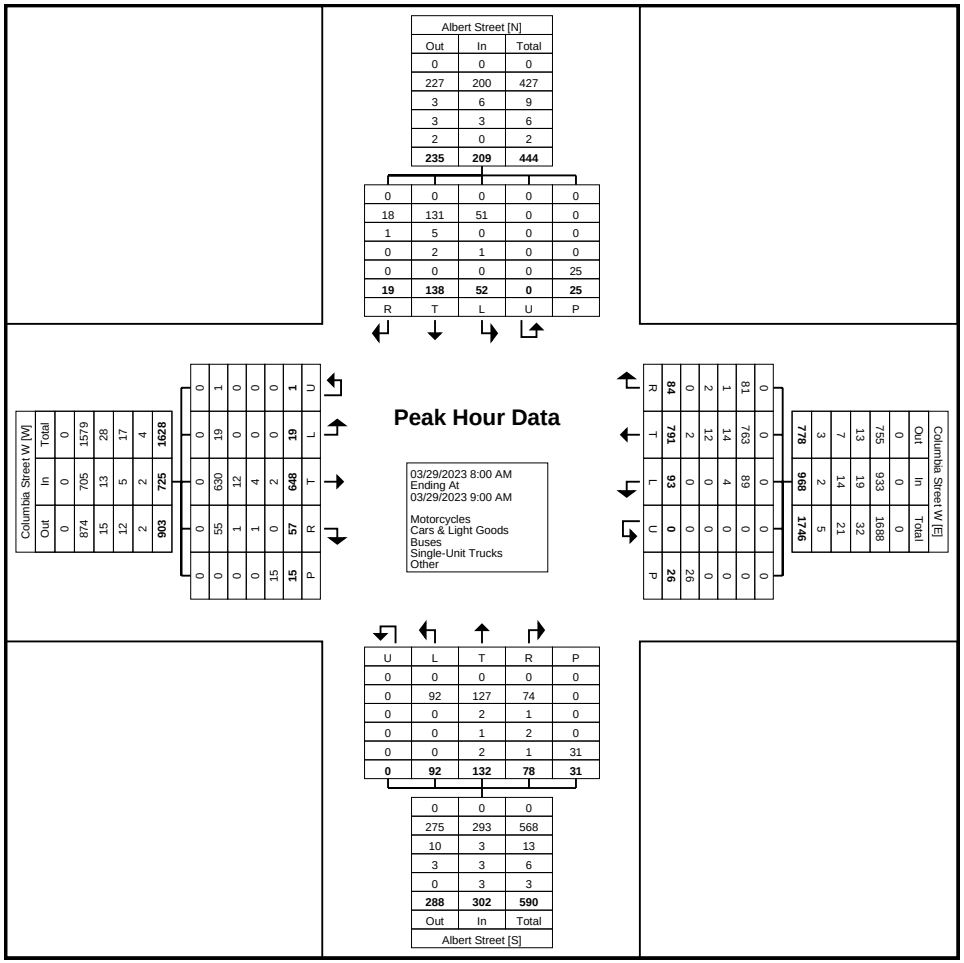
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Columbia Street W Eastbound						Columbia Street W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	2	151	19	0	4	172	25	182	25	0	8	232	32	34	16	0	11	82	14	43	1	0	5	58	544
8:15 AM	5	140	13	0	6	158	30	235	13	0	10	278	19	38	18	0	7	75	8	25	10	0	6	43	554
8:30 AM	9	178	10	0	4	197	16	180	23	0	4	219	15	30	23	0	9	68	14	37	4	0	7	55	539
8:45 AM	3	179	15	1	1	198	22	194	23	0	4	239	26	30	21	0	4	77	16	33	4	0	7	53	567
Total	19	648	57	1	15	725	93	791	84	0	26	968	92	132	78	0	31	302	52	138	19	0	25	209	2204
Approach %	2.6	89.4	7.9	0.1	-	-	9.6	81.7	8.7	0.0	-	-	30.5	43.7	25.8	0.0	-	-	24.9	66.0	9.1	0.0	-	-	-
Total %	0.9	29.4	2.6	0.0	-	32.9	4.2	35.9	3.8	0.0	-	43.9	4.2	6.0	3.5	0.0	-	13.7	2.4	6.3	0.9	0.0	-	9.5	-
PHF	0.528	0.905	0.750	0.250	-	0.915	0.775	0.841	0.840	0.000	-	0.871	0.719	0.868	0.848	0.000	-	0.921	0.813	0.802	0.475	0.000	-	0.901	0.972
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	19	630	55	1	-	705	89	763	81	0	-	933	92	127	74	0	-	293	51	131	18	0	-	200	2131
% Cars & Light Goods	100.0	97.2	96.5	100.0	-	97.2	95.7	96.5	96.4	-	-	96.4	100.0	96.2	94.9	-	-	97.0	98.1	94.9	94.7	-	-	95.7	96.7
Buses	0	12	1	0	-	13	4	14	1	0	-	19	0	2	1	0	-	3	0	5	1	0	-	6	41
% Buses	0.0	1.9	1.8	0.0	-	1.8	4.3	1.8	1.2	-	-	2.0	0.0	1.5	1.3	-	-	1.0	0.0	3.6	5.3	-	-	2.9	1.9
Single-Unit Trucks	0	4	1	0	-	5	0	12	2	0	-	14	0	1	2	0	-	3	1	2	0	0	-	3	25
% Single-Unit Trucks	0.0	0.6	1.8	0.0	-	0.7	0.0	1.5	2.4	-	-	1.4	0.0	0.8	2.6	-	-	1.0	1.9	1.4	0.0	-	-	1.4	1.1
Articulated Trucks	0	2	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	3
% Articulated Trucks	0.0	0.3	0.0	0.0	-	0.3	0.0	0.1	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	2	1	0	-	3	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	1.5	1.3	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	4.0	-	-
Pedestrians	-	-	-	-	15	-	-	-	-	-	26	-	-	-	-	-	31	-	-	-	-	-	24	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	96.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

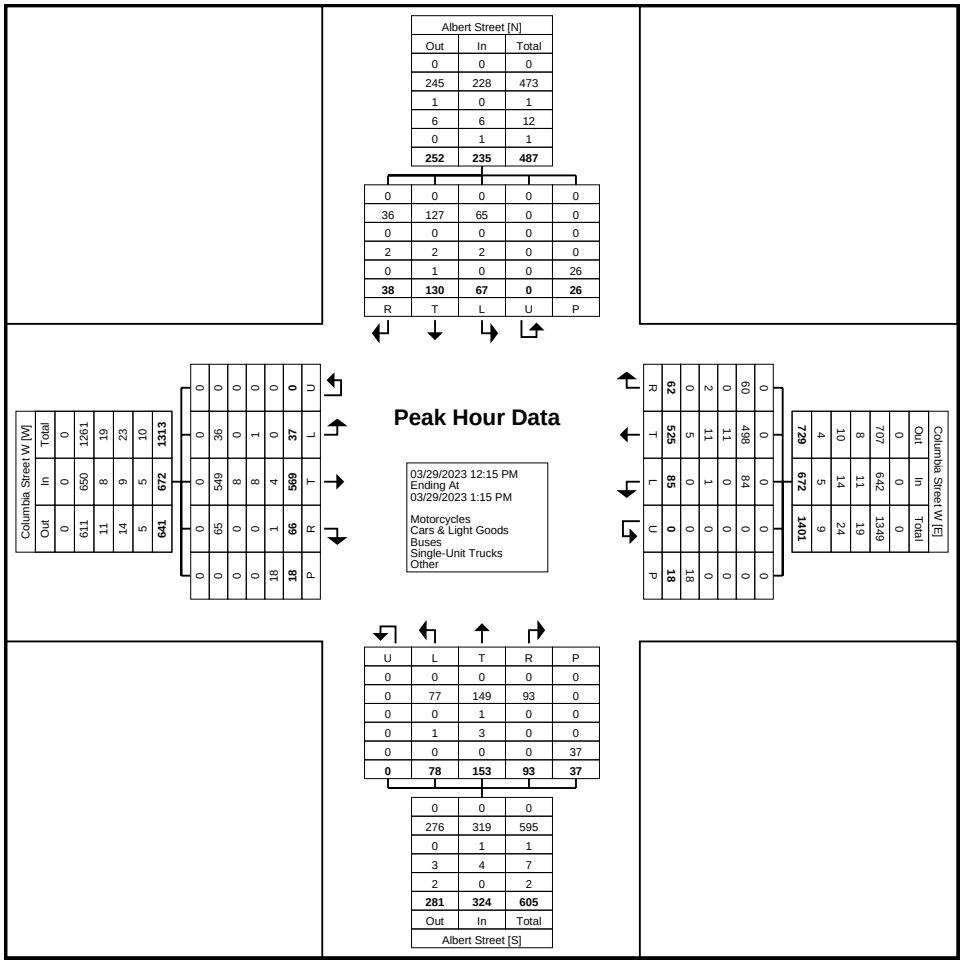
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Columbia Street W Eastbound						Columbia Street W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:15 PM	10	131	13	0	3	154	21	126	20	0	4	167	16	43	23	0	6	82	12	31	8	0	9	51	454
12:30 PM	10	155	27	0	3	192	21	136	9	0	5	166	17	24	24	0	13	65	18	34	7	0	6	59	482
12:45 PM	6	146	14	0	5	166	25	134	21	0	6	180	21	51	21	0	8	93	21	35	10	0	5	66	505
1:00 PM	11	137	12	0	7	160	18	129	12	0	3	159	24	35	25	0	10	84	16	30	13	0	6	59	462
Total	37	569	66	0	18	672	85	525	62	0	18	672	78	153	93	0	37	324	67	130	38	0	26	235	1903
Approach %	5.5	84.7	9.8	0.0	-	-	12.6	78.1	9.2	0.0	-	-	24.1	47.2	28.7	0.0	-	-	28.5	55.3	16.2	0.0	-	-	-
Total %	1.9	29.9	3.5	0.0	-	35.3	4.5	27.6	3.3	0.0	-	35.3	4.1	8.0	4.9	0.0	-	17.0	3.5	6.8	2.0	0.0	-	12.3	-
PHF	0.841	0.918	0.611	0.000	-	0.875	0.850	0.965	0.738	0.000	-	0.933	0.813	0.750	0.930	0.000	-	0.871	0.798	0.929	0.731	0.000	-	0.890	0.942
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	36	549	65	0	-	650	84	498	60	0	-	642	77	149	93	0	-	319	65	127	36	0	-	228	1839
% Cars & Light Goods	97.3	96.5	98.5	-	-	96.7	98.8	94.9	96.8	-	-	95.5	98.7	97.4	100.0	-	-	98.5	97.0	97.7	94.7	-	-	97.0	96.6
Buses	0	8	0	0	-	8	0	11	0	0	-	11	0	1	0	0	-	1	0	0	0	0	-	0	20
% Buses	0.0	1.4	0.0	-	-	1.2	0.0	2.1	0.0	-	-	1.6	0.0	0.7	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	1.1
Single-Unit Trucks	1	8	0	0	-	9	1	11	2	0	-	14	1	3	0	0	-	4	2	2	2	0	-	6	33
% Single-Unit Trucks	2.7	1.4	0.0	-	-	1.3	1.2	2.1	3.2	-	-	2.1	1.3	2.0	0.0	-	-	1.2	3.0	1.5	5.3	-	-	2.6	1.7
Articulated Trucks	0	3	0	0	-	3	0	4	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	7
% Articulated Trucks	0.0	0.5	0.0	-	-	0.4	0.0	0.8	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4
Bicycles on Road	0	1	1	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	4
% Bicycles on Road	0.0	0.2	1.5	-	-	0.3	0.0	0.2	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.4	0.2
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	11.1	-	-	-	-	-	5.6	-	-	-	-	-	2.7	-	-	-	-	-	7.7	-	-
Pedestrians	-	-	-	-	16	-	-	-	-	-	17	-	-	-	-	-	36	-	-	-	-	-	24	-	-
% Pedestrians	-	-	-	-	88.9	-	-	-	-	-	94.4	-	-	-	-	-	97.3	-	-	-	-	-	92.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

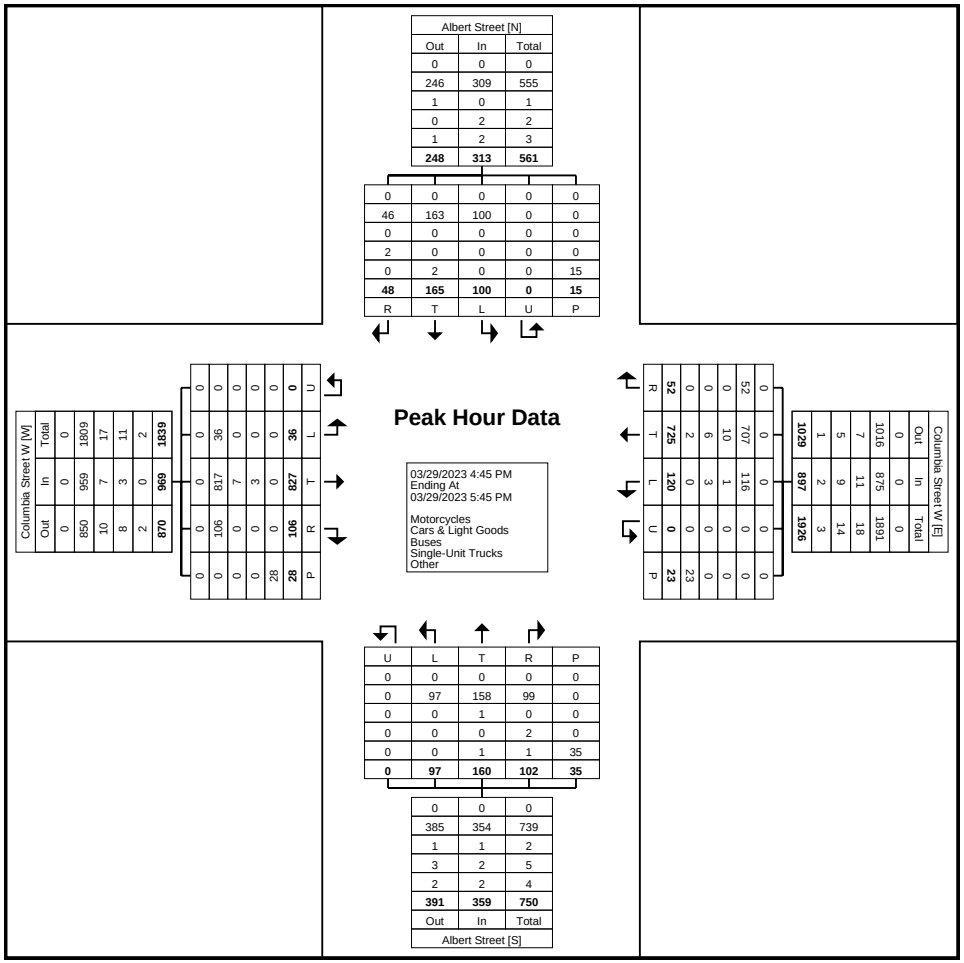
Turning Movement Peak Hour Data (4:45 PM)

Start Time	Columbia Street W Eastbound						Columbia Street W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:45 PM	5	201	22	0	5	228	20	182	11	0	1	213	22	35	19	0	10	76	30	36	16	0	7	82	599
5:00 PM	11	229	31	0	5	271	29	156	11	0	2	196	23	46	24	0	6	93	26	45	3	0	3	74	634
5:15 PM	12	215	26	0	6	253	42	196	15	0	13	253	28	45	27	0	8	100	23	51	18	0	1	92	698
5:30 PM	8	182	27	0	12	217	29	191	15	0	7	235	24	34	32	0	11	90	21	33	11	0	4	65	607
Total	36	827	106	0	28	969	120	725	52	0	23	897	97	160	102	0	35	359	100	165	48	0	15	313	2538
Approach %	3.7	85.3	10.9	0.0	-	-	13.4	80.8	5.8	0.0	-	-	27.0	44.6	28.4	0.0	-	-	31.9	52.7	15.3	0.0	-	-	-
Total %	1.4	32.6	4.2	0.0	-	38.2	4.7	28.6	2.0	0.0	-	35.3	3.8	6.3	4.0	0.0	-	14.1	3.9	6.5	1.9	0.0	-	12.3	-
PHF	0.750	0.903	0.855	0.000	-	0.894	0.714	0.925	0.867	0.000	-	0.886	0.866	0.870	0.797	0.000	-	0.898	0.833	0.809	0.667	0.000	-	0.851	0.909
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	36	817	106	0	-	959	116	707	52	0	-	875	97	158	99	0	-	354	100	163	46	0	-	309	2497
% Cars & Light Goods	100.0	98.8	100.0	-	-	99.0	96.7	97.5	100.0	-	-	97.5	100.0	98.8	97.1	-	-	98.6	100.0	98.8	95.8	-	-	98.7	98.4
Buses	0	7	0	0	-	7	1	10	0	0	-	11	0	1	0	0	-	1	0	0	0	0	-	0	19
% Buses	0.0	0.8	0.0	-	-	0.7	0.8	1.4	0.0	-	-	1.2	0.0	0.6	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.7
Single-Unit Trucks	0	3	0	0	-	3	3	6	0	0	-	9	0	0	2	0	-	2	0	0	2	0	-	2	16
% Single-Unit Trucks	0.0	0.4	0.0	-	-	0.3	2.5	0.8	0.0	-	-	1.0	0.0	0.0	2.0	-	-	0.6	0.0	0.0	4.2	-	-	0.6	0.6
Articulated Trucks	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	1	0	-	2	0	2	0	0	-	2	4
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.6	1.0	-	-	0.6	0.0	1.2	0.0	-	-	0.6	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	8.7	-	-	-	-	-	5.7	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	28	-	-	-	-	-	21	-	-	-	-	-	33	-	-	-	-	-	15	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	91.3	-	-	-	-	-	94.3	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Columbia Street W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Peak Hour Data Plot (4:45 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

Turning Movement Data

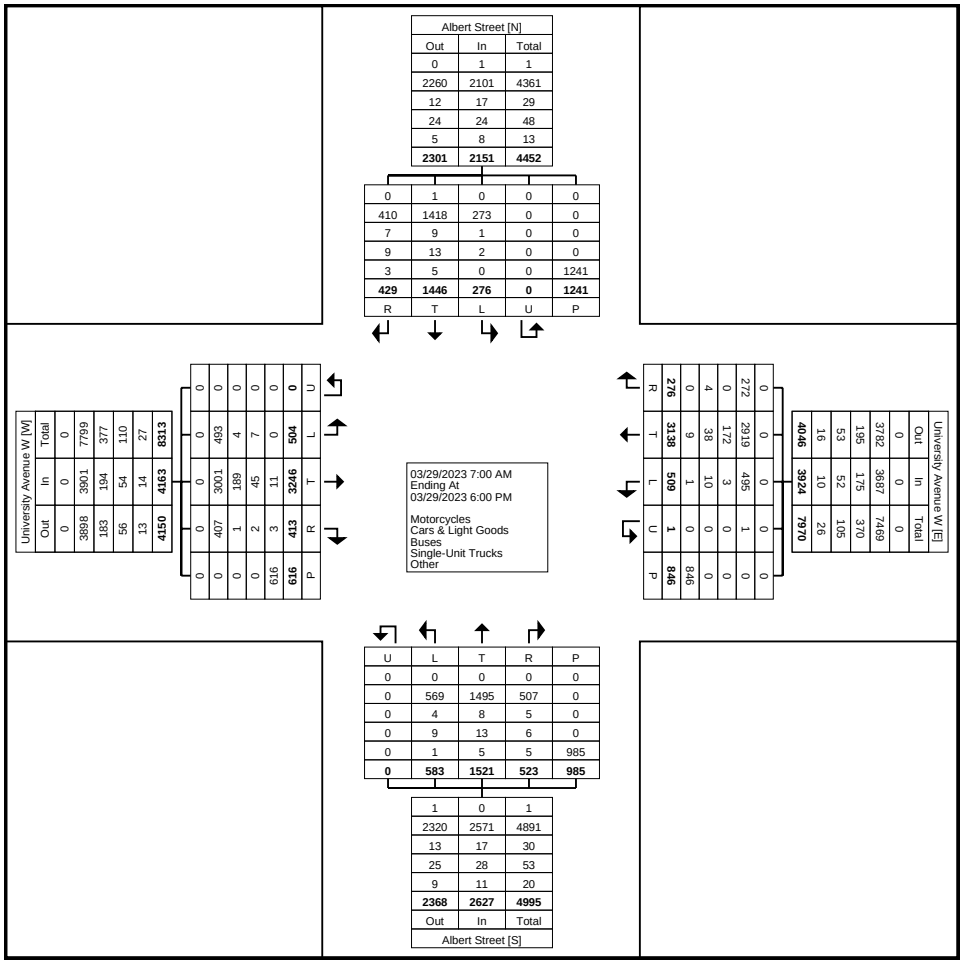
Start Time	University Avenue W Eastbound						University Avenue W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	4	44	1	0	4	49	4	44	3	0	4	51	8	18	2	0	8	28	3	19	3	0	5	25	153
7:15 AM	6	59	2	0	2	67	6	41	2	0	3	49	4	14	3	0	4	21	4	18	1	0	2	23	160
7:30 AM	13	60	8	0	10	81	6	57	3	0	9	66	5	34	4	0	9	43	9	17	10	0	6	36	226
7:45 AM	26	90	7	0	7	123	19	69	4	0	15	92	11	40	8	0	4	59	11	36	7	0	16	54	328
Hourly Total	49	253	18	0	23	320	35	211	12	0	31	258	28	106	17	0	25	151	27	90	21	0	29	138	867
8:00 AM	25	86	2	0	8	113	25	90	9	0	11	124	15	36	7	0	12	58	6	55	17	0	33	78	373
8:15 AM	15	84	6	0	29	105	20	101	9	0	41	130	24	48	13	0	46	85	7	58	7	0	36	72	392
8:30 AM	9	87	6	0	15	102	17	84	5	0	20	106	8	53	18	0	15	79	4	47	12	0	16	63	350
8:45 AM	16	82	6	0	4	104	17	87	6	0	12	110	19	42	10	0	12	71	6	52	12	0	14	70	355
Hourly Total	65	339	20	0	56	424	79	362	29	0	84	470	66	179	48	0	85	293	23	212	48	0	99	283	1470
9:00 AM	11	84	10	0	11	105	11	67	9	0	12	87	22	58	12	0	6	92	6	25	8	0	29	39	323
9:15 AM	19	85	8	0	18	112	15	88	10	0	25	113	14	42	11	0	24	67	7	36	10	0	31	53	345
9:30 AM	14	69	8	0	19	91	12	109	3	0	14	124	15	45	12	0	25	72	6	39	7	0	29	52	339
9:45 AM	16	102	13	0	21	131	12	92	5	0	42	109	8	30	15	0	52	53	2	31	11	0	46	44	337
Hourly Total	60	340	39	0	69	439	50	356	27	0	93	433	59	175	50	0	107	284	21	131	36	0	135	188	1344
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	16	129	16	0	12	161	17	91	6	0	28	114	21	45	23	0	31	89	10	42	14	0	61	66	430
11:45 AM	15	102	16	0	16	133	11	104	8	1	10	124	16	50	26	0	30	92	15	43	12	0	31	70	419
Hourly Total	31	231	32	0	28	294	28	195	14	1	38	238	37	95	49	0	61	181	25	85	26	0	92	136	849
12:00 PM	14	95	16	0	19	125	17	105	12	0	10	134	17	36	14	0	22	67	14	33	22	0	28	69	395
12:15 PM	12	109	13	0	9	134	11	104	15	0	24	130	23	54	11	0	39	88	12	38	13	0	35	63	415
12:30 PM	22	95	18	0	26	135	18	106	9	0	28	133	18	31	19	0	40	68	13	45	13	0	57	71	407
12:45 PM	15	109	19	0	41	143	19	115	15	0	80	149	28	59	15	0	69	102	8	54	17	0	69	79	473
Hourly Total	63	408	66	0	95	537	65	430	51	0	142	546	86	180	59	0	170	325	47	170	65	0	189	282	1690
1:00 PM	14	91	9	0	23	114	9	104	11	0	24	124	16	55	16	0	41	87	5	40	12	0	41	57	382
1:15 PM	13	99	14	0	13	126	16	100	9	0	25	125	16	50	13	0	34	79	7	50	15	0	45	72	402
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	27	190	23	0	36	240	25	204	20	0	49	249	32	105	29	0	75	166	12	90	27	0	86	129	784
3:00 PM	17	121	24	0	18	162	13	99	6	0	20	118	21	50	17	0	27	88	5	44	14	0	33	63	431
3:15 PM	10	104	13	0	13	127	28	108	12	0	18	148	21	39	16	0	26	76	8	44	15	0	34	67	418
3:30 PM	9	118	13	0	15	140	25	110	9	0	25	144	19	46	20	0	30	85	9	34	14	0	50	57	426
3:45 PM	17	138	13	0	53	168	24	121	11	0	87	156	28	55	24	0	83	107	14	47	20	0	64	81	512
Hourly Total	53	481	63	0	99	597	90	438	38	0	150	566	89	190	77	0	166	356	36	169	63	0	181	268	1787
4:00 PM	15	131	19	0	31	165	15	119	7	0	34	141	21	75	27	0	41	123	15	40	23	0	52	78	507
4:15 PM	15	124	20	0	15	159	12	105	10	0	18	127	17	64	21	0	21	102	5	60	14	0	38	79	467

4:30 PM	24	149	18	0	16	191	10	116	12	0	18	138	26	57	21	0	32	104	6	59	14	0	37	79	512
4:45 PM	17	130	20	0	21	167	19	111	12	0	18	142	23	49	23	0	36	95	11	54	18	0	46	83	487
Hourly Total	71	534	77	0	83	682	56	451	41	0	88	548	87	245	92	0	130	424	37	213	69	0	173	319	1973
5:00 PM	24	103	22	0	25	149	16	126	10	0	45	152	19	76	22	0	33	117	12	70	15	0	64	97	515
5:15 PM	16	131	15	0	53	162	21	111	13	0	69	145	31	62	28	0	60	121	14	83	28	0	73	125	553
5:30 PM	28	109	24	0	21	161	20	148	10	0	28	178	32	59	28	0	33	119	8	58	22	0	59	88	546
5:45 PM	17	127	14	0	28	158	24	106	11	0	29	141	17	49	24	0	40	90	14	75	9	0	61	98	487
Hourly Total	85	470	75	0	127	630	81	491	44	0	171	616	99	246	102	0	166	447	48	286	74	0	257	408	2101
Grand Total	504	3246	413	0	616	4163	509	3138	276	1	846	3924	583	1521	523	0	985	2627	276	1446	429	0	1241	2151	12865
Approach %	12.1	78.0	9.9	0.0	-	-	13.0	80.0	7.0	0.0	-	-	22.2	57.9	19.9	0.0	-	-	12.8	67.2	19.9	0.0	-	-	-
Total %	3.9	25.2	3.2	0.0	-	32.4	4.0	24.4	2.1	0.0	-	30.5	4.5	11.8	4.1	0.0	-	20.4	2.1	11.2	3.3	0.0	-	16.7	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.0	-	-	0.0	0.0
Cars & Light Goods	493	3001	407	0	-	3901	495	2919	272	1	-	3687	569	1495	507	0	-	2571	273	1418	410	0	-	2101	12260
% Cars & Light Goods	97.8	92.5	98.5	-	-	93.7	97.2	93.0	98.6	100.0	-	94.0	97.6	98.3	96.9	-	-	97.9	98.9	98.1	95.6	-	-	97.7	95.3
Buses	4	189	1	0	-	194	3	172	0	0	-	175	4	8	5	0	-	17	1	9	7	0	-	17	403
% Buses	0.8	5.8	0.2	-	-	4.7	0.6	5.5	0.0	0.0	-	4.5	0.7	0.5	1.0	-	-	0.6	0.4	0.6	1.6	-	-	0.8	3.1
Single-Unit Trucks	7	45	2	0	-	54	10	38	4	0	-	52	9	13	6	0	-	28	2	13	9	0	-	24	158
% Single-Unit Trucks	1.4	1.4	0.5	-	-	1.3	2.0	1.2	1.4	0.0	-	1.3	1.5	0.9	1.1	-	-	1.1	0.7	0.9	2.1	-	-	1.1	1.2
Articulated Trucks	0	4	2	0	-	6	1	1	0	0	-	2	0	1	2	0	-	3	0	0	0	0	-	0	11
% Articulated Trucks	0.0	0.1	0.5	-	-	0.1	0.2	0.0	0.0	0.0	-	0.1	0.0	0.1	0.4	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	7	1	0	-	8	0	8	0	0	-	8	1	4	3	0	-	8	0	5	3	0	-	8	32
% Bicycles on Road	0.0	0.2	0.2	-	-	0.2	0.0	0.3	0.0	0.0	-	0.2	0.2	0.3	0.6	-	-	0.3	0.0	0.3	0.7	-	-	0.4	0.2
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	5	-	-	-	-	-	5	-	-
% Bicycles on Crosswalk	-	-	-	-	0.2	-	-	-	-	-	0.4	-	-	-	-	-	0.5	-	-	-	-	-	0.4	-	-
Pedestrians	-	-	-	-	615	-	-	-	-	-	843	-	-	-	-	-	980	-	-	-	-	-	1236	-	-
% Pedestrians	-	-	-	-	99.8	-	-	-	-	-	99.6	-	-	-	-	-	99.5	-	-	-	-	-	99.6	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

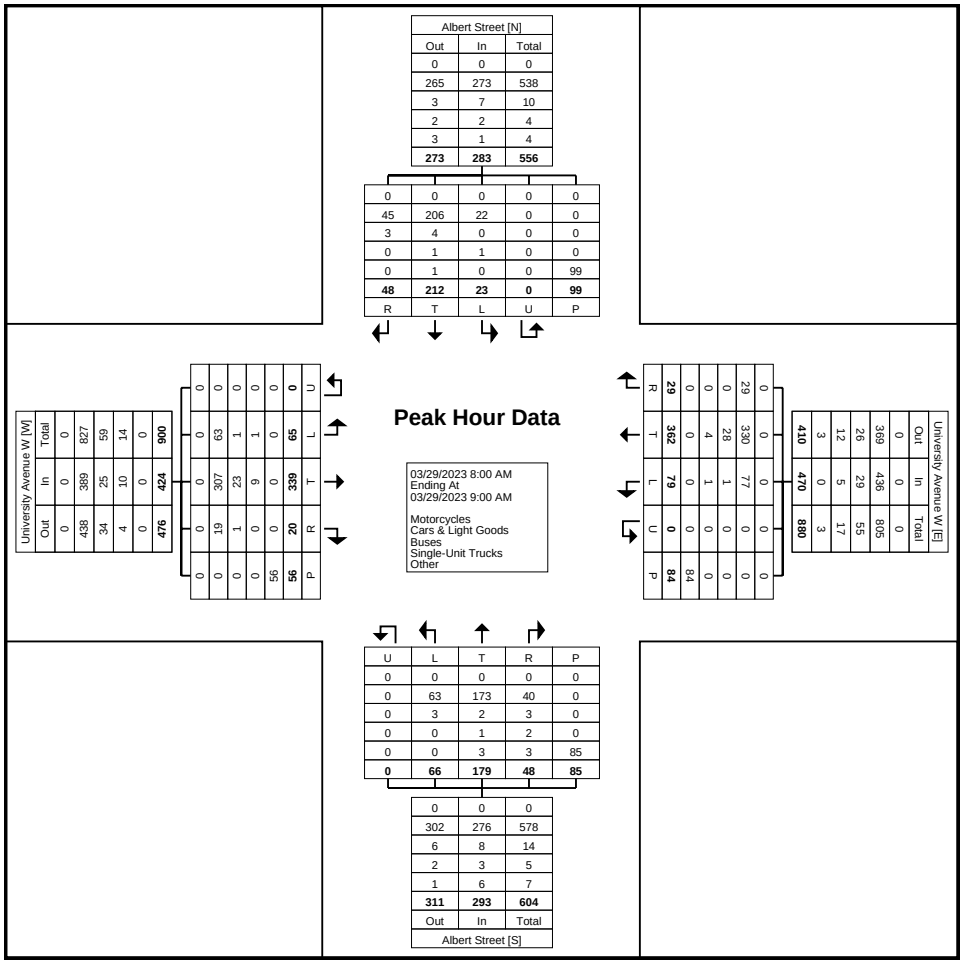
Turning Movement Peak Hour Data (8:00 AM)

Start Time	University Avenue W Eastbound						University Avenue W Westbound						Albert Street Northbound						Albert Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
8:00 AM	25	86	2	0	8	113	25	90	9	0	11	124	15	36	7	0	12	58	6	55	17	0	33	78	373
8:15 AM	15	84	6	0	29	105	20	101	9	0	41	130	24	48	13	0	46	85	7	58	7	0	36	72	392
8:30 AM	9	87	6	0	15	102	17	84	5	0	20	106	8	53	18	0	15	79	4	47	12	0	16	63	350
8:45 AM	16	82	6	0	4	104	17	87	6	0	12	110	19	42	10	0	12	71	6	52	12	0	14	70	355
Total	65	339	20	0	56	424	79	362	29	0	84	470	66	179	48	0	85	293	23	212	48	0	99	283	1470
Approach %	15.3	80.0	4.7	0.0	-	-	16.8	77.0	6.2	0.0	-	-	22.5	61.1	16.4	0.0	-	-	8.1	74.9	17.0	0.0	-	-	-
Total %	4.4	23.1	1.4	0.0	-	28.8	5.4	24.6	2.0	0.0	-	32.0	4.5	12.2	3.3	0.0	-	19.9	1.6	14.4	3.3	0.0	-	19.3	-
PHF	0.650	0.974	0.833	0.000	-	0.938	0.790	0.896	0.806	0.000	-	0.904	0.688	0.844	0.667	0.000	-	0.862	0.821	0.914	0.706	0.000	-	0.907	0.938
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	63	307	19	0	-	389	77	330	29	0	-	436	63	173	40	0	-	276	22	206	45	0	-	273	1374
% Cars & Light Goods	96.9	90.6	95.0	-	-	91.7	97.5	91.2	100.0	-	-	92.8	95.5	96.6	83.3	-	-	94.2	95.7	97.2	93.8	-	-	96.5	93.5
Buses	1	23	1	0	-	25	1	28	0	0	-	29	3	2	3	0	-	8	0	4	3	0	-	7	69
% Buses	1.5	6.8	5.0	-	-	5.9	1.3	7.7	0.0	-	-	6.2	4.5	1.1	6.3	-	-	2.7	0.0	1.9	6.3	-	-	2.5	4.7
Single-Unit Trucks	1	9	0	0	-	10	1	4	0	0	-	5	0	1	2	0	-	3	1	1	0	0	-	2	20
% Single-Unit Trucks	1.5	2.7	0.0	-	-	2.4	1.3	1.1	0.0	-	-	1.1	0.0	0.6	4.2	-	-	1.0	4.3	0.5	0.0	-	-	0.7	1.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.1	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	3	2	0	-	5	0	1	0	0	-	1	6
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.7	4.2	-	-	1.7	0.0	0.5	0.0	-	-	0.4	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.0	-	-
Pedestrians	-	-	-	-	56	-	-	-	-	-	84	-	-	-	-	-	85	-	-	-	-	-	98	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	99.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

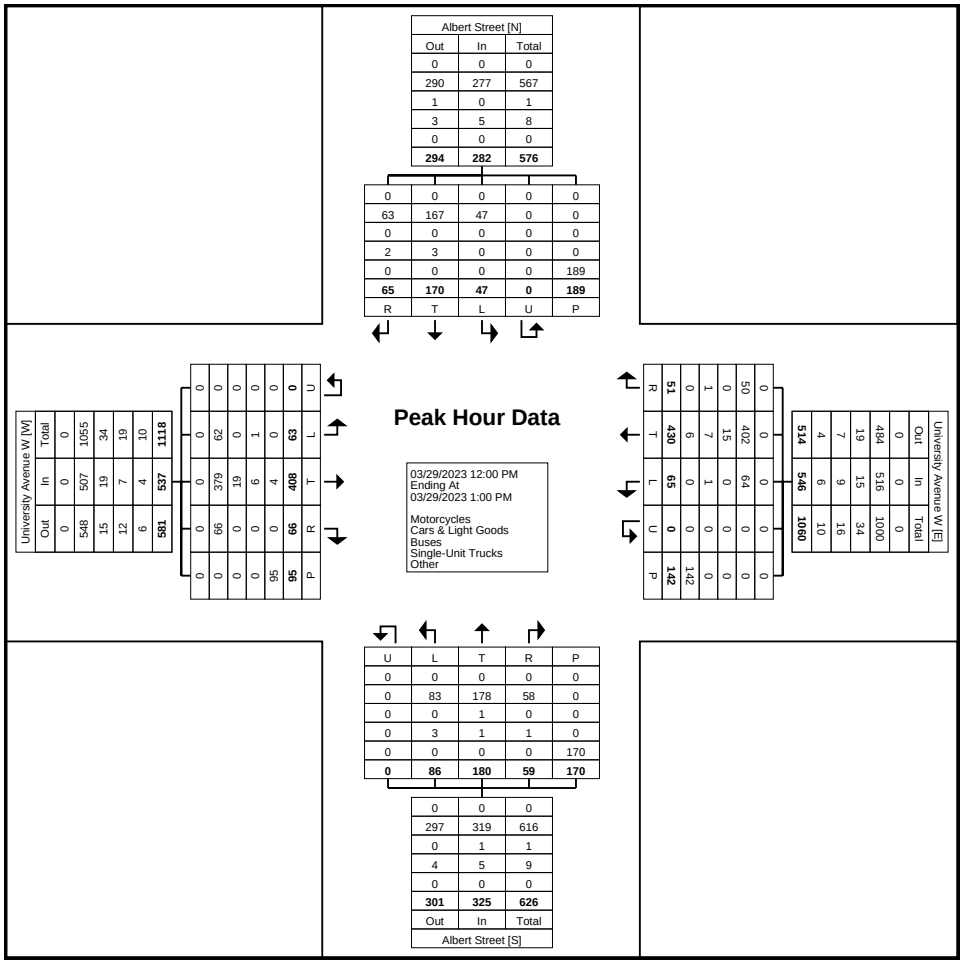
Turning Movement Peak Hour Data (12:00 PM)

Start Time	University Avenue W Eastbound						University Avenue W Westbound						Albert Street Northbound						Albert Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	14	95	16	0	19	125	17	105	12	0	10	134	17	36	14	0	22	67	14	33	22	0	28	69	395
12:15 PM	12	109	13	0	9	134	11	104	15	0	24	130	23	54	11	0	39	88	12	38	13	0	35	63	415
12:30 PM	22	95	18	0	26	135	18	106	9	0	28	133	18	31	19	0	40	68	13	45	13	0	57	71	407
12:45 PM	15	109	19	0	41	143	19	115	15	0	80	149	28	59	15	0	69	102	8	54	17	0	69	79	473
Total	63	408	66	0	95	537	65	430	51	0	142	546	86	180	59	0	170	325	47	170	65	0	189	282	1690
Approach %	11.7	76.0	12.3	0.0	-	-	11.9	78.8	9.3	0.0	-	-	26.5	55.4	18.2	0.0	-	-	16.7	60.3	23.0	0.0	-	-	-
Total %	3.7	24.1	3.9	0.0	-	31.8	3.8	25.4	3.0	0.0	-	32.3	5.1	10.7	3.5	0.0	-	19.2	2.8	10.1	3.8	0.0	-	16.7	-
PHF	0.716	0.936	0.868	0.000	-	0.939	0.855	0.935	0.850	0.000	-	0.916	0.768	0.763	0.776	0.000	-	0.797	0.839	0.787	0.739	0.000	-	0.892	0.893
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	62	379	66	0	-	507	64	402	50	0	-	516	83	178	58	0	-	319	47	167	63	0	-	277	1619
% Cars & Light Goods	98.4	92.9	100.0	-	-	94.4	98.5	93.5	98.0	-	-	94.5	96.5	98.9	98.3	-	-	98.2	100.0	98.2	96.9	-	-	98.2	95.8
Buses	0	19	0	0	-	19	0	15	0	0	-	15	0	1	0	0	-	1	0	0	0	0	-	0	35
% Buses	0.0	4.7	0.0	-	-	3.5	0.0	3.5	0.0	-	-	2.7	0.0	0.6	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	2.1
Single-Unit Trucks	1	6	0	0	-	7	1	7	1	0	-	9	3	1	1	0	-	5	0	3	2	0	-	5	26
% Single-Unit Trucks	1.6	1.5	0.0	-	-	1.3	1.5	1.6	2.0	-	-	1.6	3.5	0.6	1.7	-	-	1.5	0.0	1.8	3.1	-	-	1.8	1.5
Articulated Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	3	0	0	-	3	0	6	0	0	-	6	0	0	0	0	-	0	0	0	0	0	-	0	9
% Bicycles on Road	0.0	0.7	0.0	-	-	0.6	0.0	1.4	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.2	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	95	-	-	-	-	-	142	-	-	-	-	-	168	-	-	-	-	-	189	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	98.8	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



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

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023

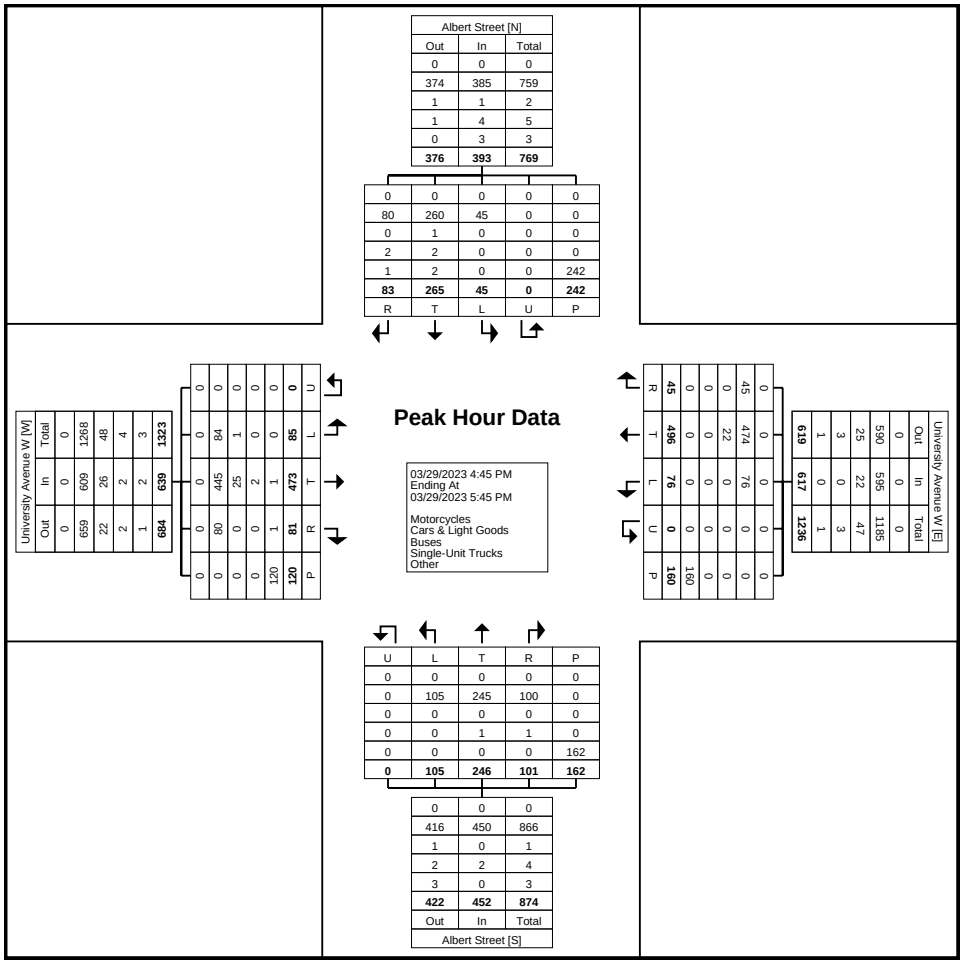
Turning Movement Peak Hour Data (4:45 PM)

Start Time	University Avenue W Eastbound						University Avenue W Westbound						Albert Street Northbound						Albert Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:45 PM	17	130	20	0	21	167	19	111	12	0	18	142	23	49	23	0	36	95	11	54	18	0	46	83	487
5:00 PM	24	103	22	0	25	149	16	126	10	0	45	152	19	76	22	0	33	117	12	70	15	0	64	97	515
5:15 PM	16	131	15	0	53	162	21	111	13	0	69	145	31	62	28	0	60	121	14	83	28	0	73	125	553
5:30 PM	28	109	24	0	21	161	20	148	10	0	28	178	32	59	28	0	33	119	8	58	22	0	59	88	546
Total	85	473	81	0	120	639	76	496	45	0	160	617	105	246	101	0	162	452	45	265	83	0	242	393	2101
Approach %	13.3	74.0	12.7	0.0	-	-	12.3	80.4	7.3	0.0	-	-	23.2	54.4	22.3	0.0	-	-	11.5	67.4	21.1	0.0	-	-	-
Total %	4.0	22.5	3.9	0.0	-	30.4	3.6	23.6	2.1	0.0	-	29.4	5.0	11.7	4.8	0.0	-	21.5	2.1	12.6	4.0	0.0	-	18.7	-
PHF	0.759	0.903	0.844	0.000	-	0.957	0.905	0.838	0.865	0.000	-	0.867	0.820	0.809	0.902	0.000	-	0.934	0.804	0.798	0.741	0.000	-	0.786	0.950
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	84	445	80	0	-	609	76	474	45	0	-	595	105	245	100	0	-	450	45	260	80	0	-	385	2039
% Cars & Light Goods	98.8	94.1	98.8	-	-	95.3	100.0	95.6	100.0	-	-	96.4	100.0	99.6	99.0	-	-	99.6	100.0	98.1	96.4	-	-	98.0	97.0
Buses	1	25	0	0	-	26	0	22	0	0	-	22	0	0	0	0	-	0	0	1	0	0	-	1	49
% Buses	1.2	5.3	0.0	-	-	4.1	0.0	4.4	0.0	-	-	3.6	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	2.3
Single-Unit Trucks	0	2	0	0	-	2	0	0	0	0	-	0	0	1	1	0	-	2	0	2	2	0	-	4	8
% Single-Unit Trucks	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	1.0	-	-	0.4	0.0	0.8	2.4	-	-	1.0	0.4
Articulated Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	2	1	0	-	3	4
% Bicycles on Road	0.0	0.0	1.2	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.8	1.2	-	-	0.8	0.2
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.8	-	-	-	-	-	0.6	-	-	-	-	-	0.0	-	-	-	-	-	0.4	-	-
Pedestrians	-	-	-	-	119	-	-	-	-	-	159	-	-	-	-	-	162	-	-	-	-	-	241	-	-
% Pedestrians	-	-	-	-	99.2	-	-	-	-	-	99.4	-	-	-	-	-	100.0	-	-	-	-	-	99.6	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: University Avenue W & Albert Street
Site Code: 230150
Start Date: 03/29/2023



Turning Movement Peak Hour Data Plot (4:45 PM)

CURRENT TRAFFIC SIGNAL TIMING

INT # **24** | **COLUMBIA STREET @ Albert Street** | T08-50/ **3W**

Date Prepared: **March 7, 2023**

Mode of Control **Fixed Time**

Left Info

Actuated	**EB**	LT	-	**COLUMBIA STREET**
Actuated	**WB**	LT	-	**COLUMBIA STREET**
Actuated	**NB**	LT	-	**Albert Street**
Actuated	**SB**	LT	-	**Albert Street**

*Offsets are a percentage of the cycle length and refers to the beginning of Main Street green

Pattern 1 7:00-10:00 & 15:00-18:00 Monday - Friday

COLUMBIA STREET

OFFSET 71%

EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow		Min	5.0	seconds
	Ext	3.0	seconds			Ext	3.0	seconds
	Max	6.8	seconds			Max	6.8	seconds
EBL Amber Arrow		3.0	seconds	WBL Amber Arrow			3.0	seconds
All Red		1.0	seconds	All Red			1.0	seconds
Green		30.0	seconds					
Amber		4.0	seconds	Walk	17.0	seconds		
All Red		2.0	seconds	FDW	13.0	seconds		

Albert Street

SBL Green Arrow	Min	5.0	seconds	NBL Green Arrow		Min	5.0	seconds
	Ext	3.0	seconds			Ext	3.0	seconds
	Max	6.8	seconds			Max	6.8	seconds
SBL Amber Arrow		3.0	seconds	NBL Amber Arrow			3.0	seconds
All Red		1.0	seconds	All Red			1.0	seconds
Green		26.4	seconds					
Amber		4.0	seconds	Walk	12.4	seconds		
All Red		2.0	seconds	FDW	14.0	seconds		
TOTAL		90.0	seconds					

Min=Minimum Time
Ext=Extension Time
Max=Maximum Time

This signal timing cannot be presented as evidence in a court of law.

Pattern 2 10:00-15:00 & 18:00-21:00 M-F; 8:30-21:00 SaT; 11:00-18:00 SuN

COLUMBIA STREET								OFFSET	5%
EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow			Min	5.0	seconds
	Ext	3.0	seconds				Ext	3.0	seconds
	Max	6.4	seconds				Max	6.4	seconds
EBL Amber Arrow		3.0	seconds	WBL Amber Arrow				3.0	seconds
All Red		1.0	seconds	All Red				1.0	seconds
Green		22.8	seconds						
Amber		4.0	seconds	Walk	9.8	seconds			
All Red		2.0	seconds	FDW	13.0	seconds			
Albert Street									
SBL Green Arrow	Min	5.0	seconds	NBL Green Arrow			Min	5.0	seconds
	Ext	3.0	seconds				Ext	3.0	seconds
	Max	6.4	seconds				Max	6.4	seconds
SBL Amber Arrow		3.0	seconds	NBL Amber Arrow				3.0	seconds
All Red		1.0	seconds	All Red				1.0	seconds
Green		24.4	seconds						
Amber		4.0	seconds	Walk	10.4	seconds			
All Red		2.0	seconds	FDW	14.0	seconds			
TOTAL		80.0	seconds						

Pattern 3 All other times

COLUMBIA STREET						OFFSET	17%
Green		31.1	seconds				
Amber		4.0	seconds	Walk	18.1	seconds	
All Red		2.0	seconds	FDW	13.0	seconds	
Albert Street							
Green		26.9	seconds				
Amber		4.0	seconds	Walk	12.9	seconds	
All Red		2.0	seconds	FDW	14.0	seconds	
TOTAL		70.0	seconds				

Min=Minimum Time
Ext=Extension Time
Max=Maximum Time

This signal timing cannot be presented as evidence in a court of law.

Region of Waterloo

CURRENT TRAFFIC SIGNAL TIMING

INT # **543** **UNIVERSITY AVENUE @ Albert Avenue** T08-50/ **4W**

Date Prepared: **March 7, 2023**

Mode of Control **Fixed Time**

Left Info **Actuated** **EB** LT - **UNIVERSITY AVENUE**
Actuated **WB** LT - **UNIVERSITY AVENUE**

*Offsets are a percentage of the cycle length and refers to the beginning of Main Street green

Pattern 1 7:00-10:30 Monday-Friday

UNIVERSITY AVENUE								OFFSET	20%
EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow			Min	5.0	seconds
	Ext	3.0	seconds				Ext	3.0	seconds
	Max	6.0	seconds				Max	6.0	seconds
EBL Amber Arrow		3.0	seconds	WBL Amber Arrow				3.0	seconds
All Red		1.0	seconds	All Red				1.0	seconds
Green		39.0	seconds						
Amber		4.0	seconds	Walk	28.0	seconds			
All Red		2.0	seconds	FDW	11.0	seconds			
Albert Avenue									
Green		39.0	seconds						
Amber		4.0	seconds	Walk	24.0	seconds			
All Red		2.0	seconds	FDW	15.0	seconds			
TOTAL		100.0	seconds						

Pattern 2 10:30-14:30 & 19:00-22:00 M-F, 8:30-22:00 Sat, 10:00-22:00 Sun

UNIVERSITY AVENUE								OFFSET	97%
EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow			Min	5.0	seconds
	Ext	3.0	seconds				Ext	3.0	seconds
	Max	6.0	seconds				Max	6.0	seconds
EBL Amber Arrow		3.0	seconds	WBL Amber Arrow				3.0	seconds
All Red		1.0	seconds	All Red				1.0	seconds
Green		40.0	seconds						
Amber		4.0	seconds	Walk	29.0	seconds			
All Red		2.0	seconds	FDW	11.0	seconds			
Albert Avenue									
Green		38.0	seconds						
Amber		4.0	seconds	Walk	23.0	seconds			
All Red		2.0	seconds	FDW	15.0	seconds			
TOTAL		100.0	seconds						

Min=Minimum Time
Ext=Extension Time
Max=Maximum Time

This signal timing cannot be presented as evidence in a court of law.

Pattern 3 14:30-19:00 Monday-Friday

UNIVERSITY AVENUE							OFFSET	13%
EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow			Min 5.0	seconds
	Ext	3.0	seconds				Ext 3.0	seconds
	Max	7.0	seconds				Max 7.0	seconds
EBL Amber Arrow		3.0	seconds	WBL Amber Arrow			3.0	seconds
All Red		1.0	seconds	All Red			1.0	seconds
Green		35.8	seconds					
Amber		4.0	seconds	Walk	24.8	seconds		
All Red		2.0	seconds	FDW	11.0	seconds		
Albert Avenue								
Green		51.2	seconds					
Amber		4.0	seconds	Walk	36.2	seconds		
All Red		2.0	seconds	FDW	15.0	seconds		
TOTAL		110.0	seconds					

Pattern 4 ALL OTHER TIMES

UNIVERSITY AVENUE							OFFSET	26%
Green		35.6	seconds					
Amber		4.0	seconds	Walk	24.6	seconds		
All Red		2.0	seconds	FDW	11.0	seconds		
Albert Avenue								
Green		32.4	seconds					
Amber		4.0	seconds	Walk	17.4	seconds		
All Red		2.0	seconds	FDW	15.0	seconds		
TOTAL		80.0	seconds					

Min=Minimum Time
Ext=Extension Time
Max=Maximum Time

This signal timing cannot be presented as evidence in a court of law.

Appendix C

Base Year Operations

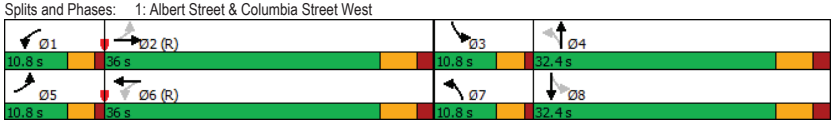
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	648	57	93	791	84	92	132	78	52	138	19
Future Volume (vph)	20	648	57	93	791	84	92	132	78	52	138	19
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		0.99	0.99		0.98	1.00	
Frt		0.988			0.986			0.944			0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3180	0	1603	3172	0	1668	1478	0	1635	1521	0
Flt Permitted	0.206			0.236			0.586			0.568		
Satd. Flow (perm)	359	3180	0	393	3172	0	1016	1478	0	960	1521	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			14			35			8	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	25		31	31		25	15		26	26		15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	4%	4%	3%	4%	0%	2%	4%	2%	5%	5%
Adj. Flow (vph)	20	648	57	93	791	84	92	132	78	52	138	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	705	0	93	875	0	92	210	0	52	157	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	10.8	36.0		10.8	36.0		10.8	32.4		10.8	32.4	
Total Split (%)	12.0%	40.0%		12.0%	40.0%		12.0%	36.0%		12.0%	36.0%	
Maximum Green (s)	6.8	30.0		6.8	30.0		6.8	26.4		6.8	26.4	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		17.0			17.0			12.4			12.4	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	41.3	36.3		43.4	40.7		34.6	30.6		33.7	28.4	
Actuated g/C Ratio	0.46	0.40		0.48	0.45		0.38	0.34		0.37	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.08	0.55		0.33	0.61		0.21	0.40		0.13	0.32	
Control Delay	13.4	23.8		16.5	22.4		16.8	22.0		15.8	24.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.4	23.8		16.5	22.4		16.8	22.0		15.8	24.5	
LOS	B	C		B	C		B	C		B	C	
Approach Delay		23.5			21.9			20.4			22.4	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	1.7	50.7		8.5	53.5		9.1	23.2		5.0	19.1	
Queue Length 95th (m)	5.4	68.7		16.8	90.1		18.0	42.5		11.5	34.8	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	265	1289		281	1441		440	525		411	485	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.55		0.33	0.61		0.21	0.40		0.13	0.32	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 22.3 Intersection LOS: C
Intersection Capacity Utilization 71.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Albert Street & Columbia Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	648	57	93	791	84	92	132	78	52	138	19
Future Volume (veh/h)	20	648	57	93	791	84	92	132	78	52	138	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.99		0.96	0.98		0.97	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1733	1720	1720	1733	1720	1775	1624	1599	1747	1586	1586
Adj Flow Rate, veh/h	20	648	57	93	791	84	92	132	78	52	138	19
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	3	4	4	3	4	0	2	4	2	5	5
Cap, veh/h	238	1225	108	310	1288	137	419	312	184	360	429	59
Arrive On Green	0.02	0.40	0.38	0.05	0.43	0.41	0.05	0.33	0.31	0.04	0.32	0.29
Sat Flow, veh/h	1690	3051	268	1638	2991	318	1690	947	559	1664	1359	187
Grp Volume(v), veh/h	20	349	356	93	435	440	92	0	210	52	0	157
Grp Sat Flow(s),veh/h/ln	1690	1647	1672	1638	1647	1662	1690	0	1506	1664	0	1546
Q Serve(g_s), s	0.6	14.5	14.6	3.0	18.4	18.5	3.4	0.0	9.9	1.9	0.0	7.0
Cycle Q Clear(g_c), s	0.6	14.5	14.6	3.0	18.4	18.5	3.4	0.0	9.9	1.9	0.0	7.0
Prop In Lane	1.00		0.16	1.00		0.19	1.00		0.37	1.00		0.12
Lane Grp Cap(c), veh/h	238	661	671	310	709	716	419	0	496	360	0	488
V/C Ratio(X)	0.08	0.53	0.53	0.30	0.61	0.61	0.22	0.00	0.42	0.14	0.00	0.32
Avail Cap(c_a), veh/h	329	661	671	350	709	716	455	0	496	418	0	488
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.8	20.5	20.6	16.6	19.8	20.0	20.6	0.0	23.8	21.1	0.0	23.6
Incr Delay (d2), s/veh	0.1	3.0	3.0	0.5	3.9	3.9	0.3	0.0	0.6	0.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.7	3.7	0.6	4.5	4.6	0.8	0.0	2.3	0.4	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.9	23.5	23.6	17.1	23.8	23.9	20.8	0.0	24.4	21.2	0.0	23.9
LnGrp LOS	B	C	C	B	C	C	C	A	C	C	A	C
Approach Vol, veh/h		725			968			302			209	
Approach Delay, s/veh		23.4			23.2			23.3			23.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.6	40.1	7.6	33.6	6.0	42.8	8.9	32.4
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.8	30.0	6.8	26.4	6.8	30.0	6.8	26.4
Max Q Clear Time (g_c+I1), s	5.0	16.6	3.9	11.9	2.6	20.5	5.4	9.0
Green Ext Time (p_c), s	0.0	4.3	0.0	1.2	0.0	4.3	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	23.3
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	8	6	22	7	54	2	236	36	48	237	2
Future Volume (vph)	12	8	6	22	7	54	2	236	36	48	237	2
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.969			0.912			0.982			0.999	
Flt Protected		0.977			0.987						0.992	
Satd. Flow (prot)	0	1395	0	0	1344	0	0	1467	0	0	1456	0
Flt Permitted		0.977			0.987						0.992	
Satd. Flow (perm)	0	1395	0	0	1344	0	0	1467	0	0	1456	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	11		8	8		11	17		21	21		17
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	13%	0%	5%	0%	2%	0%	3%	0%	6%	4%	0%
Adj. Flow (vph)	12	8	6	22	7	54	2	236	36	48	237	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	83	0	0	274	0	0	287	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	6	22	7	54	2	236	36	48	237	2
Future Vol, veh/h	12	8	6	22	7	54	2	236	36	48	237	2
Conflicting Peds, #/hr	11	0	8	8	0	11	17	0	21	21	0	17
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	13	0	5	0	2	0	3	0	6	4	0
Mvmt Flow	12	8	6	22	7	54	2	236	36	48	237	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	651	648	263	628	631	286	256	0	0	293	0	0
Stage 1	351	351	-	279	279	-	-	-	-	-	-	-
Stage 2	300	297	-	349	352	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.63	6.2	7.15	6.5	6.22	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.63	-	6.15	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.63	-	6.15	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.117	3.3	3.545	4	3.318	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	384	375	781	391	401	753	1321	-	-	1246	-	-
Stage 1	670	613	-	721	683	-	-	-	-	-	-	-
Stage 2	713	648	-	661	635	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	331	347	766	359	371	734	1304	-	-	1226	-	-
Mov Cap-2 Maneuver	331	347	-	359	371	-	-	-	-	-	-	-
Stage 1	660	578	-	708	671	-	-	-	-	-	-	-
Stage 2	647	636	-	614	599	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	12.9	0.1	1.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1		SBL	SBT	SBR
Capacity (veh/h)	1304	-	-	387	540	1226	-	-
HCM Lane V/C Ratio	0.002	-	-	0.067	0.154	0.039	-	-
HCM Control Delay (s)	7.8	0	-	15	12.9	8.1	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0.1	-	-

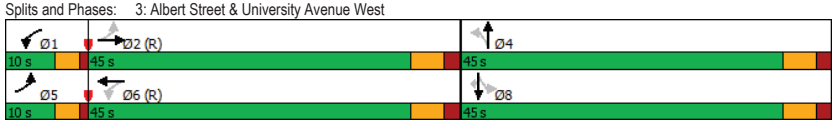
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	339	20	79	362	29	66	179	48	23	212	48
Future Volume (vph)	65	339	20	79	362	29	66	179	48	23	212	48
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.93	0.99		0.94	0.99		0.97	0.98		0.96		0.95
Frt		0.992			0.989			0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1619	2994	0	1619	3012	0	1588	1490	0	1603	1842	1388
Flt Permitted	0.476			0.500			0.566			0.549		
Satd. Flow (perm)	754	2994	0	798	3012	0	917	1490	0	885	1842	1312
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7			10			16				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	99		85	85		99	56		84	84		56
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	10%	5%	3%	9%	0%	5%	2%	13%	4%	2%	6%
Adj. Flow (vph)	65	339	20	79	362	29	66	179	48	23	212	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	359	0	79	391	0	66	227	0	23	212	48
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	39.0		5.0	39.0		39.0	39.0		39.0	39.0	39.0
Minimum Split (s)	9.0	45.0		9.0	45.0		45.0	45.0		45.0	45.0	45.0
Total Split (s)	10.0	45.0		10.0	45.0		45.0	45.0		45.0	45.0	45.0
Total Split (%)	10.0%	45.0%		10.0%	45.0%		45.0%	45.0%		45.0%	45.0%	45.0%
Maximum Green (s)	6.0	39.0		6.0	39.0		39.0	39.0		39.0	39.0	39.0
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		28.0			28.0		24.0	24.0		24.0	24.0	24.0
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	47.8	43.0		47.8	43.0		41.0	41.0		41.0	41.0	41.0
Actuated g/C Ratio	0.48	0.43		0.48	0.43		0.41	0.41		0.41	0.41	0.41

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.16	0.28		0.18	0.30		0.18	0.37		0.06	0.28	0.09
Control Delay	13.6	19.4		13.9	19.6		20.4	21.1		18.7	21.0	18.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	13.6	19.4		13.9	19.6		20.4	21.1		18.7	21.0	18.8
LOS	B	B		B	B		C	C		B	C	B
Approach Delay		18.5			18.6			20.9			20.4	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	6.1	23.2		7.5	25.3		7.9	27.3		2.6	26.4	5.5
Queue Length 95th (m)	12.8	33.5		14.8	36.3		16.9	45.8		7.5	42.8	12.5
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	412	1291		430	1300		375	620		362	755	537
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.16	0.28		0.18	0.30		0.18	0.37		0.06	0.28	0.09

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.37
Intersection Signal Delay: 19.4 Intersection LOS: B
Intersection Capacity Utilization 107.5% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 3: Albert Street & University Avenue West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	339	20	79	362	29	66	179	48	23	212	48
Future Volume (veh/h)	65	339	20	79	362	29	66	179	48	23	212	48
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.88	0.93		0.88	0.96		0.94	0.96		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1733	1637	1706	1733	1650	1775	1706	1624	1483	1720	1870	1668
Adj Flow Rate, veh/h	65	339	20	79	362	29	66	179	48	23	212	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	10	5	3	9	0	5	2	13	4	2	6
Cap, veh/h	422	1259	74	438	1245	99	401	498	133	386	767	544
Arrive On Green	0.04	0.43	0.41	0.04	0.43	0.41	0.41	0.41	0.39	0.41	0.41	0.41
Sat Flow, veh/h	1651	2958	173	1651	2908	231	982	1214	325	1020	1870	1327
Grp Volume(v), veh/h	65	177	182	79	194	197	66	0	227	23	212	48
Grp Sat Flow(s),veh/h/ln	1651	1555	1577	1651	1568	1571	982	0	1539	1020	1870	1327
Q Serve(g_s), s	2.3	7.4	7.5	2.8	8.1	8.2	4.8	0.0	10.3	1.6	7.5	2.2
Cycle Q Clear(g_c), s	2.3	7.4	7.5	2.8	8.1	8.2	12.3	0.0	10.3	11.9	7.5	2.2
Prop In Lane	1.00		0.11	1.00		0.15	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	422	662	671	438	671	673	401	0	631	386	767	544
V/C Ratio(X)	0.15	0.27	0.27	0.18	0.29	0.29	0.16	0.00	0.36	0.06	0.28	0.09
Avail Cap(c_a), veh/h	452	662	671	463	671	673	401	0	631	386	767	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	18.6	18.7	16.2	18.6	18.8	23.7	0.0	20.6	24.5	19.6	18.1
Incr Delay (d2), s/veh	0.2	1.0	1.0	0.2	1.1	1.1	0.2	0.0	0.3	0.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.8	1.8	0.6	2.0	2.0	0.8	0.0	2.3	0.3	2.1	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.4	19.6	19.7	16.4	19.7	19.9	23.9	0.0	20.9	24.6	19.8	18.1
LnGrp LOS	B	B	B	B	B	B	C	A	C	C	B	B
Approach Vol, veh/h		424			470			293			283	
Approach Delay, s/veh		19.2			19.2			21.6			19.9	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	46.6		45.0	8.2	46.8		45.0				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	6.0	39.0		39.0	6.0	39.0		39.0				
Max Q Clear Time (g_c+I1), s	4.8	9.5		14.3	4.3	10.2		13.9				
Green Ext Time (p_c), s	0.0	2.7		2.0	0.0	3.0		1.8				

Intersection Summary

HCM 6th Ctrl Delay 19.8
HCM 6th LOS B



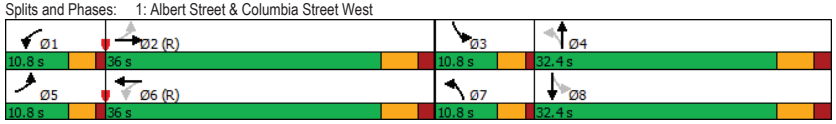
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	827	106	120	725	52	97	160	102	100	165	48
Future Volume (vph)	36	827	106	120	725	52	97	160	102	100	165	48
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		0.98	0.99		0.99	0.99	
Frt		0.983			0.990			0.942			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3223	0	1619	3203	0	1668	1495	0	1668	1548	0
Flt Permitted	0.254			0.128			0.524			0.450		
Satd. Flow (perm)	443	3223	0	216	3203	0	902	1495	0	779	1548	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			9			37			17	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	15		35	35		15	28		23	23		28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	3%	3%	0%	0%	1%	2%	0%	0%	4%
Adj. Flow (vph)	36	827	106	120	725	52	97	160	102	100	165	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	933	0	120	777	0	97	262	0	100	213	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	10.8	36.0		10.8	36.0		10.8	32.4		10.8	32.4	
Total Split (%)	12.0%	40.0%		12.0%	40.0%		12.0%	36.0%		12.0%	36.0%	
Maximum Green (s)	6.8	30.0		6.8	30.0		6.8	26.4		6.8	26.4	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		17.0			17.0			12.4			12.4	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	40.6	34.3		42.6	38.5		33.8	28.4		33.8	28.4	
Actuated g/C Ratio	0.45	0.38		0.47	0.43		0.38	0.32		0.38	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.13	0.75		0.58	0.56		0.25	0.53		0.28	0.43	
Control Delay	13.9	29.4		26.3	23.1		17.3	26.1		17.9	25.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.9	29.4		26.3	23.1		17.3	26.1		17.9	25.5	
LOS	B	C		C	C		B	C		B	C	
Approach Delay		28.8			23.5			23.7			23.1	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	3.2	73.4		11.1	57.4		9.6	31.0		9.9	26.1	
Queue Length 95th (m)	8.0	97.0		#25.4	77.2		18.7	54.1		19.3	45.6	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	294	1237		208	1376		396	497		359	500	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.75		0.58	0.56		0.24	0.53		0.28	0.43	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 25.5 Intersection LOS: C
Intersection Capacity Utilization 76.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Columbia Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	827	106	120	725	52	97	160	102	100	165	48
Future Volume (veh/h)	36	827	106	120	725	52	97	160	102	100	165	48
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	0.99		0.96	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1761	1775	1733	1733	1775	1775	1637	1624	1775	1650	1599
Adj Flow Rate, veh/h	36	827	106	120	725	52	97	160	102	100	165	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	3	3	0	0	1	2	0	0	4
Cap, veh/h	276	1141	146	253	1291	93	380	291	186	334	387	112
Arrive On Green	0.03	0.39	0.36	0.06	0.42	0.39	0.06	0.32	0.29	0.06	0.32	0.29
Sat Flow, veh/h	1690	2963	380	1651	3105	223	1690	923	588	1690	1219	355
Grp Volume(v), veh/h	36	467	466	120	384	393	97	0	262	100	0	213
Grp Sat Flow(s),veh/h/ln	1690	1673	1670	1651	1647	1681	1690	0	1511	1690	0	1574
Q Serve(g_s), s	1.2	21.4	21.5	4.0	16.0	16.1	3.6	0.0	13.0	3.7	0.0	9.7
Cycle Q Clear(g_c), s	1.2	21.4	21.5	4.0	16.0	16.1	3.6	0.0	13.0	3.7	0.0	9.7
Prop In Lane	1.00		0.23	1.00		0.13	1.00		0.39	1.00		0.23
Lane Grp Cap(c), veh/h	276	644	643	253	684	699	380	0	477	334	0	499
V/C Ratio(X)	0.13	0.72	0.72	0.47	0.56	0.56	0.26	0.00	0.55	0.30	0.00	0.43
Avail Cap(c_a), veh/h	348	644	643	273	684	699	412	0	477	363	0	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.8	23.6	23.8	19.0	20.0	20.2	20.7	0.0	25.9	21.2	0.0	24.5
Incr Delay (d2), s/veh	0.2	7.0	7.0	1.4	3.3	3.3	0.4	0.0	1.3	0.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	6.1	6.1	0.9	4.0	4.1	0.9	0.0	3.1	0.9	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	30.6	30.8	20.4	23.4	23.4	21.1	0.0	27.2	21.7	0.0	25.0
LnGrp LOS	B	C	C	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		969			897			359			313	
Approach Delay, s/veh		30.2			23.0			25.5			24.0	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.7	38.7	9.2	32.4	7.0	41.4	9.1	32.5
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.8	30.0	6.8	26.4	6.8	30.0	6.8	26.4
Max Q Clear Time (g_c+I1), s	6.0	23.5	5.7	15.0	3.2	18.1	5.6	11.7
Green Ext Time (p_c), s	0.0	3.5	0.0	1.3	0.0	4.4	0.0	1.1

Intersection Summary

HCM 6th Ctrl Delay 26.2
HCM 6th LOS C



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	18	25	19	26	36	57	20	305	48	38	347	16
Future Volume (vph)	18	25	19	26	36	57	20	305	48	38	347	16
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.959			0.935			0.983			0.995	
Flt Protected		0.986			0.989			0.997			0.995	
Satd. Flow (prot)	0	1449	0	0	1372	0	0	1490	0	0	1504	0
Flt Permitted		0.986			0.989			0.997			0.995	
Satd. Flow (perm)	0	1449	0	0	1372	0	0	1490	0	0	1504	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	14		18	18		14	23		40	40		23
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	15%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	18	25	19	26	36	57	20	305	48	38	347	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	0	0	119	0	0	373	0	0	401	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	18	25	19	26	36	57	20	305	48	38	347	16
Future Vol, veh/h	18	25	19	26	36	57	20	305	48	38	347	16
Conflicting Peds, #/hr	14	0	18	18	0	14	23	0	40	40	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	15	0	0	0	1	0	0	1	0
Mvmt Flow	18	25	19	26	36	57	20	305	48	38	347	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	884	887	396	880	871	383	386	0	0	393	0	0
Stage 1	454	454	-	409	409	-	-	-	-	-	-	-
Stage 2	430	433	-	471	462	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.25	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.635	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	268	285	658	254	291	669	1184	-	-	1177	-	-
Stage 1	589	573	-	594	600	-	-	-	-	-	-	-
Stage 2	607	585	-	549	568	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	202	254	637	207	260	641	1163	-	-	1140	-	-
Mov Cap-2 Maneuver	202	254	-	207	260	-	-	-	-	-	-	-
Stage 1	566	539	-	563	569	-	-	-	-	-	-	-
Stage 2	501	555	-	480	534	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.1	21.4	0.4	0.8
HCM LOS	C	C		

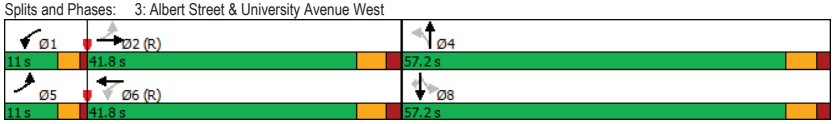
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1163	-	-	285	337	1140	-	-
HCM Lane V/C Ratio	0.017	-	-	0.218	0.353	0.033	-	-
HCM Control Delay (s)	8.2	0	-	21.1	21.4	8.3	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	1.6	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	473	81	76	496	45	105	246	101	45	265	83
Future Volume (vph)	85	473	81	76	496	45	105	246	101	45	265	83
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.85	0.96		0.90	0.97		0.95	0.97		0.94		0.91
Frt		0.978			0.988			0.956				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1651	2983	0	1668	3077	0	1668	1494	0	1668	1860	1442
Flt Permitted	0.338			0.329			0.531			0.453		
Satd. Flow (perm)	498	2983	0	520	3077	0	885	1494	0	749	1860	1316
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		19			9			26				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	242		162	162		242	120		160	160		120
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	6%	0%	0%	4%	0%	0%	1%	1%	0%	1%	2%
Adj. Flow (vph)	85	473	81	76	496	45	105	246	101	45	265	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	554	0	76	541	0	105	347	0	45	265	83
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.8		5.0	35.8		51.2	51.2		51.2	51.2	51.2
Minimum Split (s)	9.0	41.8		9.0	41.8		57.2	57.2		57.2	57.2	57.2
Total Split (s)	11.0	41.8		11.0	41.8		57.2	57.2		57.2	57.2	57.2
Total Split (%)	10.0%	38.0%		10.0%	38.0%		52.0%	52.0%		52.0%	52.0%	52.0%
Maximum Green (s)	7.0	35.8		7.0	35.8		51.2	51.2		51.2	51.2	51.2
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		24.8			24.8		36.2	36.2		36.2	36.2	36.2
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	45.6	40.0		45.6	40.0		53.2	53.2		53.2	53.2	53.2
Actuated g/C Ratio	0.41	0.36		0.41	0.36		0.48	0.48		0.48	0.48	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.31	0.51		0.27	0.48		0.25	0.47		0.12	0.29	0.13
Control Delay	21.2	29.0		20.5	29.0		18.6	20.1		16.8	18.2	16.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	21.2	29.0		20.5	29.0		18.6	20.1		16.8	18.2	16.4
LOS	C	C		C	C		B	C		B	B	B
Approach Delay		27.9			27.9			19.7			17.7	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	10.3	47.5		9.2	46.7		12.6	43.8		5.1	32.7	9.4
Queue Length 95th (m)	19.7	64.2		17.9	62.9		24.1	68.2		11.8	49.9	18.2
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	280	1096		288	1124		428	735		362	899	636
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.30	0.51		0.26	0.48		0.25	0.47		0.12	0.29	0.13

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 14.3 (13%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.51		
Intersection Signal Delay: 24.2	Intersection LOS: C	
Intersection Capacity Utilization 133.5%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Albert Street & University Avenue West





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	473	81	76	496	45	105	246	101	45	265	83
Future Volume (veh/h)	85	473	81	76	496	45	105	246	101	45	265	83
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.87		0.65	0.88		0.65	0.94		0.90	0.95		0.90
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1761	1692	1775	1775	1720	1775	1775	1637	1637	1775	1885	1723
Adj Flow Rate, veh/h	85	473	81	76	496	45	105	246	101	45	265	83
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	6	0	0	4	0	0	1	1	0	1	2
Cap, veh/h	291	923	154	277	1038	93	435	514	211	370	912	636
Arrive On Green	0.05	0.36	0.35	0.04	0.36	0.34	0.48	0.48	0.47	0.48	0.48	0.48
Sat Flow, veh/h	1677	2532	423	1690	2882	258	926	1063	436	932	1885	1315
Grp Volume(v), veh/h	85	296	258	76	278	263	105	0	347	45	265	83
Grp Sat Flow(s),veh/h/ln	1677	1607	1348	1690	1634	1506	926	0	1499	932	1885	1315
Q Serve(g_s), s	3.6	15.8	16.6	3.2	14.4	14.9	8.5	0.0	17.2	3.8	9.3	3.8
Cycle Q Clear(g_c), s	3.6	15.8	16.6	3.2	14.4	14.9	17.7	0.0	17.2	21.0	9.3	3.8
Prop In Lane	1.00		0.31	1.00		0.17	1.00		0.29	1.00		1.00
Lane Grp Cap(c), veh/h	291	586	491	277	588	542	435	0	725	370	912	636
V/C Ratio(X)	0.29	0.51	0.53	0.27	0.47	0.48	0.24	0.00	0.48	0.12	0.29	0.13
Avail Cap(c_a), veh/h	319	586	491	312	588	542	435	0	725	370	912	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	27.2	27.7	23.1	27.1	27.4	22.4	0.0	19.3	26.2	17.1	15.7
Incr Delay (d2), s/veh	0.5	3.1	4.0	0.5	2.7	3.1	0.3	0.0	0.5	0.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	4.7	4.3	0.9	4.3	4.2	1.3	0.0	3.7	0.6	2.5	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.3	30.3	31.7	23.7	29.9	30.5	22.7	0.0	19.8	26.3	17.2	15.7
LnGrp LOS	C	C	C	C	C	C	C	A	B	C	B	B
Approach Vol, veh/h		639			617			452			393	
Approach Delay, s/veh		30.0			29.4			20.5			18.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.7	44.1		57.2	9.2	43.6		57.2				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	35.8		51.2	7.0	35.8		51.2				
Max Q Clear Time (g_c+I1), s	5.2	18.6		19.7	5.6	16.9		23.0				
Green Ext Time (p_c), s	0.0	3.9		3.7	0.0	3.8		2.7				

Intersection Summary												
HCM 6th Ctrl Delay			25.5									
HCM 6th LOS			C									

Appendix D

Background Development Material



262-268, 274, 276, and 280 Albert Street

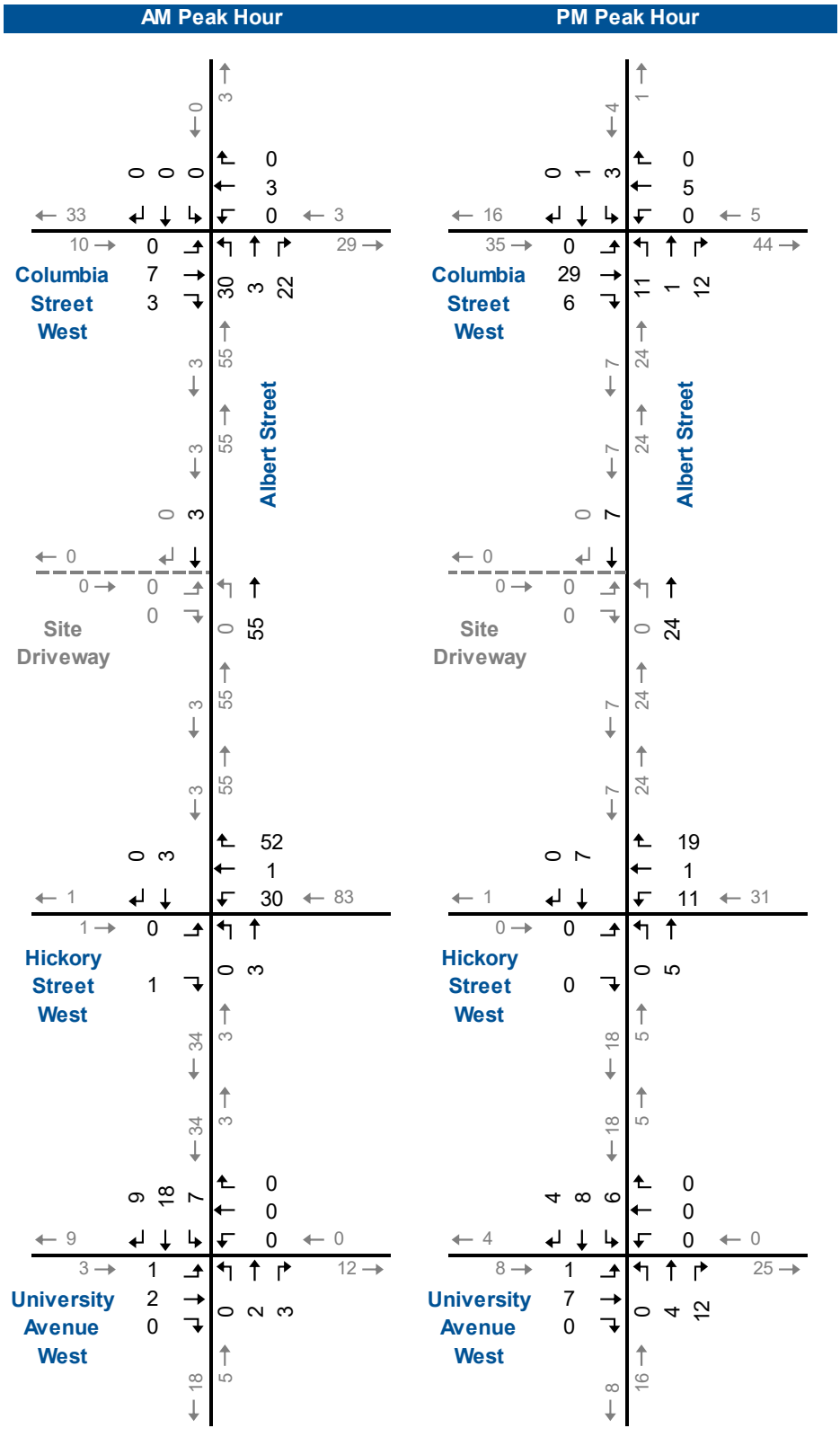
Land Use	Units/GFA	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 221 - Multi-Family Housing (Mid-Rise)	185 Units	Eq	7	45	52	Eq	35	12	47
Total Trip Generation			**7**	**45**	**52**		**35**	**12**	**47**

LUC 221 - AM: T = 0.25(X) + 5.35 | PM: T = 0.29(X) - 6.26

84, 86 Hickory Street West and 284, 286 Albert Street

Land Use	Units/GFA	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 221 - Multi-Family Housing (Mid-Rise)	115 Units	Eq	5	29	34	Eq	20	7	27
Total Trip Generation			**5**	**29**	**34**		**20**	**7**	**27**

LUC 221 - AM: T = 0.25(X) + 5.35 | PM: T = 0.29(X) - 6.26



Background Development Traffic Volumes

Appendix E

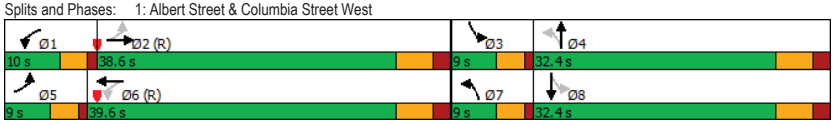
2029 Background Traffic Operations

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	748	56	87	894	95	134	152	119	84	130	21
Future Volume (vph)	23	748	56	87	894	95	134	152	119	84	130	21
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		0.99	0.98		0.98	1.00	
Frt		0.990			0.986			0.934			0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3186	0	1603	3169	0	1668	1449	0	1603	1515	0
Flt Permitted	0.163			0.195			0.601			0.471		
Satd. Flow (perm)	284	3186	0	325	3169	0	1041	1449	0	781	1515	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			15			46			9	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	25		31	31		25	15		26	26		15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	4%	4%	3%	4%	0%	2%	5%	4%	5%	5%
Adj. Flow (vph)	23	748	56	87	894	95	134	152	119	84	130	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	804	0	87	989	0	134	271	0	84	151	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	9.0	38.6		10.0	39.6		9.0	32.4		9.0	32.4	
Total Split (%)	10.0%	42.9%		11.1%	44.0%		10.0%	36.0%		10.0%	36.0%	
Maximum Green (s)	5.0	32.6		6.0	33.6		5.0	26.4		5.0	26.4	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			10.0			10.0	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	40.6	36.6		43.4	41.0		34.2	30.2		33.4	28.4	
Actuated g/C Ratio	0.45	0.41		0.48	0.46		0.38	0.34		0.37	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.11	0.62		0.36	0.68		0.31	0.53		0.25	0.31	
Control Delay	13.0	24.1		16.6	22.9		19.7	25.0		18.6	24.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.0	24.1		16.6	22.9		19.7	25.0		18.6	24.1	
LOS	B	C		B	C		B	C		B	C	
Approach Delay		23.8			22.4			23.2			22.2	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	1.9	57.4		7.6	61.0		14.1	31.3		8.6	18.2	
Queue Length 95th (m)	5.7	76.7		15.2	99.0		25.8	55.5		17.4	33.4	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	204	1301		242	1451		430	516		335	484	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.62		0.36	0.68		0.31	0.53		0.25	0.31	

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 90		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.68		
Intersection Signal Delay: 23.0	Intersection LOS: C	
Intersection Capacity Utilization 77.4%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Albert Street & Columbia Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	748	56	87	894	95	134	152	119	84	130	21
Future Volume (veh/h)	23	748	56	87	894	95	134	152	119	84	130	21
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1733	1720	1720	1733	1720	1775	1624	1586	1720	1586	1586
Adj Flow Rate, veh/h	23	748	56	87	894	95	134	152	119	84	130	21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	3	4	4	3	4	0	2	5	4	5	5
Cap, veh/h	207	1244	93	277	1276	136	426	267	209	309	418	68
Arrive On Green	0.02	0.40	0.38	0.05	0.43	0.40	0.06	0.32	0.30	0.05	0.32	0.29
Sat Flow, veh/h	1690	3095	232	1638	2990	318	1690	834	653	1638	1326	214
Grp Volume(v), veh/h	23	398	406	87	492	497	134	0	271	84	0	151
Grp Sat Flow(s),veh/h/ln	1690	1647	1680	1638	1647	1661	1690	0	1486	1638	0	1540
Q Serve(g_s), s	0.7	17.1	17.2	2.9	22.0	22.1	5.0	0.0	13.7	3.2	0.0	6.7
Cycle Q Clear(g_c), s	0.7	17.1	17.2	2.9	22.0	22.1	5.0	0.0	13.7	3.2	0.0	6.7
Prop In Lane	1.00		0.14	1.00		0.19	1.00		0.44	1.00		0.14
Lane Grp Cap(c), veh/h	207	662	675	277	703	709	426	0	476	309	0	486
V/C Ratio(X)	0.11	0.60	0.60	0.31	0.70	0.70	0.31	0.00	0.57	0.27	0.00	0.31
Avail Cap(c_a), veh/h	260	662	675	306	703	709	426	0	476	318	0	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.5	21.2	21.4	17.3	21.1	21.3	21.0	0.0	25.8	21.5	0.0	23.5
Incr Delay (d2), s/veh	0.2	4.0	3.9	0.6	5.7	5.7	0.4	0.0	1.6	0.5	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.4	4.5	0.6	5.6	5.7	1.3	0.0	3.3	0.7	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.7	25.2	25.3	18.0	26.8	27.0	21.5	0.0	27.4	22.0	0.0	23.8
LnGrp LOS	B	C	C	B	C	C	C	A	C	C	A	C
Approach Vol, veh/h		827			1076			405			235	
Approach Delay, s/veh		25.1			26.2			25.4			23.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	40.2	8.6	32.8	6.2	42.4	9.0	32.4
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	32.6	5.0	26.4	5.0	33.6	5.0	26.4
Max Q Clear Time (g_c+I1), s	4.9	19.2	5.2	15.7	2.7	24.1	7.0	8.7
Green Ext Time (p_c), s	0.0	4.9	0.0	1.3	0.0	4.9	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	25.4
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	8	55	9	113	2	269	0	0	270	2
Future Volume (vph)	23	0	8	55	9	113	2	269	0	0	270	2
Ideal Flow (vphpl)	1765	1000	1765	1550	1550	1550	1650	1650	1000	1000	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.965			0.914						0.999	
Flt Protected		0.964			0.985							
Satd. Flow (prot)	0	920	0	0	1342	0	0	1584	0	0	1568	0
Flt Permitted		0.964			0.985							
Satd. Flow (perm)	0	920	0	0	1342	0	0	1584	0	0	1568	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	11		8	8		11	17		21	21		17
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	5%	0%	2%	0%	3%	0%	0%	4%	0%
Adj. Flow (vph)	23	0	8	55	9	113	2	269	0	0	270	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	31	0	0	177	0	0	271	0	0	272	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.1%	ICU Level of Service A	
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	0	8	55	9	113	2	269	0	0	270	2
Future Vol, veh/h	23	0	8	55	9	113	2	269	0	0	270	2
Conflicting Peds, #/hr	11	0	8	8	0	11	17	0	21	21	0	17
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	2	0	3	0	0	4	0
Mvmt Flow	23	0	8	55	9	113	2	269	0	0	270	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	633	561	296	556	562	280	289	0	-	-	-	0
Stage 1	288	288	-	273	273	-	-	-	-	-	-	-
Stage 2	345	273	-	283	289	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.5	6.22	4.1	-	-	-	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4	3.318	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	395	439	748	437	439	759	1284	-	0	0	-	-
Stage 1	724	677	-	726	688	-	-	-	0	0	-	-
Stage 2	675	688	-	718	677	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	323	432	734	429	432	753	1267	-	-	-	-	-
Mov Cap-2 Maneuver	323	432	-	429	432	-	-	-	-	-	-	-
Stage 1	713	668	-	725	687	-	-	-	-	-	-	-
Stage 2	560	687	-	706	668	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.4	13.7	0.1	0
HCM LOS	C	B		

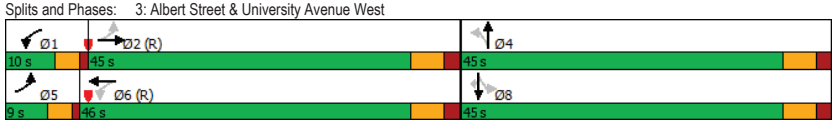
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1267	-	378	592	-	-
HCM Lane V/C Ratio	0.002	-	0.082	0.299	-	-
HCM Control Delay (s)	7.8	0	15.4	13.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	1.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	394	23	89	408	29	74	177	84	33	257	63
Future Volume (vph)	64	394	23	89	408	29	74	177	84	33	257	63
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.88	0.99		0.90	0.98		0.96	0.96		0.94		0.92
Frt		0.992			0.990			0.952				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1619	2979	0	1619	2995	0	1588	1419	0	1603	1842	1388
Flt Permitted	0.454			0.448			0.515			0.510		
Satd. Flow (perm)	683	2979	0	688	2995	0	825	1419	0	808	1842	1280
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7			9			29				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	99		85	85		99	56		84	84		56
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	10%	5%	3%	9%	0%	5%	2%	13%	4%	2%	6%
Adj. Flow (vph)	64	394	23	89	408	29	74	177	84	33	257	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	417	0	89	437	0	74	261	0	33	257	63
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	39.0		5.0	39.0		39.0	39.0		39.0	39.0	39.0
Minimum Split (s)	9.0	45.0		9.0	45.0		45.0	45.0		45.0	45.0	45.0
Total Split (s)	9.0	45.0		10.0	46.0		45.0	45.0		45.0	45.0	45.0
Total Split (%)	9.0%	45.0%		10.0%	46.0%		45.0%	45.0%		45.0%	45.0%	45.0%
Maximum Green (s)	5.0	39.0		6.0	40.0		39.0	39.0		39.0	39.0	39.0
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		10.0			10.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	47.0	43.0		48.6	43.8		41.0	41.0		41.0	41.0	41.0
Actuated g/C Ratio	0.47	0.43		0.49	0.44		0.41	0.41		0.41	0.41	0.41

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.17	0.32		0.23	0.33		0.22	0.44		0.10	0.34	0.12
Control Delay	13.9	20.0		14.3	19.5		21.4	21.5		19.3	21.9	19.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	13.9	20.0		14.3	19.5		21.4	21.5		19.3	21.9	19.2
LOS	B	C		B	B		C	C		B	C	B
Approach Delay		19.2			18.6			21.5			21.1	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	6.0	27.6		8.5	28.5		9.0	31.0		3.8	33.0	7.3
Queue Length 95th (m)	12.6	39.2		16.4	40.2		19.1	52.1		9.9	51.9	15.6
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	367	1284		390	1317		338	598		331	755	524
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.17	0.32		0.23	0.33		0.22	0.44		0.10	0.34	0.12

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.44			
Intersection Signal Delay: 19.9		Intersection LOS: B	
Intersection Capacity Utilization 113.6%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 3: Albert Street & University Avenue West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	394	23	89	408	29	74	177	84	33	257	63
Future Volume (veh/h)	64	394	23	89	408	29	74	177	84	33	257	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.88	0.96		0.88	0.97		0.94	0.98		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1733	1637	1706	1733	1650	1775	1706	1624	1483	1720	1870	1668
Adj Flow Rate, veh/h	64	394	23	89	408	29	74	177	84	33	257	63
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	10	5	3	9	0	5	2	13	4	2	6
Cap, veh/h	408	1252	73	420	1260	89	369	417	198	358	767	544
Arrive On Green	0.04	0.42	0.40	0.05	0.43	0.41	0.41	0.41	0.39	0.41	0.41	0.41
Sat Flow, veh/h	1651	2960	172	1651	2940	207	941	1016	482	1005	1870	1327
Grp Volume(v), veh/h	64	206	211	89	216	221	74	0	261	33	257	63
Grp Sat Flow(s),veh/h/ln	1651	1555	1577	1651	1568	1579	941	0	1498	1005	1870	1327
Q Serve(g_s), s	2.2	8.8	9.0	3.1	9.1	9.3	5.8	0.0	12.5	2.4	9.4	2.9
Cycle Q Clear(g_c), s	2.2	8.8	9.0	3.1	9.1	9.3	15.2	0.0	12.5	15.0	9.4	2.9
Prop In Lane	1.00		0.11	1.00		0.13	1.00		0.32	1.00		1.00
Lane Grp Cap(c), veh/h	408	657	667	420	672	677	369	0	614	358	767	544
V/C Ratio(X)	0.16	0.31	0.32	0.21	0.32	0.33	0.20	0.00	0.42	0.09	0.34	0.12
Avail Cap(c_a), veh/h	422	657	667	441	672	677	369	0	614	358	767	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.5	19.2	19.3	16.4	18.9	19.1	25.4	0.0	21.3	26.5	20.2	18.3
Incr Delay (d2), s/veh	0.2	1.2	1.2	0.2	1.3	1.3	0.3	0.0	0.5	0.1	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.1	2.2	0.7	2.2	2.3	0.9	0.0	2.8	0.4	2.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.7	20.4	20.6	16.7	20.2	20.4	25.7	0.0	21.8	26.6	20.4	18.4
LnGrp LOS	B	C	C	B	C	C	C	A	C	C	C	B
Approach Vol, veh/h		481			526			335			353	
Approach Delay, s/veh		20.0			19.7			22.7			20.6	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.7	46.3		45.0	8.2	46.8		45.0				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	6.0	39.0		39.0	5.0	40.0		39.0				
Max Q Clear Time (g_c+I1), s	5.1	11.0		17.2	4.2	11.3		17.0				
Green Ext Time (p_c), s	0.0	3.2		2.4	0.0	3.3		2.3				

Intersection Summary		
HCM 6th Ctrl Delay	20.6	
HCM 6th LOS	C	



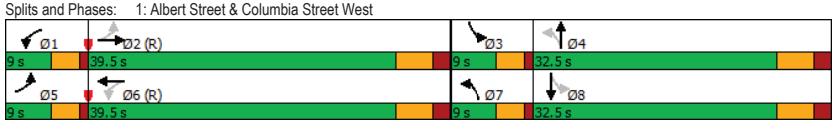
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	972	113	122	821	59	120	181	155	170	169	54
Future Volume (vph)	41	972	113	122	821	59	120	181	155	170	169	54
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		0.98	0.98		0.99	0.99	
Frt		0.984			0.990			0.931			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3223	0	1619	3201	0	1668	1471	0	1668	1542	0
Flt Permitted	0.207			0.112			0.509			0.344		
Satd. Flow (perm)	361	3223	0	189	3201	0	875	1471	0	596	1542	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			10			50			19	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	15		35	35		15	28		23	23		28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	3%	3%	0%	0%	1%	2%	0%	0%	4%
Adj. Flow (vph)	41	972	113	122	821	59	120	181	155	170	169	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1085	0	122	880	0	120	336	0	170	223	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	9.0	39.5		9.0	39.5		9.0	32.5		9.0	32.5	
Total Split (%)	10.0%	43.9%		10.0%	43.9%		10.0%	36.1%		10.0%	36.1%	
Maximum Green (s)	5.0	33.5		5.0	33.5		5.0	26.5		5.0	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			10.0			10.0	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	40.6	35.5		42.2	39.1		33.4	28.4		33.4	28.4	
Actuated g/C Ratio	0.45	0.39		0.47	0.43		0.37	0.32		0.37	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.17	0.85		0.73	0.63		0.33	0.67		0.61	0.45	
Control Delay	13.7	32.2		40.4	22.9		19.8	30.4		29.2	25.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.7	32.2		40.4	22.9		19.8	30.4		29.2	25.7	
LOS	B	C		D	C		B	C		C	C	
Approach Delay		31.5			25.1			27.7			27.3	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	3.5	85.5		10.8	63.7		12.5	42.1		18.4	27.4	
Queue Length 95th (m)	8.5	#112.7		#33.3	84.6		23.4	71.5		32.0	47.3	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	236	1280		168	1397		368	499		280	501	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.85		0.73	0.63		0.33	0.67		0.61	0.45	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 28.2 Intersection LOS: C
Intersection Capacity Utilization 86.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Columbia Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	972	113	122	821	59	120	181	155	170	169	54
Future Volume (veh/h)	41	972	113	122	821	59	120	181	155	170	169	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.96	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1761	1775	1733	1733	1775	1775	1637	1624	1775	1650	1599
Adj Flow Rate, veh/h	41	972	113	122	821	59	120	181	155	170	169	54
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	3	3	0	0	1	2	0	0	4
Cap, veh/h	249	1188	138	212	1290	93	368	253	217	265	375	120
Arrive On Green	0.04	0.40	0.37	0.06	0.42	0.39	0.06	0.32	0.29	0.06	0.32	0.29
Sat Flow, veh/h	1690	3002	349	1651	3105	223	1690	802	687	1690	1189	380
Grp Volume(v), veh/h	41	542	543	122	435	445	120	0	336	170	0	223
Grp Sat Flow(s),veh/h/ln	1690	1673	1678	1651	1647	1681	1690	0	1490	1690	0	1568
Q Serve(g_s), s	1.3	26.0	26.1	4.1	18.9	19.0	4.5	0.0	18.0	5.0	0.0	10.3
Cycle Q Clear(g_c), s	1.3	26.0	26.1	4.1	18.9	19.0	4.5	0.0	18.0	5.0	0.0	10.3
Prop In Lane	1.00		0.21	1.00		0.13	1.00		0.46	1.00		0.24
Lane Grp Cap(c), veh/h	249	662	664	212	684	698	368	0	470	265	0	495
V/C Ratio(X)	0.16	0.82	0.82	0.58	0.64	0.64	0.33	0.00	0.71	0.64	0.00	0.45
Avail Cap(c_a), veh/h	283	662	664	212	684	698	368	0	472	265	0	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.9	24.3	24.5	20.9	20.9	21.0	21.2	0.0	27.7	26.9	0.0	24.8
Incr Delay (d2), s/veh	0.3	10.8	10.8	3.8	4.5	4.4	0.5	0.0	5.1	5.1	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	7.7	7.8	1.1	4.8	4.9	1.1	0.0	4.7	1.8	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.2	35.1	35.3	24.7	25.4	25.4	21.7	0.0	32.7	32.0	0.0	25.4
LnGrp LOS	B	D	D	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		1126			1002			456			393	
Approach Delay, s/veh		34.6			25.3			29.8			28.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	39.6	9.0	32.4	7.2	41.4	9.0	32.4
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	5.0	33.5	5.0	26.5	5.0	33.5	5.0	26.5
Max Q Clear Time (g_c+I1), s	6.1	28.1	7.0	20.0	3.3	21.0	6.5	12.3
Green Ext Time (p_c), s	0.0	3.4	0.0	1.2	0.0	5.2	0.0	1.2

Intersection Summary

HCM 6th Ctrl Delay 29.9
HCM 6th LOS C



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	0	21	40	42	83	23	348	0	0	398	18
Future Volume (vph)	48	0	21	40	42	83	23	348	0	0	398	18
Ideal Flow (vphpl)	1765	1000	1765	1550	1550	1550	1650	1650	1000	1000	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.959			0.932						0.994	
Flt Protected		0.966			0.988			0.997				
Satd. Flow (prot)	0	916	0	0	1362	0	0	1612	0	0	1607	0
Flt Permitted		0.966			0.988			0.997				
Satd. Flow (perm)	0	916	0	0	1362	0	0	1612	0	0	1607	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	14		18	18		14	23		40	40		23
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	15%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	48	0	21	40	42	83	23	348	0	0	398	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	69	0	0	165	0	0	371	0	0	416	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	48	0	21	40	42	83	23	348	0	0	398	18
Future Vol, veh/h	48	0	21	40	42	83	23	348	0	0	398	18
Conflicting Peds, #/hr	14	0	18	18	0	14	23	0	40	40	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	15	0	0	0	1	0	0	1	0
Mvmt Flow	48	0	21	40	42	83	23	348	0	0	398	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	901	824	448	830	833	362	439	0	-	-	-	0
Stage 1	430	430	-	394	394	-	-	-	-	-	-	-
Stage 2	471	394	-	436	439	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.25	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.635	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	261	310	615	275	307	687	1132	-	0	0	-	-
Stage 1	607	587	-	606	609	-	-	-	0	0	-	-
Stage 2	577	609	-	574	582	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	194	296	596	256	293	680	1112	-	-	-	-	-
Mov Cap-2 Maneuver	194	296	-	256	293	-	-	-	-	-	-	-
Stage 1	581	576	-	590	593	-	-	-	-	-	-	-
Stage 2	453	593	-	546	572	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.5	20.8	0.5	0
HCM LOS	D	C		

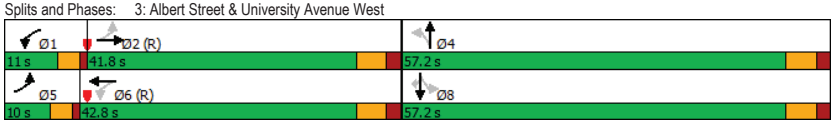
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1112	-	244	391	-	-
HCM Lane V/C Ratio	0.021	-	0.283	0.422	-	-
HCM Control Delay (s)	8.3	0	25.5	20.8	-	-
HCM Lane LOS	A	A	D	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	552	91	86	559	45	118	245	162	57	306	97
Future Volume (vph)	85	552	91	86	559	45	118	245	162	57	306	97
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.83	0.94		0.88	0.96		0.91	0.91		0.91		0.83
Frt		0.979			0.989			0.940				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1651	2914	0	1668	3054	0	1668	1386	0	1668	1860	1442
Flt Permitted	0.307			0.266			0.492			0.399		
Satd. Flow (perm)	442	2914	0	412	3054	0	788	1386	0	637	1860	1201
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		18			8			42				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	242		162	162		242	120		160	160		120
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	6%	0%	0%	4%	0%	0%	1%	1%	0%	1%	2%
Adj. Flow (vph)	85	552	91	86	559	45	118	245	162	57	306	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	643	0	86	604	0	118	407	0	57	306	97
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.8		5.0	35.8		51.2	51.2		51.2	51.2	51.2
Minimum Split (s)	9.0	41.8		9.0	41.8		57.2	57.2		57.2	57.2	57.2
Total Split (s)	10.0	41.8		11.0	42.8		57.2	57.2		57.2	57.2	57.2
Total Split (%)	9.1%	38.0%		10.0%	38.9%		52.0%	52.0%		52.0%	52.0%	52.0%
Maximum Green (s)	6.0	35.8		7.0	36.8		51.2	51.2		51.2	51.2	51.2
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		10.0			10.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	44.8	40.0		46.4	40.8		53.2	53.2		53.2	53.2	53.2
Actuated g/C Ratio	0.41	0.36		0.42	0.37		0.48	0.48		0.48	0.48	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.35	0.60		0.34	0.53		0.31	0.59		0.19	0.34	0.17
Control Delay	22.3	31.2		22.0	29.4		20.1	22.4		18.2	18.9	17.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	22.3	31.2		22.0	29.4		20.1	22.4		18.2	18.9	17.0
LOS	C	C		C	C		C	C		B	B	B
Approach Delay		30.2			28.5			21.9			18.4	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	10.3	58.0		10.4	53.0		14.7	54.0		6.6	38.7	11.2
Queue Length 95th (m)	19.7	77.3		19.8	70.5		28.0	84.7		14.9	58.2	21.1
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	245	1071		253	1137		381	692		308	899	580
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.35	0.60		0.34	0.53		0.31	0.59		0.19	0.34	0.17

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 14.3 (13%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.60		
Intersection Signal Delay: 25.6	Intersection LOS: C	
Intersection Capacity Utilization 133.6%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Albert Street & University Avenue West





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	552	91	86	559	45	118	245	162	57	306	97
Future Volume (veh/h)	85	552	91	86	559	45	118	245	162	57	306	97
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.71	0.99		0.71	0.97		0.90	0.99		0.90
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1761	1692	1775	1775	1720	1775	1775	1637	1637	1775	1885	1723
Adj Flow Rate, veh/h	85	552	91	86	559	45	118	245	162	57	306	97
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	6	0	0	4	0	0	1	1	0	1	2
Cap, veh/h	287	933	152	268	1065	85	412	423	280	325	912	636
Arrive On Green	0.05	0.36	0.34	0.05	0.36	0.34	0.48	0.48	0.47	0.48	0.48	0.48
Sat Flow, veh/h	1677	2593	422	1690	2958	236	903	875	579	923	1885	1315
Grp Volume(v), veh/h	85	340	303	86	307	297	118	0	407	57	306	97
Grp Sat Flow(s),veh/h/ln	1677	1607	1408	1690	1634	1561	903	0	1454	923	1885	1315
Q Serve(g_s), s	3.6	18.9	19.4	3.6	16.3	16.6	10.2	0.0	22.3	5.2	11.0	4.5
Cycle Q Clear(g_c), s	3.6	18.9	19.4	3.6	16.3	16.6	21.2	0.0	22.3	27.5	11.0	4.5
Prop In Lane	1.00		0.30	1.00		0.15	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	287	578	507	268	588	562	412	0	703	325	912	636
V/C Ratio(X)	0.30	0.59	0.60	0.32	0.52	0.53	0.29	0.00	0.58	0.18	0.34	0.15
Avail Cap(c_a), veh/h	299	578	507	295	588	562	412	0	703	325	912	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	28.6	29.0	23.6	27.7	27.9	24.0	0.0	20.7	30.3	17.5	15.8
Incr Delay (d2), s/veh	0.6	4.3	5.2	0.7	3.3	3.5	0.4	0.0	1.2	0.3	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	5.7	5.3	1.0	4.9	4.8	1.5	0.0	4.7	0.9	2.9	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	32.9	34.2	24.3	31.0	31.5	24.4	0.0	21.9	30.5	17.7	15.9
LnGrp LOS	C	C	C	C	C	C	C	A	C	C	B	B
Approach Vol, veh/h		728			690			525			460	
Approach Delay, s/veh		32.3			30.4			22.5			18.9	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.2	43.6		57.2	9.2	43.6		57.2				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	35.8		51.2	6.0	36.8		51.2				
Max Q Clear Time (g_c+I1), s	5.6	21.4		24.3	5.6	18.6		29.5				
Green Ext Time (p_c), s	0.0	4.2		4.4	0.0	4.2		3.0				

Intersection Summary												
HCM 6th Ctrl Delay			27.0									
HCM 6th LOS			C									

Appendix F

2029 Total Traffic Operations



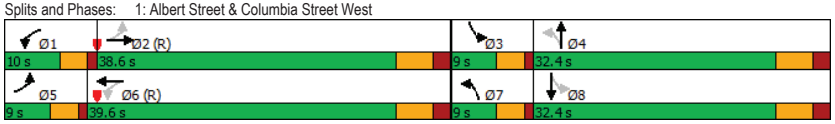
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	748	59	89	894	95	144	153	126	84	131	21
Future Volume (vph)	23	748	59	89	894	95	144	153	126	84	131	21
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		0.99	0.98		0.98	1.00	
Frt		0.989			0.986			0.932			0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3181	0	1603	3169	0	1668	1444	0	1603	1515	0
Flt Permitted	0.163			0.194			0.599			0.459		
Satd. Flow (perm)	284	3181	0	323	3169	0	1038	1444	0	762	1515	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			15			48			9	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	25		31	31		25	15		26	26		15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	4%	4%	3%	4%	0%	2%	5%	4%	5%	5%
Adj. Flow (vph)	23	748	59	89	894	95	144	153	126	84	131	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	807	0	89	989	0	144	279	0	84	152	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	9.0	38.6		10.0	39.6		9.0	32.4		9.0	32.4	
Total Split (%)	10.0%	42.9%		11.1%	44.0%		10.0%	36.0%		10.0%	36.0%	
Maximum Green (s)	5.0	32.6		6.0	33.6		5.0	26.4		5.0	26.4	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			10.0			10.0	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	40.6	36.6		43.4	41.0		34.2	30.2		33.4	28.4	
Actuated g/C Ratio	0.45	0.41		0.48	0.46		0.38	0.34		0.37	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.11	0.62		0.37	0.68		0.34	0.54		0.26	0.31	
Control Delay	13.0	24.2		16.8	22.9		20.2	25.3		18.7	24.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.0	24.2		16.8	22.9		20.2	25.3		18.7	24.2	
LOS	B	C		B	C		C	C		B	C	
Approach Delay		23.8			22.4			23.5			22.2	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	1.9	57.7		7.8	61.0		15.3	32.5		8.6	18.3	
Queue Length 95th (m)	5.7	77.3		15.4	99.0		27.5	57.3		17.4	33.6	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	204	1299		241	1451		429	516		329	484	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.62		0.37	0.68		0.34	0.54		0.26	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 23.1 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Albert Street & Columbia Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	748	59	89	894	95	144	153	126	84	131	21
Future Volume (veh/h)	23	748	59	89	894	95	144	153	126	84	131	21
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1733	1720	1720	1733	1720	1775	1624	1586	1720	1586	1586
Adj Flow Rate, veh/h	23	748	59	89	894	95	144	153	126	84	131	21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	3	4	4	3	4	0	2	5	4	5	5
Cap, veh/h	207	1237	98	277	1276	136	425	261	215	302	419	67
Arrive On Green	0.02	0.40	0.38	0.05	0.43	0.40	0.06	0.32	0.30	0.05	0.32	0.29
Sat Flow, veh/h	1690	3081	243	1638	2990	318	1690	813	670	1638	1328	213
Grp Volume(v), veh/h	23	400	407	89	492	497	144	0	279	84	0	152
Grp Sat Flow(s),veh/h/ln	1690	1647	1678	1638	1647	1661	1690	0	1483	1638	0	1540
Q Serve(g_s), s	0.7	17.3	17.3	2.9	22.0	22.1	5.0	0.0	14.3	3.2	0.0	6.8
Cycle Q Clear(g_c), s	0.7	17.3	17.3	2.9	22.0	22.1	5.0	0.0	14.3	3.2	0.0	6.8
Prop In Lane	1.00		0.14	1.00		0.19	1.00		0.45	1.00		0.14
Lane Grp Cap(c), veh/h	207	661	674	277	703	709	425	0	475	302	0	486
V/C Ratio(X)	0.11	0.60	0.60	0.32	0.70	0.70	0.34	0.00	0.59	0.28	0.00	0.31
Avail Cap(c_a), veh/h	260	661	674	305	703	709	425	0	475	311	0	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.5	21.3	21.4	17.4	21.1	21.3	21.6	0.0	26.0	21.6	0.0	23.5
Incr Delay (d2), s/veh	0.2	4.1	4.0	0.7	5.7	5.7	0.5	0.0	1.9	0.5	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.5	4.5	0.6	5.6	5.7	1.4	0.0	3.4	0.7	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.7	25.3	25.4	18.0	26.8	27.0	22.0	0.0	27.9	22.1	0.0	23.9
LnGrp LOS	B	C	C	B	C	C	C	A	C	C	A	C
Approach Vol, veh/h		830			1078			423			236	
Approach Delay, s/veh		25.2			26.2			25.9			23.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.5	40.1	8.6	32.8	6.2	42.4	9.0	32.4
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	32.6	5.0	26.4	5.0	33.6	5.0	26.4
Max Q Clear Time (g_c+I1), s	4.9	19.3	5.2	16.3	2.7	24.1	7.0	8.8
Green Ext Time (p_c), s	0.0	4.9	0.0	1.3	0.0	4.9	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	25.5
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	8	55	9	113	2	273	0	0	279	2
Future Volume (vph)	23	0	8	55	9	113	2	273	0	0	279	2
Ideal Flow (vphpl)	1765	1000	1765	1550	1550	1550	1650	1650	1000	1000	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.965			0.914						0.999	
Flt Protected		0.964			0.985							
Satd. Flow (prot)	0	920	0	0	1342	0	0	1584	0	0	1568	0
Flt Permitted		0.964			0.985							
Satd. Flow (perm)	0	920	0	0	1342	0	0	1584	0	0	1568	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	11		8	8		11	17		21	21		17
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	5%	0%	2%	0%	3%	0%	0%	4%	0%
Adj. Flow (vph)	23	0	8	55	9	113	2	273	0	0	279	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	31	0	0	177	0	0	275	0	0	281	0
Sign Control		Stop			Stop			Free			Free	

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

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	0	8	55	9	113	2	273	0	0	279	2
Future Vol, veh/h	23	0	8	55	9	113	2	273	0	0	279	2
Conflicting Peds, #/hr	11	0	8	8	0	11	17	0	21	21	0	17
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	5	0	2	0	3	0	0	4	0
Mvmt Flow	23	0	8	55	9	113	2	273	0	0	279	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	646	574	305	569	575	284	298	0	-	-	-	0
Stage 1	297	297	-	277	277	-	-	-	-	-	-	-
Stage 2	349	277	-	292	298	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.5	6.22	4.1	-	-	-	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4	3.318	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	387	432	740	428	431	755	1275	-	0	0	-	-
Stage 1	716	671	-	723	685	-	-	-	0	0	-	-
Stage 2	671	685	-	710	671	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	316	426	726	420	425	749	1258	-	-	-	-	-
Mov Cap-2 Maneuver	316	426	-	420	425	-	-	-	-	-	-	-
Stage 1	705	662	-	722	684	-	-	-	-	-	-	-
Stage 2	556	684	-	698	662	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.6	13.8	0.1	0
HCM LOS	C	B		

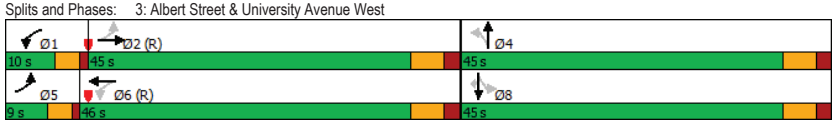
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1258	-	370	584	-	-
HCM Lane V/C Ratio	0.002	-	0.084	0.303	-	-
HCM Control Delay (s)	7.9	0	15.6	13.8	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	1.3	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	394	23	89	408	30	74	179	84	34	262	66
Future Volume (vph)	65	394	23	89	408	30	74	179	84	34	262	66
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.88	0.99		0.90	0.98		0.96	0.96		0.94		0.92
Frt		0.992			0.990			0.952				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1619	2979	0	1619	2994	0	1588	1420	0	1603	1842	1388
Flt Permitted	0.453			0.448			0.509			0.508		
Satd. Flow (perm)	681	2979	0	688	2994	0	816	1420	0	805	1842	1280
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		7			9			29				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	99		85	85		99	56		84	84		56
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	10%	5%	3%	9%	0%	5%	2%	13%	4%	2%	6%
Adj. Flow (vph)	65	394	23	89	408	30	74	179	84	34	262	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	417	0	89	438	0	74	263	0	34	262	66
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	39.0		5.0	39.0		39.0	39.0		39.0	39.0	39.0
Minimum Split (s)	9.0	45.0		9.0	45.0		45.0	45.0		45.0	45.0	45.0
Total Split (s)	9.0	45.0		10.0	46.0		45.0	45.0		45.0	45.0	45.0
Total Split (%)	9.0%	45.0%		10.0%	46.0%		45.0%	45.0%		45.0%	45.0%	45.0%
Maximum Green (s)	5.0	39.0		6.0	40.0		39.0	39.0		39.0	39.0	39.0
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		10.0			10.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	47.0	43.0		48.6	43.8		41.0	41.0		41.0	41.0	41.0
Actuated g/C Ratio	0.47	0.43		0.49	0.44		0.41	0.41		0.41	0.41	0.41

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.18	0.32		0.23	0.33		0.22	0.44		0.10	0.35	0.13
Control Delay	13.9	20.0		14.3	19.5		21.4	21.6		19.4	22.0	19.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	13.9	20.0		14.3	19.5		21.4	21.6		19.4	22.0	19.3
LOS	B	C		B	B		C	C		B	C	B
Approach Delay		19.2			18.6			21.5			21.2	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	6.1	27.6		8.5	28.6		9.0	31.3		3.9	33.7	7.7
Queue Length 95th (m)	12.8	39.2		16.4	40.4		19.2	52.6		10.2	52.9	16.1
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	367	1284		390	1316		334	599		330	755	524
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.18	0.32		0.23	0.33		0.22	0.44		0.10	0.35	0.13

Intersection Summary		
Area Type:	Other	
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 100		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.44		
Intersection Signal Delay: 19.9	Intersection LOS: B	
Intersection Capacity Utilization 113.6%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Albert Street & University Avenue West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	394	23	89	408	30	74	179	84	34	262	66
Future Volume (veh/h)	65	394	23	89	408	30	74	179	84	34	262	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.88	0.96		0.88	0.97		0.94	0.98		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1733	1637	1706	1733	1650	1775	1706	1624	1483	1720	1870	1668
Adj Flow Rate, veh/h	65	394	23	89	408	30	74	179	84	34	262	66
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	10	5	3	9	0	5	2	13	4	2	6
Cap, veh/h	407	1252	73	420	1255	92	366	418	196	356	767	544
Arrive On Green	0.04	0.42	0.40	0.05	0.43	0.41	0.41	0.41	0.39	0.41	0.41	0.41
Sat Flow, veh/h	1651	2960	172	1651	2931	214	935	1020	479	1003	1870	1327
Grp Volume(v), veh/h	65	206	211	89	217	221	74	0	263	34	262	66
Grp Sat Flow(s),veh/h/ln	1651	1555	1577	1651	1568	1577	935	0	1499	1003	1870	1327
Q Serve(g_s), s	2.3	8.8	9.0	3.1	9.2	9.4	5.9	0.0	12.6	2.5	9.6	3.1
Cycle Q Clear(g_c), s	2.3	8.8	9.0	3.1	9.2	9.4	15.5	0.0	12.6	15.2	9.6	3.1
Prop In Lane	1.00		0.11	1.00		0.14	1.00		0.32	1.00		1.00
Lane Grp Cap(c), veh/h	407	657	667	420	671	675	366	0	615	356	767	544
V/C Ratio(X)	0.16	0.31	0.32	0.21	0.32	0.33	0.20	0.00	0.43	0.10	0.34	0.12
Avail Cap(c_a), veh/h	421	657	667	441	671	675	366	0	615	356	767	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.5	19.2	19.3	16.4	19.0	19.1	25.6	0.0	21.4	26.6	20.2	18.3
Incr Delay (d2), s/veh	0.2	1.2	1.2	0.2	1.3	1.3	0.3	0.0	0.5	0.1	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.1	2.2	0.7	2.2	2.3	0.9	0.0	2.8	0.4	2.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.7	20.4	20.6	16.7	20.2	20.4	25.8	0.0	21.8	26.7	20.5	18.4
LnGrp LOS	B	C	C	B	C	C	C	A	C	C	C	B
Approach Vol, veh/h		482			527			337			362	
Approach Delay, s/veh		20.0			19.7			22.7			20.7	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.7	46.3		45.0	8.2	46.8		45.0				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	6.0	39.0		39.0	5.0	40.0		39.0				
Max Q Clear Time (g_c+I1), s	5.1	11.0		17.5	4.3	11.4		17.2				
Green Ext Time (p_c), s	0.0	3.2		2.4	0.0	3.4		2.3				

Intersection Summary		
HCM 6th Ctrl Delay	20.6	
HCM 6th LOS	C	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	18	9	4	404	273	6
Future Volume (vph)	18	9	4	404	273	6
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.955				0.997	
Flt Protected	0.968					
Satd. Flow (prot)	1582	0	0	1600	1550	0
Flt Permitted	0.968					
Satd. Flow (perm)	1582	0	0	1600	1550	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.6			155.7	45.1	
Travel Time (s)	4.4			11.2	3.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	5%	2%
Adj. Flow (vph)	18	9	4	404	273	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	408	279	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	18	9	4	404	273	6
Future Vol, veh/h	18	9	4	404	273	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	5	2
Mvmt Flow	18	9	4	404	273	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	688	276	279	0	-	0
Stage 1	276	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	412	763	1284	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	410	763	1284	-	-	-
Mov Cap-2 Maneuver	410	-	-	-	-	-
Stage 1	768	-	-	-	-	-
Stage 2	669	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1284	-	485	-	-
HCM Lane V/C Ratio	0.003	-	0.056	-	-
HCM Control Delay (s)	7.8	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

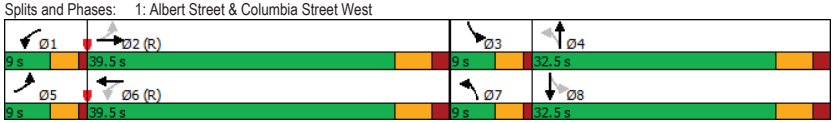
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	972	123	129	821	59	126	182	159	170	170	54
Future Volume (vph)	41	972	123	129	821	59	126	182	159	170	170	54
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	30.0		0.0	35.0		0.0	25.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		0.98	0.98		0.99	0.99	
Frt		0.983			0.990			0.930			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	3218	0	1619	3201	0	1668	1469	0	1668	1542	0
Flt Permitted	0.207			0.112			0.507			0.337		
Satd. Flow (perm)	361	3218	0	189	3201	0	871	1469	0	584	1542	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			10			51			19	
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		64.1			78.3			56.5			58.7	
Travel Time (s)		4.6			5.6			4.1			3.5	
Confl. Peds. (#/hr)	15		35	35		15	28		23	23		28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	3%	3%	0%	0%	1%	2%	0%	0%	4%
Adj. Flow (vph)	41	972	123	129	821	59	126	182	159	170	170	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1095	0	129	880	0	126	341	0	170	224	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Detector Phase	5	2		1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	30.0		5.0	26.4		5.0	26.4	
Minimum Split (s)	9.0	36.0		9.0	36.0		9.0	32.4		9.0	32.4	
Total Split (s)	9.0	39.5		9.0	39.5		9.0	32.5		9.0	32.5	
Total Split (%)	10.0%	43.9%		10.0%	43.9%		10.0%	36.1%		10.0%	36.1%	
Maximum Green (s)	5.0	33.5		5.0	33.5		5.0	26.5		5.0	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			10.0			10.0	
Flash Dont Walk (s)		13.0			13.0			14.0			14.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	40.6	35.5		42.2	39.1		33.4	28.4		33.4	28.4	
Actuated g/C Ratio	0.45	0.39		0.47	0.43		0.37	0.32		0.37	0.32	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.17	0.86		0.77	0.63		0.34	0.68		0.62	0.45	
Control Delay	13.7	32.7		45.3	22.9		20.2	30.8		29.8	25.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.7	32.7		45.3	22.9		20.2	30.8		29.8	25.8	
LOS	B	C		D	C		C	C		C	C	
Approach Delay		32.0			25.8			27.9			27.5	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	3.5	86.6		11.5	63.7		13.2	42.9		18.4	27.5	
Queue Length 95th (m)	8.5	#115.8		#36.6	84.6		24.4	72.7		32.0	47.7	
Internal Link Dist (m)		40.1			54.3			32.5			34.7	
Turn Bay Length (m)	30.0			35.0			25.0			30.0		
Base Capacity (vph)	236	1280		168	1397		367	500		276	501	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.86		0.77	0.63		0.34	0.68		0.62	0.45	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 63.9 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.7 Intersection LOS: C
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Albert Street & Columbia Street West





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	972	123	129	821	59	126	182	159	170	170	54
Future Volume (veh/h)	41	972	123	129	821	59	126	182	159	170	170	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.96	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1775	1761	1775	1733	1733	1775	1775	1637	1624	1775	1650	1599
Adj Flow Rate, veh/h	41	972	123	129	821	59	126	182	159	170	170	54
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	3	3	0	0	1	2	0	0	4
Cap, veh/h	249	1175	149	209	1290	93	367	251	219	261	376	119
Arrive On Green	0.04	0.40	0.37	0.06	0.42	0.39	0.06	0.32	0.29	0.06	0.32	0.29
Sat Flow, veh/h	1690	2969	376	1651	3105	223	1690	794	694	1690	1191	378
Grp Volume(v), veh/h	41	548	547	129	435	445	126	0	341	170	0	224
Grp Sat Flow(s),veh/h/ln	1690	1673	1672	1651	1647	1681	1690	0	1488	1690	0	1569
Q Serve(g_s), s	1.3	26.5	26.5	4.4	18.9	19.0	4.7	0.0	18.4	5.0	0.0	10.3
Cycle Q Clear(g_c), s	1.3	26.5	26.5	4.4	18.9	19.0	4.7	0.0	18.4	5.0	0.0	10.3
Prop In Lane	1.00		0.22	1.00		0.13	1.00		0.47	1.00		0.24
Lane Grp Cap(c), veh/h	249	662	661	209	684	698	367	0	470	261	0	495
V/C Ratio(X)	0.16	0.83	0.83	0.62	0.64	0.64	0.34	0.00	0.73	0.65	0.00	0.45
Avail Cap(c_a), veh/h	283	662	661	209	684	698	367	0	471	261	0	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.9	24.4	24.7	21.2	20.9	21.0	21.3	0.0	27.8	27.0	0.0	24.8
Incr Delay (d2), s/veh	0.3	11.4	11.4	5.4	4.5	4.4	0.6	0.0	5.5	5.7	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	7.9	8.0	1.2	4.8	4.9	1.2	0.0	4.9	1.8	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.2	35.8	36.1	26.5	25.4	25.4	21.8	0.0	33.3	32.7	0.0	25.5
LnGrp LOS	B	D	D	C	C	C	C	A	C	C	A	C
Approach Vol, veh/h		1136			1009			467			394	
Approach Delay, s/veh		35.3			25.5			30.2			28.6	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	39.6	9.0	32.4	7.2	41.4	9.0	32.4
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	5.0	33.5	5.0	26.5	5.0	33.5	5.0	26.5
Max Q Clear Time (g_c+I1), s	6.4	28.5	7.0	20.4	3.3	21.0	6.7	12.3
Green Ext Time (p_c), s	0.0	3.2	0.0	1.2	0.0	5.2	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	0	21	40	42	83	23	358	0	0	405	18
Future Volume (vph)	48	0	21	40	42	83	23	358	0	0	405	18
Ideal Flow (vphpl)	1765	1000	1765	1550	1550	1550	1650	1650	1000	1000	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.959			0.932						0.994	
Flt Protected		0.966			0.988			0.997				
Satd. Flow (prot)	0	916	0	0	1362	0	0	1612	0	0	1606	0
Flt Permitted		0.966			0.988			0.997				
Satd. Flow (perm)	0	916	0	0	1362	0	0	1612	0	0	1606	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		99.8			95.8			89.1			155.7	
Travel Time (s)		7.2			6.9			6.4			11.2	
Confl. Peds. (#/hr)	14		18	18		14	23		40	40		23
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	15%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	48	0	21	40	42	83	23	358	0	0	405	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	69	0	0	165	0	0	381	0	0	423	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	68.8%	ICU Level of Service C	
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	48	0	21	40	42	83	23	358	0	0	405	18
Future Vol, veh/h	48	0	21	40	42	83	23	358	0	0	405	18
Conflicting Peds, #/hr	14	0	18	18	0	14	23	0	40	40	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	15	0	0	0	1	0	0	1	0
Mvmt Flow	48	0	21	40	42	83	23	358	0	0	405	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	918	841	455	847	850	372	446	0	-	-	-	0
Stage 1	437	437	-	404	404	-	-	-	-	-	-	-
Stage 2	481	404	-	443	446	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.25	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.25	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.635	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	254	303	609	268	300	678	1125	-	0	0	-	-
Stage 1	602	583	-	598	603	-	-	-	0	0	-	-
Stage 2	570	603	-	569	577	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	188	290	590	250	287	671	1105	-	-	-	-	-
Mov Cap-2 Maneuver	188	290	-	250	287	-	-	-	-	-	-	-
Stage 1	576	573	-	582	587	-	-	-	-	-	-	-
Stage 2	447	587	-	541	567	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.3	21.3	0.5	0
HCM LOS	D	C		

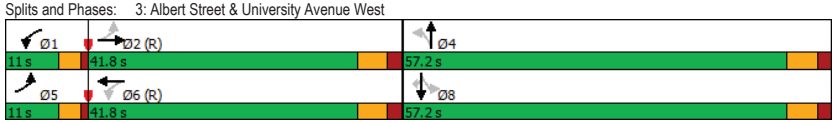
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1105	-	237	384	-	-
HCM Lane V/C Ratio	0.021	-	0.291	0.43	-	-
HCM Control Delay (s)	8.3	0	26.3	21.3	-	-
HCM Lane LOS	A	A	D	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.2	2.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	552	91	86	559	46	118	251	162	58	310	99
Future Volume (vph)	88	552	91	86	559	46	118	251	162	58	310	99
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1650	1650	1775	1900	1750
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	25.0		0.0	25.0		0.0	40.0		0.0	15.0		25.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.83	0.94		0.88	0.96		0.91	0.91		0.91		0.83
Frt		0.979			0.989			0.941				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1651	2914	0	1668	3051	0	1668	1390	0	1668	1860	1442
Flt Permitted	0.295			0.272			0.488			0.394		
Satd. Flow (perm)	428	2914	0	420	3051	0	782	1390	0	631	1860	1201
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)		18			8			41				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.5			98.1			76.9			55.4	
Travel Time (s)		4.6			7.1			5.5			4.0	
Confl. Peds. (#/hr)	242		162	162		242	120		160	160		120
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	6%	0%	0%	4%	0%	0%	1%	1%	0%	1%	2%
Adj. Flow (vph)	88	552	91	86	559	46	118	251	162	58	310	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	643	0	86	605	0	118	413	0	58	310	99
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	35.8		5.0	35.8		51.2	51.2		51.2	51.2	51.2
Minimum Split (s)	9.0	41.8		9.0	41.8		57.2	57.2		57.2	57.2	57.2
Total Split (s)	11.0	41.8		11.0	41.8		57.2	57.2		57.2	57.2	57.2
Total Split (%)	10.0%	38.0%		10.0%	38.0%		52.0%	52.0%		52.0%	52.0%	52.0%
Maximum Green (s)	7.0	35.8		7.0	35.8		51.2	51.2		51.2	51.2	51.2
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		10.0			10.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		11.0			11.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	45.6	40.0		45.6	40.0		53.2	53.2		53.2	53.2	53.2
Actuated g/C Ratio	0.41	0.36		0.41	0.36		0.48	0.48		0.48	0.48	0.48

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.35	0.60		0.34	0.54		0.31	0.60		0.19	0.34	0.17
Control Delay	22.1	31.2		22.0	30.3		20.2	22.7		18.3	19.0	17.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	22.1	31.2		22.0	30.3		20.2	22.7		18.3	19.0	17.0
LOS	C	C		C	C		C	C		B	B	B
Approach Delay		30.1			29.3			22.2			18.5	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	10.7	58.0		10.4	54.0		14.7	55.4		6.8	39.4	11.5
Queue Length 95th (m)	20.1	77.3		19.8	71.6		28.1	86.7		15.2	58.8	21.6
Internal Link Dist (m)		40.5			74.1			52.9			31.4	
Turn Bay Length (m)	25.0			25.0			40.0			15.0		25.0
Base Capacity (vph)	255	1071		253	1114		378	693		305	899	580
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.35	0.60		0.34	0.54		0.31	0.60		0.19	0.34	0.17

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 14.3 (13%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.60		
Intersection Signal Delay: 25.9	Intersection LOS: C	
Intersection Capacity Utilization 133.7%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Albert Street & University Avenue West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	552	91	86	559	46	118	251	162	58	310	99
Future Volume (veh/h)	88	552	91	86	559	46	118	251	162	58	310	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.71	0.99		0.70	0.97		0.90	0.99		0.90
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1761	1692	1775	1775	1720	1775	1775	1637	1637	1775	1885	1723
Adj Flow Rate, veh/h	88	552	91	86	559	46	118	251	162	58	310	99
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	6	0	0	4	0	0	1	1	0	1	2
Cap, veh/h	288	933	152	268	1058	86	409	428	276	321	912	636
Arrive On Green	0.05	0.36	0.34	0.05	0.36	0.34	0.48	0.48	0.47	0.48	0.48	0.48
Sat Flow, veh/h	1677	2593	422	1690	2950	241	898	885	571	919	1885	1315
Grp Volume(v), veh/h	88	340	303	86	308	297	118	0	413	58	310	99
Grp Sat Flow(s),veh/h/ln	1677	1607	1408	1690	1634	1557	898	0	1457	919	1885	1315
Q Serve(g_s), s	3.7	18.9	19.4	3.6	16.4	16.7	10.3	0.0	22.7	5.4	11.2	4.6
Cycle Q Clear(g_c), s	3.7	18.9	19.4	3.6	16.4	16.7	21.5	0.0	22.7	28.0	11.2	4.6
Prop In Lane	1.00		0.30	1.00		0.15	1.00		0.39	1.00		1.00
Lane Grp Cap(c), veh/h	288	578	506	268	586	558	409	0	705	321	912	636
V/C Ratio(X)	0.31	0.59	0.60	0.32	0.53	0.53	0.29	0.00	0.59	0.18	0.34	0.16
Avail Cap(c_a), veh/h	313	578	506	295	586	558	409	0	705	321	912	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	28.6	29.0	23.6	27.9	28.1	24.2	0.0	20.8	30.6	17.6	15.9
Incr Delay (d2), s/veh	0.6	4.3	5.2	0.7	3.3	3.6	0.4	0.0	1.3	0.3	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	5.7	5.3	1.0	5.0	4.9	1.5	0.0	4.8	0.9	3.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.7	32.9	34.2	24.3	31.2	31.7	24.6	0.0	22.1	30.9	17.8	16.0
LnGrp LOS	C	C	C	C	C	C	C	A	C	C	B	B
Approach Vol, veh/h		731			691			531			467	
Approach Delay, s/veh		32.3			30.6			22.6			19.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.2	43.6		57.2	9.4	43.4		57.2				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	35.8		51.2	7.0	35.8		51.2				
Max Q Clear Time (g_c+I1), s	5.6	21.4		24.7	5.7	18.7		30.0				
Green Ext Time (p_c), s	0.0	4.2		4.4	0.0	4.1		3.1				

Intersection Summary		
HCM 6th Ctrl Delay	27.1	
HCM 6th LOS	C	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	7	10	480	416	18
Future Volume (vph)	11	7	10	480	416	18
Ideal Flow (vphpl)	1765	1765	1650	1650	1650	1650
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.947				0.994	
Flt Protected	0.970			0.999		
Satd. Flow (prot)	1572	0	0	1614	1605	0
Flt Permitted	0.970			0.999		
Satd. Flow (perm)	1572	0	0	1614	1605	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.6			155.7	45.1	
Travel Time (s)	4.4			11.2	3.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%
Adj. Flow (vph)	11	7	10	480	416	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	490	434	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	7	10	480	416	18
Future Vol, veh/h	11	7	10	480	416	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	1	1	2
Mvmt Flow	11	7	10	480	416	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	925	425	434	0	-	0
Stage 1	425	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	299	629	1126	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	295	629	1126	-	-	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	609	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.2	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1126	-	372	-	-
HCM Lane V/C Ratio	0.009	-	0.048	-	-
HCM Control Delay (s)	8.2	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-