

Final Report

Transportation Impact Study – 249 Sunview Street, Waterloo



Prepared for Lester Sunview Development Inc.
by Arcadis
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1 Introduction

Lester Sunview Development Inc. (the ‘proponent’) is proposing to construct a residential development located at 249 Sunview Street (the ‘proposed development site’). The property currently consists of a single-detached residential dwelling, while the proposed development consists of a 12-storey apartment building containing 131 dwelling units (the ‘proposed development’). Primary access to the proposed development site will be via Sunview Street, with 34 parking spaces to be provided at full build-out.

The purpose of this Transportation Impact Study (TIS) is to analyze the impact that the proposed development may have on the surrounding transportation network. This report takes into consideration background traffic growth and other proposed developments in the area.

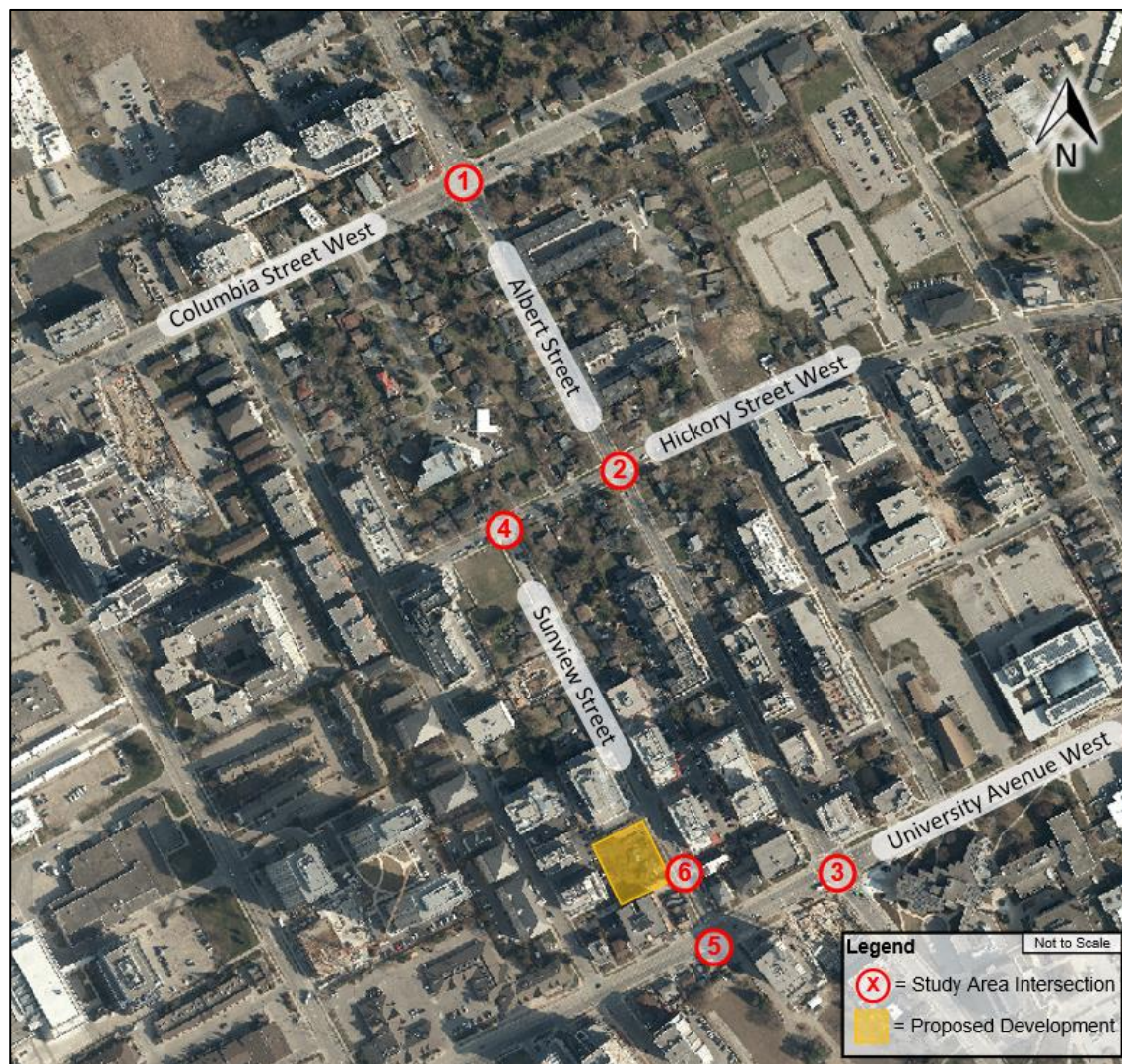
This report is outlined with the following sections:

- **Section 1** through **Section 6** discuss the TIS;
- **Section 7** discusses the conclusions reached based on the preceding sections.

1.1 Study Area

The proposed development site is located on the west side of Sunview Street, 60 metres north of the Sunview Street and University Avenue West intersection in the City of Waterloo. This is illustrated in **Exhibit 1-1**.

Exhibit 1-1: Study Area



Base Map Source: Region of Waterloo. Retrieved October 20, 2022 from https://maps.waterloo.ca/Html5Viewer/?viewer=waterlooviewer&viewer=waterlooviewer&_ga=2.134758836.454887642.1642086859-921520690.1639506881

The proposed development site is located in a predominantly residential area, with several high-density residential buildings in close proximity. The proposed development is also located within walking distance of commercial uses, as well as educational institutions including the Wilfrid Laurier University, the Lazaridis School of Business & Economics, and the University of Waterloo campus.

In addition, the University of Waterloo Station (described in **Section 2.2**) is located approximately 800 metres northwest.

The study area intersections consist of the following locations (as illustrated in **Exhibit 1-1**):

1. Columbia Street West and Albert Street (signalized);
2. Hickory Street West and Albert Street (unsignalized);
3. University Avenue West and Albert Street (signalized);
4. Hickory Street West and Sunview Street (unsignalized);
5. University Avenue West and Sunview Street (unsignalized); and
6. Proposed Site Access and Sunview Street (unsignalized).

1.2 Analysis Periods

Based on the proposed development's land uses and size, the following analysis periods were used in this study:

- Weekday AM Peak Period – 7:00 a.m. to 9:00 a.m. on a typical weekday; and
- Weekday PM Peak Period – 4:00 p.m. to 6:00 p.m. on a typical weekday.

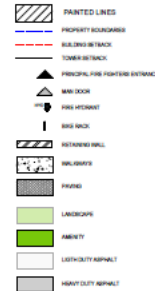
1.3 Proposed Development

The proposed development consists of a 12-story residential building containing 131 dwelling units. One full-movement access onto Sunview Street is proposed to serve the development, with a total of 34 parking spaces provided at full build-out.

The proposed site plan is illustrated in **Exhibit 1-2**.

[illegible]

SUNVIEW STREET



GENERAL SITE PLAN NOTES:

1. ALL SITE PLANS MUST BE FULLY COORDINATED WITH LANDSCAPE AND TRAFFIC ENGINEERS.
2. THE OWNER IS RESPONSIBLE FOR RIGHTS-OF-WAY REPLACEMENT OR REPAIR COSTS TO CITY EASEMENTS.
3. ALL UNPAVED DRIVEWAYS SHALL RESULT IN A NEW DRIVE OR PAVEMENT TO ADJACENT PROPERTIES ON BAYVIEW.
4. ALL DRIVEWAYS SHALL BE REMOVED OFF SITE AT THE OWNER'S EXPENSE.
5. ALL DRIVEWAYS ARE SUBJECT TO THE BAYVIEW PLAN.
6. THERE ARE NO DRIVEWAYS ALLOWED DURING THE DURATION OF CONSTRUCTION.
7. PARKING COULETS AND REAR ALLEYS ARE PROHIBITED.
8. DRIVEWAYS ARE NOT TO OCCUPY PUBLIC SPACE NOR TO BE IN CONFLICT WITH EXISTING LANDSCAPE AND TRAFFIC PATTERNS.
9. ALL BAYVIEW ACCESS ROUTES TO BE MAINTAINED HEREAFTER AND ALL YEAR-ROUND DRIVEWAYS.
10. ALL EQUIPMENT, EQUIPMENT TO BE FULLY DERIVED FROM PUBLIC WORKS, ROOF TOP RAMP, OR OTHER AVAILABLE MEANS.
11. ALL EQUIPMENT, INCLUDING BUT NOT LIMITED TO, SHALL BE ARCHITECTURALLY INTEGRATED INTO BUILDING HAZARD.
12. ALL EQUIPMENT AND INTERIOR FOR BUILDINGS ARE NOT TO BE CONSIDERED TO BE RESIDENTIAL UNITS.
13. DRIVE PROPOSED IN LOTS SHOULD NOT BE USED AS AN ADDITIONAL, BACKHILL

[illegible]

2 2022 Existing Conditions

This section documents the transportation network in the study area in 2022, including existing roadways, traffic control measures, intersection performance, walking and cycling facilities, and transit operations.

2.1 Existing Road Network

Exhibit 2-1 summarizes the characteristics of the study area roadways.

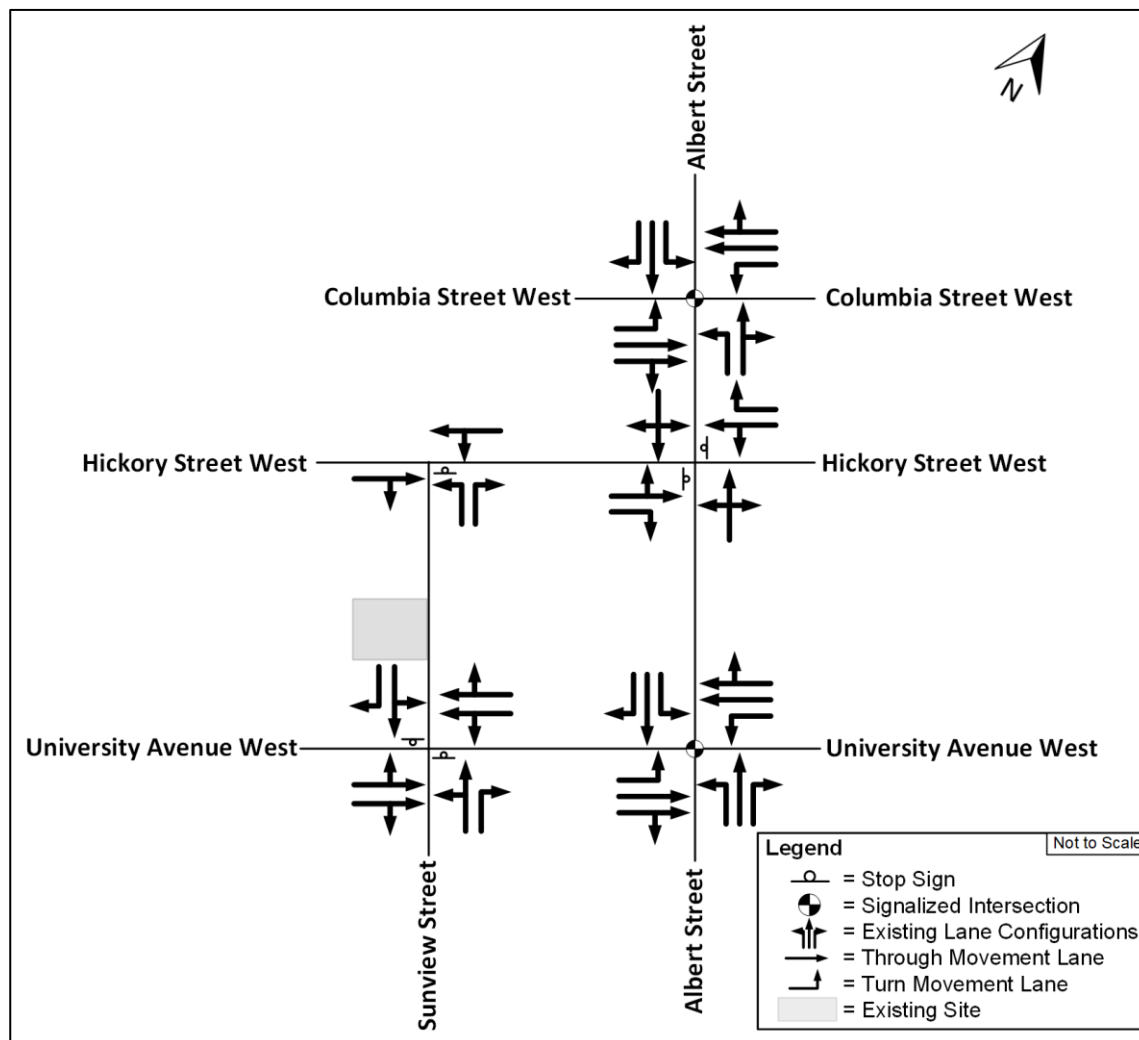
Exhibit 2-1: Study Area Existing Road Network

Street Name	Class. ¹	Orientation	Road Width (Lanes)	Traffic Direction	From	To	On-Street Parking	Speed Limit
Sunview Street	Local Road	North / South	2	Two-Way	Hickory Street West	Seagram Drive	Permitted	50 km/h
University Avenue West	Regional Arterial	East / West	2-4	Two-Way	The Boardwalk	King Street North	Prohibited	50-60 km/h
Lester Street	Local Road	North / South	2	Two-Way	Columbia Street West	Seagram Drive	Permitted	50 km/h
Albert Street	Major Collector	North / South	2-4	Two-Way North of Bridgeport Road West, and One-Way South of it	Dead End	Erb Street West	Prohibited North of Bridgeport Road West	50-60 km/h
Hickory Street West	Local Road	East / West	2	Two-Way	Lester Street	Regina Street North	Permitted	50 km/h
Columbia Street West	City Arterial	East / West	2-4	Two-Way	Sundew Drive	King Street North	Prohibited	50-60 km/h

Lane configurations for the study area intersections are illustrated in **Exhibit 2-2**.

¹ Roadway classifications were obtained from **Schedule E – Road Classification System** of the City of Waterloo Official Plan (February 2018)
(<https://www.waterloo.ca/en/government/resources/Documents/Cityadministration/Official-plan/2020/OP-Schedule-E-Road-Classification-System.pdf>).

Exhibit 2-2: Existing Lane Configuration

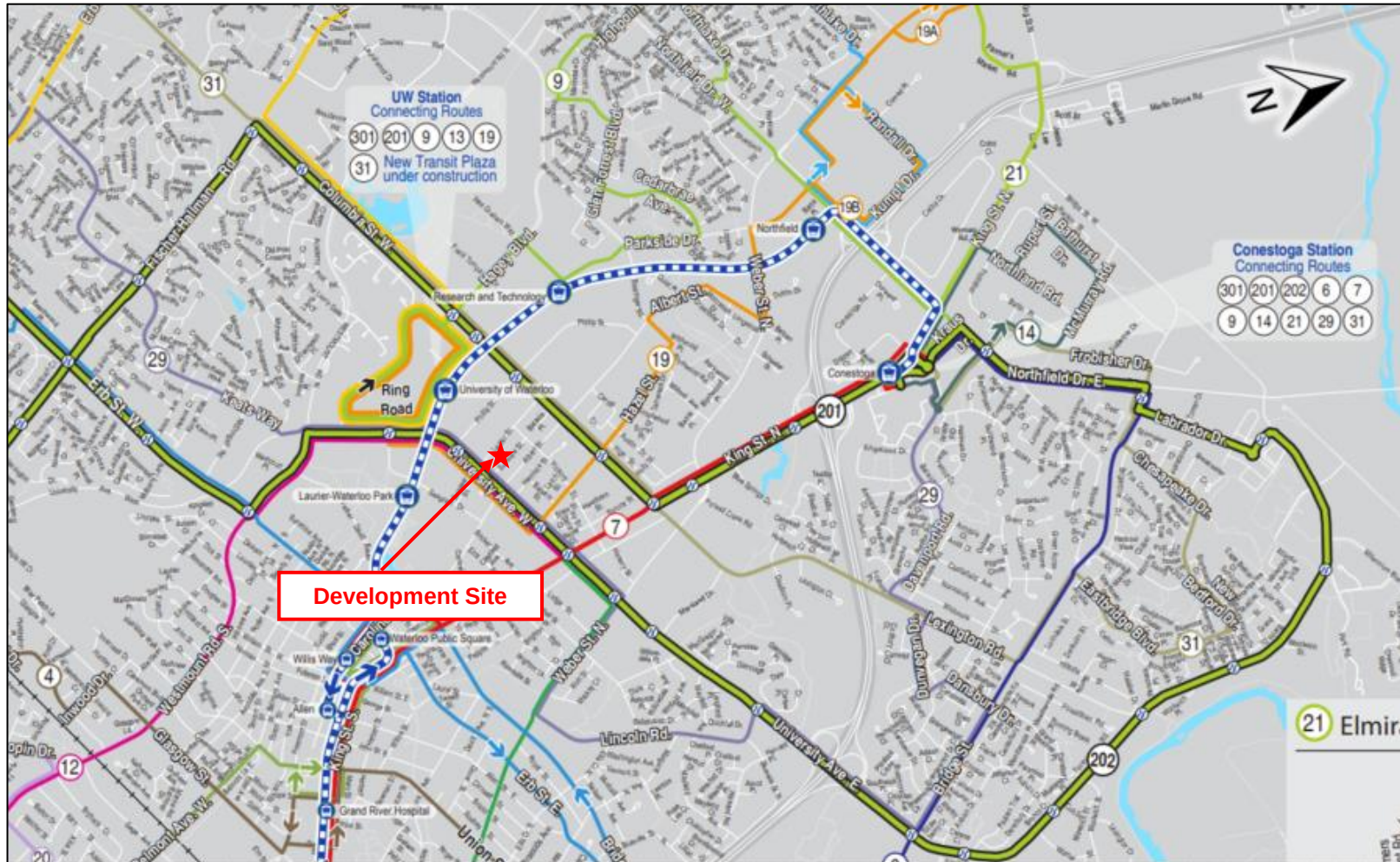


2.2 Existing Transit Network

The proposed development is located approximately 800 metres southeast of the University of Waterloo Station, which provides connectivity to several local bus routes and the ION LRT service. In addition, there are several bus stops located in close proximity to the proposed development site.

Transit services in the development area are illustrated in **Exhibit 2-3** while service patterns and destinations of the routes in close proximity are illustrated in **Exhibit 2-4**.

Exhibit 2-3: Existing Transit Network



Base Map Source: Grand River Transit. Retrieved October 20, 2022 from <https://www.grt.ca/en/schedules-maps/resources/GRT-transit-system-map-with-full-street-network.pdf>

Exhibit 2-4: Existing Transit Service Patterns

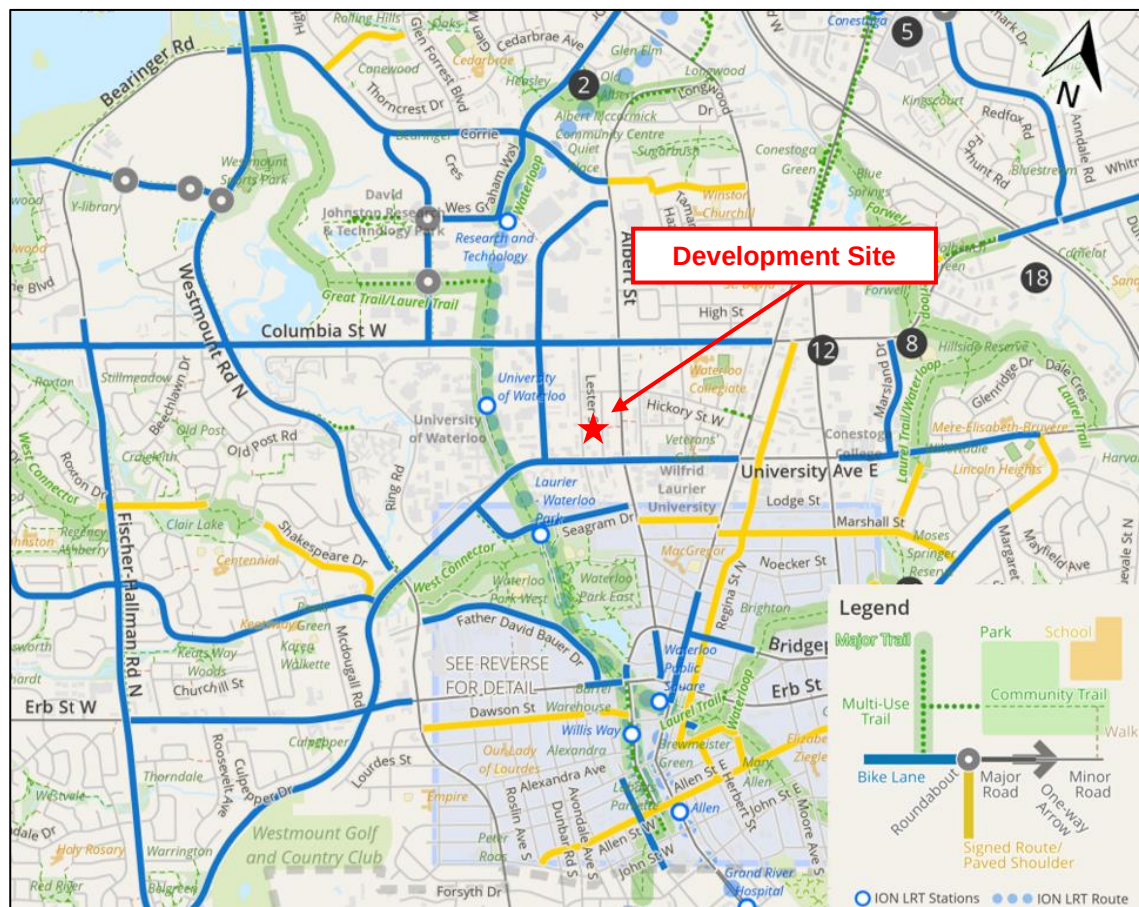
Service Provider	Route	Onward Transit Connections	Approximate Walking Distance to Nearest Bus Stop ²	Average Peak Hour Bus Service Frequency
Grand River Transit	9 Lakeshore	University of Waterloo, Conestoga Station	< 850 metres (< 14 minute)	15 minutes
	12 Westmount	Northfield Station, University of Waterloo, Wilfried Laurier University	< 100 metres (< 1 minute)	15 minutes
	13 Laurelwood	The Boardwalk, University of Waterloo	< 850 metres (< 14 minute)	15 minutes
	19 Hazel	Fairway Station, University of Waterloo, Wilfried Laurier University	< 100 metres (< 1 minute)	15 minutes
	29 Keats-University	The Boardwalk, University of Waterloo, Conestoga Station	< 100 metres (< 1 minute)	15 minutes
	31 Columbia	University of Waterloo, Conestoga Station	< 600 metres (< 10 minute)	15 minutes
	201 Fischer-Hallman	University of Waterloo, Conestoga Station	< 850 metres (< 14 minute)	15 minutes
	202 University	The Boardwalk, University of Waterloo, Wilfried Laurier University, Conestoga Station	< 360 metres (< 6 minute)	15 minutes
	301 ION Light Rail	ION Light Rail Stations	< 850 metres (< 14 minute)	10 minutes

2.3 Existing Active Transportation Network

The proposed development is well connected to the City of Waterloo cycling network and is located in close proximity to bike lanes on University Avenue West, Columbia Street West, and Phillip Street. These cycling routes are illustrated in **Exhibit 2-5**. In addition, concrete sidewalks are provided on both sides of all study area roadways.

² Approximate walking speed of 1 m/s.

Exhibit 2-5: Existing Bicycle Route Network



Base Map Source: City of Waterloo. Retrieved October 21, 2022 from <https://www.waterloo.ca/en/living/resources/Images/2020-Waterloo-Cycling-Map.pdf>

2.4 Turning Movement Counts

IBI Group commissioned the collection of new turning movement counts (TMCs) from Horizon Data Services Ltd at four of the existing study area intersections noted in **Section 1.1**. Data for the remaining existing study area intersection (Columbia Street West and Albert Street) was obtained from the Spectrum Traffic Data platform. Details regarding the TMCs used in this study are summarized in **Exhibit 2-6**.

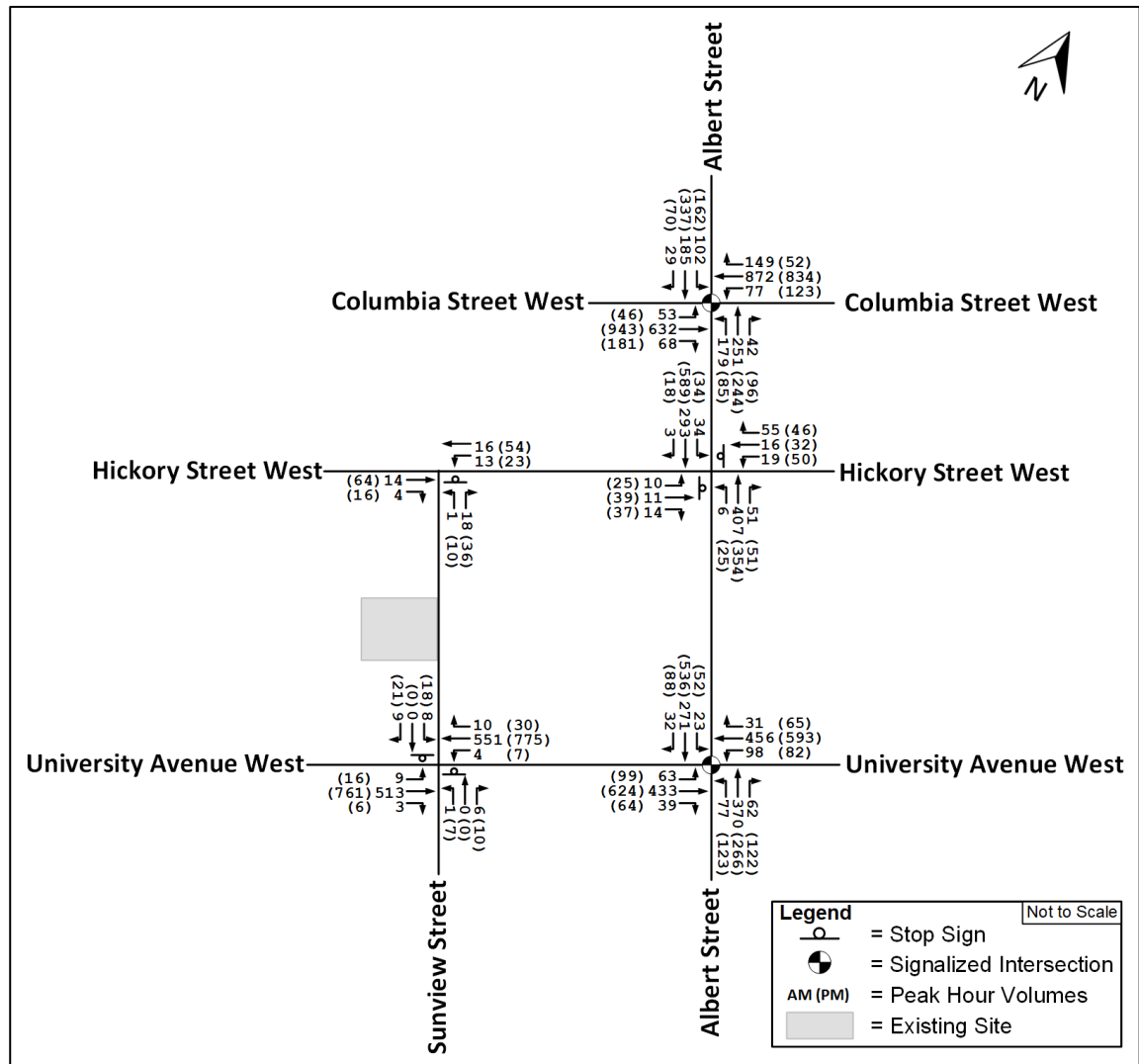
Exhibit 2-6: Traffic Data Information

Intersection	Data Source	Collection Date	Peak Hour	
			Weekday AM	Weekday PM
Columbia Street West and Albert Street	Spectrum Traffic Data Inc.	April 04, 2019	8:00 a.m. – 9:00 a.m.	4:30 p.m. – 5:30 p.m.
Hickory Street West and Albert Street	Horizon Data Service Ltd.	October 06, 2022	7:00 a.m. – 8:00 a.m.	4:00 p.m. – 5:00 p.m.
University Avenue West and Albert Street	Horizon Data Service Ltd.	October 06, 2022	8:00 a.m. – 9:00 a.m.	5:00 p.m. – 6:00 p.m.
Hickory Street West and Sunview Street	Horizon Data Service Ltd.	October 06, 2022	8:00 a.m. – 9:00 a.m.	5:00 p.m. – 6:00 p.m.
University Avenue West and Sunview Street	Horizon Data Service Ltd.	October 06, 2022	8:00 a.m. – 9:00 a.m.	5:00 p.m. – 6:00 p.m.

Although the traffic count at the Columbia Street West and Albert Street intersection was collected in 2019, a comparison between 2019 and 2022 data indicates that 2019 volumes were slightly higher than 2022 “new normal” volumes. Therefore, no growth rate was applied to the 2019 Columbia Street West and Albert Street traffic count. Full turning movement counts data (observed counts and historical counts) are presented in **Appendix A**.

A summary of the balanced 2022 Existing Conditions traffic volumes is presented in **Exhibit 2-7**.

Exhibit 2-7: 2022 Existing Conditions Traffic Volumes



2.5 Signal Timing Plans

Signal timing plans for the signalized study area intersections were acquired from the Region of Waterloo, and are presented in **Appendix B**.

2.6 2022 Existing Conditions Analysis

Using the turning movement counts described in **Section 2.4** and the signal timing plans described in **Section 2.5**, the study area intersections were analyzed using the Synchro 11 software package, which is based on the **Highway Capacity Manual** methodology.

Based on the Region of Waterloo document **Transportation Impact Study Guidelines** (July 2014), the criteria for identifying critical intersections and

movements at signalized and unsignalized intersections under the jurisdiction of the City of Waterloo or the Region of Waterloo are as follows:

- The criteria for identifying “critical” intersections are:
 - Overall Level of Service E or F (i.e. average control delay per vehicle greater than 55 seconds) for signalized intersections; and
 - Overall Level of Service E or F (i.e. average control delay per vehicle greater than 35 seconds) for unsignalized intersections.
- The criteria for identifying “critical” movements are:
 - The average control delay for individual movements is greater than 55 seconds;
 - Estimated 95th percentile queue length for an exclusive movement exceeds the available storage space;
 - Estimated 95th percentile queue length for an individual movement will block an existing access;
 - Exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes; and
 - Poor quality of service for non-auto modes.

The following subsections detail existing traffic operations at the study area intersections for the Weekday AM and PM Peak Hours. Full Highway Capacity Manual analysis for the 2022 Existing Conditions scenario is presented in **Appendix C**.

2.6.1 Signalized Intersections

The results of the 2022 Existing Conditions traffic operations analysis for the study area signalized intersection during the Weekday AM and Weekday PM Peak hours are presented in **Exhibit 2-8**.

Exhibit 2-8: 2022 Existing Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour									
Albert Street & Columbia Street West	C	31.4	0.71	EBL	C	20.8	0.35	11	52
				EBTR	C	28.3	0.65	72	-
				WBL	B	17.7	0.31	15	51
				WBTR	D	39.8	0.91	131	-
				NBL	B	19.3	0.41	33	34
				NBTR	C	30.5	0.58	69	-
				SBL	C	20.1	0.29	20	45
				SBT	C	25.9	0.33	43	-
Albert Street & University Avenue West	C	22.4	0.45	SBR	C	22.1	0.02	-	-
				EBL	B	16.1	0.18	13	41
				EBTR	C	22.1	0.39	47	-
				WBL	B	16.6	0.26	18	33
				WBTR	C	22.3	0.40	49	-
				NBL	C	22.3	0.24	21	-
				NBT	C	25.9	0.52	81	-
				NBR	B	19.2	0.05	6	64
				SBL	C	20.0	0.09	8	14
				SBT	C	23.6	0.39	58	-
				SBR	B	18.9	0.02	0	50

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday PM Peak Hour									
Albert Street & Columbia Street West	C	49.4	0.83	EBL	B	19.9	0.25	10	52
				EBTR	F	86.0	1.09	152	-
				WBL	C	25.6	0.61	27	51
				WBTR	C	30.9	0.77	96	-
				NBL	C	20.0	0.27	17	34
				NBTR	D	36.3	0.70	86	-
				SBL	C	20.3	0.50	30	45
				SBT	C	29.4	0.56	77	-
				SBR	C	21.5	0.05	1	-
Albert Street & University Avenue West	C	28.7	0.63	EBL	C	23.0	0.40	23	41
				EBTR	C	34.5	0.67	87	-
				WBL	C	24.0	0.35	19	33
				WBTR	D	35.2	0.66	82	-
				NBL	C	29.4	0.53	39	-
				NBT	B	19.2	0.30	53	-
				NBR	B	16.8	0.10	10	64
				SBL	B	17.4	0.13	14	14
				SBT	C	25.2	0.61	119	-
				SBR	B	16.5	0.08	10	50

Note: *Red font represents a lane/movement which exceeds critical operational thresholds.*

As shown in **Exhibit 2-8**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observations are noted during the Weekday AM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The eastbound left-turn, westbound left-turn, and northbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.
- At the Albert Street and University Avenue West intersection:
 - The eastbound left-turn, westbound left-turn, northbound right-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

Furthermore, the following observations are noted during the Weekday PM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The shared eastbound through/right-turn movement was found to operate above critical thresholds with an average control delay per vehicle of 86.0 seconds; and
 - The eastbound left-turn, westbound left-turn, northbound left-turn, and southbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.
- At the Albert Street and University Avenue West intersection:
 - The eastbound left-turn, westbound left-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

2.6.2 Unsignalized Intersections

The results of the 2022 Existing Conditions traffic operations analysis for the study area unsignalized intersections are presented in **Exhibit 2-9**.

Exhibit 2-9: 2022 Existing Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour							
Albert Street & Hickory Street West	2.5	EB	C	15.2	0.07	2	-
		WB	B	14.1	0.11	3	-
		NBL	A	0.2	0.01	0	-
		SBL	A	1.2	0.03	1	-
Sunview Street & Hickory Street West	4.0	WBL	A	3.4	0.01	0	-
		NBL	A	8.6	0.02	0	-
Sunview Street & University Avenue West	0.5	EBL	A	0.5	0.01	0	-
		WBL	A	0.2	0.00	0	-
		NB	B	12.9	0.01	0	-
		SB	C	20.5	0.05	1	-

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Storage Capacity (m)
Weekday PM Peak Hour							
Albert Street & Hickory Street West	6.6	EB	D	28.8	0.37	12	-
		WB	E	37.7	0.53	22	-
		NBL	A	0.8	0.03	1	-
		SBL	A	0.8	0.03	1	-
Sunview Street & Hickory Street West	3.0	WBL	A	2.3	0.02	0	-
		NBL	A	9.3	0.04	1	-
Sunview Street & University Avenue West	3.8	EBL	A	1.3	0.04	1	-
		WBL	A	0.4	0.01	0	-
		NB	E	44.0	0.13	3	-
		SB	F	125.3	0.62	20	-

Note: *Red* font represents a lane/movement which exceeds critical operational thresholds.

As shown in **Exhibit 2-9**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observation was noted during the Weekday PM Peak Hour:

- At the Sunview Street and University Avenue West intersection, the southbound movement was found to operate above critical thresholds with an average control delay per vehicle of 125.3 seconds.

2.6.3 Model Calibration

It should be noted that a common practice when calibrating an intersection capacity model is to obtain v/c ratios less than 1.00, as the methodology by which traffic volume data is collected cannot yield volumes greater than the intersection's capacity. However, if the intersection was operating at capacity when the volume data was collected, and those volumes were then increased (in this case, where volume balancing was applied), then the model would return v/c ratios greater than 1.00.

An additional consideration when calibrating to achieve a v/c ratio less than 1.00 is to ensure that the signal timings that were active in the field are the same those programmed into Synchro, as the capacity of a movement is based on the amount of green time allocated. However, the effective date of the signal timing plan received from review agency staff may not match what was active in the field at the time the traffic volumes were collected. For these reasons, calibration measures were not considered appropriate in this context.

3 Future Background Conditions

This section discusses the proposed development horizon year, background traffic growth rates, anticipated future transportation network improvements, other development-related traffic in the study area, and future traffic conditions without the proposed development under the 2027 horizon year.

3.1 Horizon Year

Based on the Region of Waterloo document **Transportation Impact Study Guidelines** (July 2014), a five-year horizon from the date of this study (i.e., 2027) was selected for the Future Background and Future Total analyses.

3.2 Background Developments

Based on a review of the available information, the following proposed development applications within vicinity of the subject site were found:

1. 229-249 Albert Street – a 12-storey mixed-use apartment building with 193 units and 74 m² of ground floor commercial usage is proposed;
2. 262-280 Albert Street – a 6-storey residential apartment building with 185 units is proposed;
3. 83-85 Hickory Street West and 265-267 Hemlock Street West – a 6-storey residential apartment building with 168 units is proposed;
4. 84, 86 Hickory Street West and 284, 286 Albert Street - a 6-storey residential apartment building with 124 units is proposed;
5. 290-298 Hemlock Street - a 6-storey residential apartment building with 92 units is proposed; and
6. 145 Columbia Street West – two residential 20-storey and 23-storey towers with 535 units combined are proposed.

The locations of the identified background developments are geographically illustrated in **Exhibit 3-1**, while the associated trips anticipated to be generated by these background developments have been illustrated in **Exhibit 3-2**.

Exhibit 3-1: Background Development Locations



Exhibit 3-2: Background Development Trips



3.3 Background Traffic Growth

An assumed annual traffic growth rate of 1.0% was applied to study area traffic volumes to account for growth occurring outside of the study area. It should be noted that the primary driver of traffic volume growth is expected to be the background developments described in **Section 3.2** that are considered separately. While Waterloo Region continues to grow, the presence of Wilfrid Laurier University, The University of Waterloo, and high-density residential communities surrounding campus is expected to result in much of the travel demand from peripheral growth using more northerly or southerly routes to travel across the city core.

The application of this proposed background growth rate results in absolute increases in traffic volumes of approximately 5.1% between 2022 and 2027.

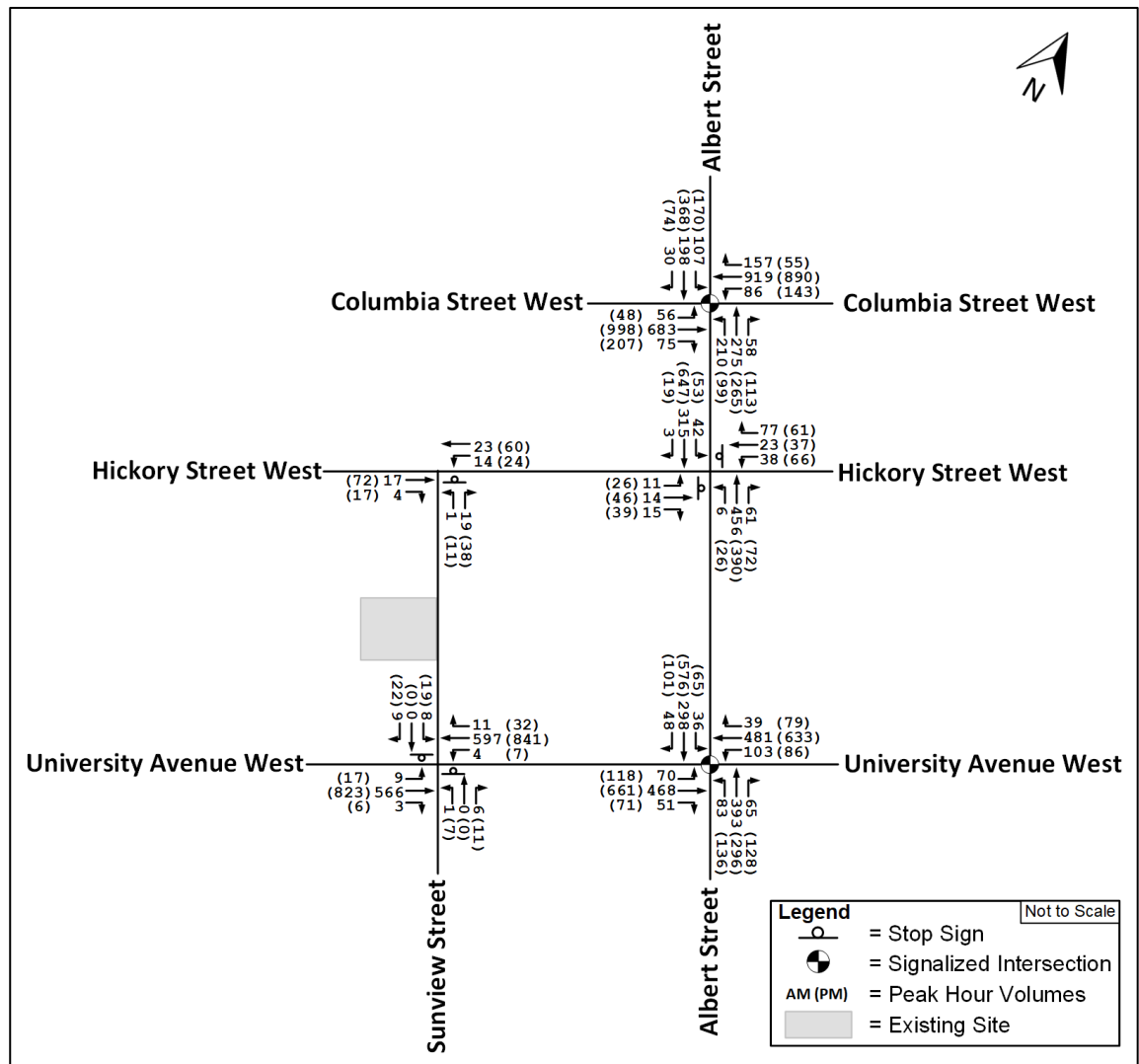
3.4 Future Transportation Network Improvements

Based on the **City of Waterloo Transportation Master Plan 2020 Update** (April 2021) as well as the **Region of Waterloo Moving Forward 2018 Transportation Master Plan** (June 2019) documents, no future transportation network improvements were identified to be included in the Future Background and Future Total analyses.

3.5 2027 Future Background Conditions Analysis

New trips resulting from the future background developments as well as the background traffic growth rate up to the horizon year of 2027 were added to the 2022 Existing Conditions scenario, producing the 2027 Future Background traffic volumes illustrated in **Exhibit 3-3**.

Exhibit 3-3: 2027 Future Background Conditions Traffic Volumes



The results of the 2027 Future Background Conditions traffic analysis are summarized in the following subsections. Full Highway Capacity Manual analysis for the 2027 Future Background Conditions scenario is presented in **Appendix D**.

3.5.1 Signalized Intersections

The results of the 2027 Future Background Conditions traffic operations analysis for the study area signalized intersections during the Weekday AM and Weekday PM Peak hours are presented in **Exhibit 3-4**.

Exhibit 3-4: 2027 Future Background Conditions Traffic Operations - Signalized Intersection

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour									
Albert Street & Columbia Street West	D	38	0.78	EBL	C	20.6	0.32	11	52
				EBTR	C	29.8	0.71	79	-
				WBL	B	18.9	0.38	16	51
				WBTR	E	55.5	0.99	142	-
				NBL	C	20.4	0.49	38	34
				NBTR	C	33.2	0.66	82	-
				SBL	C	20.5	0.34	21	45
				SBT	C	26.3	0.35	45	-
				SBR	C	22.2	0.02	-	-
Albert Street & University Avenue West	C	22.9	0.48	EBL	B	16.3	0.20	14	41
				EBTR	C	22.7	0.43	52	-
				WBL	B	16.8	0.29	19	33
				WBTR	C	22.7	0.43	52	-
				NBL	C	23.1	0.27	23	-
				NBT	C	26.6	0.55	86	-
				NBR	B	19.2	0.05	7	64
				SBL	C	21.1	0.15	12	14
				SBT	C	24.2	0.43	64	-
				SBR	B	19.0	0.04	3	50

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday PM Peak Hour									
Albert Street & Columbia Street West	E	62.6	0.92	EBL	C	20.5	0.29	10	52
				EBTR	F	119.2	1.17	168	-
				WBL	C	32.0	0.71	37	51
				WBTR	C	33.3	0.82	115	-
				NBL	C	20.6	0.33	20	34
				NBTR	D	40.9	0.78	102	-
				SBL	C	22.2	0.58	31	45
				SBT	C	30.8	0.62	85	-
				SBR	C	21.6	0.05	2	-
Albert Street & University Avenue West	C	30.2	0.68	EBL	C	24.1	0.50	26	41
				EBTR	D	35.9	0.71	94	-
				WBL	C	24.6	0.39	20	33
				WBTR	D	37.2	0.72	91	-
				NBL	D	38.4	0.66	53	-
				NBT	B	19.7	0.34	59	-
				NBR	B	16.9	0.10	10	64
				SBL	B	18.0	0.17	17	14
				SBT	C	26.6	0.66	131	-
				SBR	B	16.7	0.09	11	50

Note: Red font represents a lane/movement which exceeds critical operational thresholds.

As shown in **Exhibit 3-4**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observations are noted during the Weekday AM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The shared westbound through/right-turn movement was found to operate above critical thresholds with an average control delay per vehicle of 55.5 seconds; and
 - The 95th percentile queue length for the northbound left-turn movement was found to exceed the available storage lane capacity by approximately one car length;
 - The eastbound left-turn, westbound left-turn, northbound left-turn, and southbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

- At the Albert Street and University Avenue West intersection:
 - The eastbound left-turn, westbound left-turn, northbound right-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

Furthermore, the following observations are noted during the Weekday PM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The shared eastbound through/right-turn movement was found to operate above critical thresholds with an average control delay per vehicle of 119.2 seconds; and
 - The eastbound left-turn, westbound left-turn, northbound left-turn, and southbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.
- At the Albert Street and University Avenue West intersection:
 - The 95th percentile queue length for the southbound left-turn movement was found to exceed the available storage lane capacity by approximately one car length; and
 - The eastbound left-turn, westbound left-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

3.5.2 Unsignalized Intersections

The results of the 2027 Future Background Conditions traffic operations analysis for the study area unsignalized intersections are presented in **Exhibit 3-5**.

**Exhibit 3-5: 2027 Future Background Conditions Traffic Operations -
Unsignalized Intersections**

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour							
Albert Street & Hickory Street West	3.4	EB	C	17.2	0.10	3	-
		WB	C	16.9	0.23	7	-
		NBL	A	0.2	0.01	0	-
		SBL	A	1.5	0.04	1	-
Sunview Street & Hickory Street West	3.6	WBL	A	2.9	0.01	0	-
		NBL	A	8.7	0.02	0	-
Sunview Street & University Avenue West	0.5	EBL	A	0.4	0.01	0	-
		WBL	A	0.2	0.00	0	-
		NB	B	13.4	0.01	0	-
		SB	C	22.0	0.06	1	-
Weekday PM Peak Hour							
Albert Street & Hickory Street West	17.5	EB	E	42.5	0.53	21	-
		WB	F	120.7	0.98	58	-
		NBL	A	0.9	0.03	1	-
		SBL	A	1.3	0.05	1	-
Sunview Street & Hickory Street West	2.9	WBL	A	2.2	0.02	0	-
		NBL	A	9.4	0.04	1	-
Sunview Street & University Avenue West	5.9	EBL	A	1.5	0.05	1	-
		WBL	A	0.4	0.01	0	-
		NB	E	48.8	0.16	4	-
		SB	F	198.3	0.81	26	-

Note: Red font represents a lane/movement which exceeds critical operational thresholds.

As shown in **Exhibit 3-5**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observation was noted during the Weekday PM Peak Hour:

- At the Albert Street and Hickory Street West intersection, the westbound movement was found to operate above critical thresholds with an average control delay per vehicle of 120.7 seconds; and
- At the Sunview Street and University Avenue West intersection, the southbound movement was found to operate above critical thresholds with an average control delay per vehicle of 198.3 seconds.

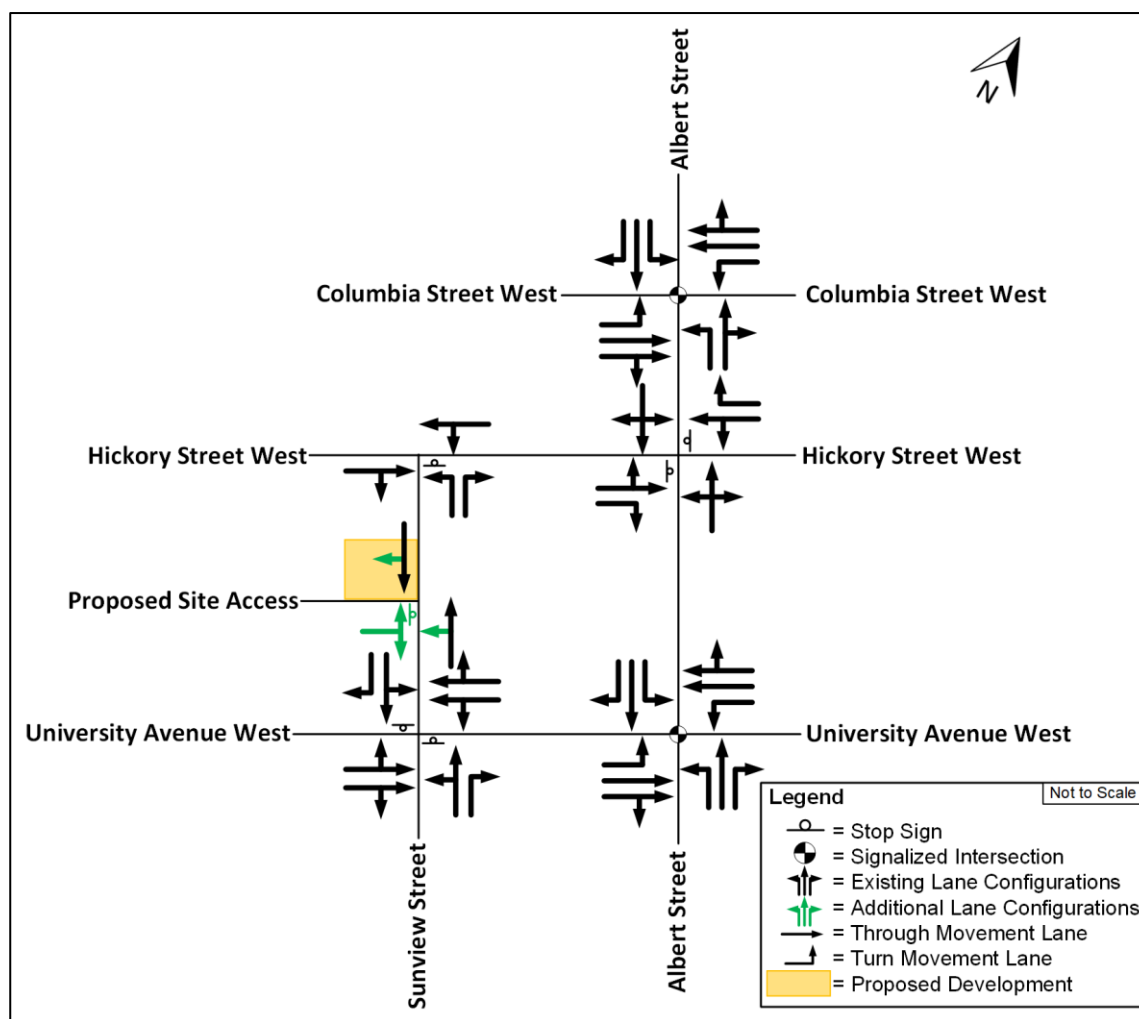
4 Future Total Conditions

This section of the report analyzes the impact of the proposed development on the Future Total Traffic Conditions for the 2027 horizon year.

4.1 Proposed Site Access

As discussed in **Section 1.3**, a full-movement access onto Sunview Street is proposed to serve the development at its south end. The future lane configuration with the proposed site access is shown in **Exhibit 4-1**.

Exhibit 4-1: Future Total Condition Lane Configuration



4.2 Trip Generation

The gross trips expected to be generated by the proposed development are examined in this section. The net trips are then assigned and distributed to the study area road network.

4.2.1 Gross Trip Generation

Trip generation rates from the publication **Trip Generation Manual, 11th Edition** (Institute of Transportation Engineers, October 2021) were used to estimate future automobile trips associated with the proposed development. Based on the nature of the development, its location context, and the data quality, the fitted curve equation for the land use code (LUC) 222: Multifamily Housing (High-Rise) – Dense Multi-Use Urban (Close to Rail Transit) was used to calculate the proposed development's estimated vehicle trips during the Weekday AM and PM Peak Hours.

The estimated net new inbound and outbound vehicle trips for the proposed development are presented in **Exhibit 4-2**.

Exhibit 4-2: Proposed Development Trip Generation

249 Sunview Street, Waterloo							
LUC 222: Multifamily Housing (High-Rise) – Close to Rail Transit – Dense Multi-Use Urban – 131 Units							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	vehicle trips / unit	$\ln(T) = 0.93\ln(X) - 1.17$			$\ln(T) = 0.87\ln(X) - 0.96$		
Directional Distribution	-	11%	89%	100%	69%	31%	100%
Trip Generation Rate	vehicle trips / unit	0.02	0.20	0.22	0.13	0.06	0.19
Total Trips	vehicle trips / hour	3	26	29	19	8	27

Based on the estimates presented in **Exhibit 4-2**, the proposed development would be expected to generate up to 29 vehicle trips during the Weekday AM Peak hour (3 inbound trips and 26 outbound trips). During the Weekday PM Peak hour, the proposed development would be anticipated to generate up to 27 vehicle trips (19 inbound trips and 8 outbound trips). Trip generation source data is presented in **Appendix E**.

It should be noted that, due to the proposed developments proximity, a large portion of future residents are expected to be affiliated with Wilfred Laurier University or The University of Waterloo. As such, trip generation estimates using LUC 222 are expected to be conservative, as these individuals which are within walking distance of campus are less likely to maintain a private automobile. While data quality is insufficient for use in this study, LUC 227: Off-Campus High- Rise Student Apartment suggests that vehicle trips on the order of magnitude of 5 new trips during the peak hours may be expected.

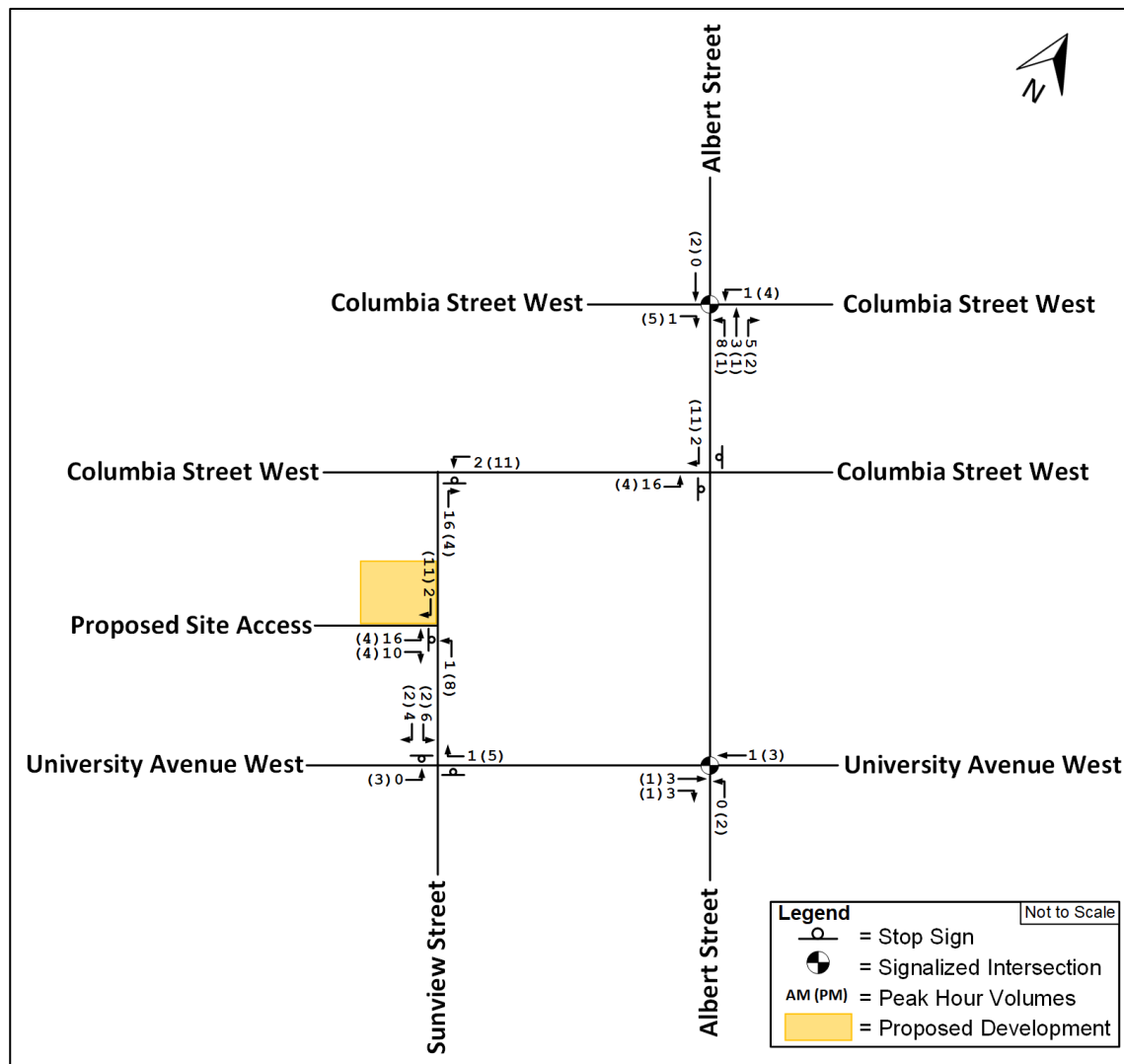
4.2.2 Trip Distribution and Assignment

Site traffic was distributed and assigned to the road network based on the existing travel patterns in the study area, the location and configuration of the proposed site access, as well as the routes providing the shortest travel times. The estimated trip distribution is outlined in **Exhibit 4-3** while the resulting site-generated volume patterns have been illustrated in **Exhibit 4-4**.

Exhibit 4-3: Trip Distribution

To / From	Inbound Trips		Outbound Trips	
	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour
Columbia Street West (East)	29%	21%	20%	25%
Columbia Street West (West)	20%	24%	28%	20%
University Avenue West (East)	16%	16%	14%	17%
University Avenue West (West)	14%	16%	15%	17%
Albert Street (North)	8%	12%	12%	7%
Albert Street (South)	13%	11%	11%	14%
Total	100%	100%	100%	100%

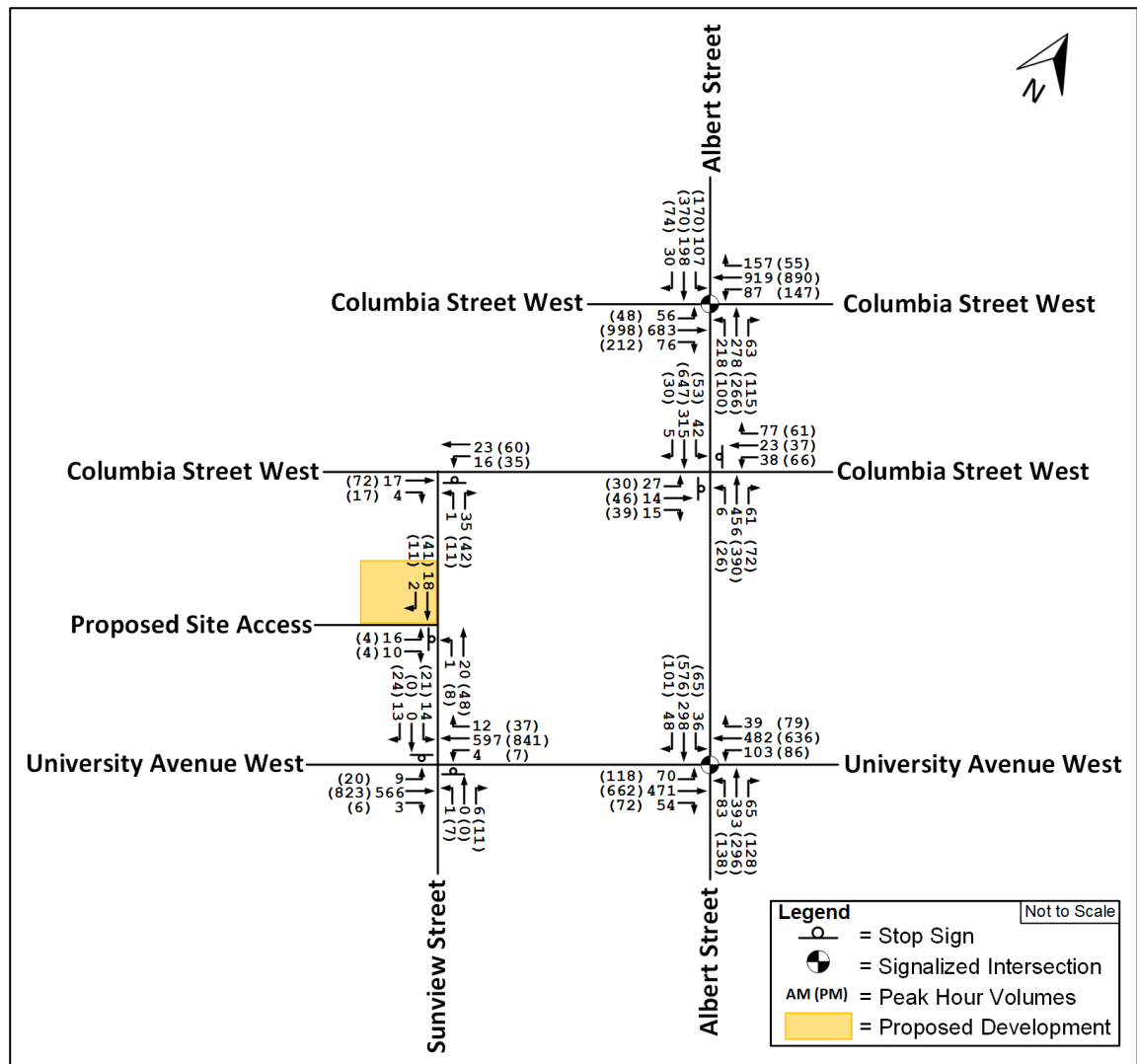
Exhibit 4-4: New Site-Generated Traffic Volumes



4.3 2027 Future Total Conditions Analysis

New trips resulting from the proposed development were added to the 2027 Future Background Conditions scenario, producing the 2027 Future Total Conditions traffic volumes illustrated in **Exhibit 4-5**.

Exhibit 4-5: 2027 Future Total Conditions Traffic Volumes



Using the volumes illustrated in **Exhibit 4-5**, traffic operations analysis was conducted to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. Full Highway Capacity Manual analysis for the 2027 Future Total Conditions scenario is presented in **Appendix F**.

4.3.1 Signalized Intersections

The results of the 2027 Future Total Conditions traffic operations for the study area signalized intersections are presented in **Exhibit 4-6**.

Exhibit 4-6: 2027 Future Total Conditions Traffic Operations – Signalized Intersections

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour									
Albert Street & Columbia Street West	D	38.0	0.79	EBL	C	20.6	0.32	11	52
				EBTR	C	29.8	0.71	80	-
				WBL	B	19.0	0.38	16	51
				WBTR	E	55.5	0.99	142	-
				NBL	C	20.6	0.51	40	34
				NBTR	C	33.8	0.67	88	-
				SBL	C	20.5	0.34	21	45
				SBT	C	26.3	0.35	45	-
Albert Street & University Avenue West	C	23.0	0.48	SBR	C	22.2	0.02	-	-
				EBL	B	16.3	0.20	14	41
				EBTR	C	22.8	0.43	52	-
				WBL	B	16.8	0.30	19	33
				WBTR	C	22.7	0.43	52	-
				NBL	C	23.1	0.27	23	-
				NBT	C	26.6	0.55	86	-
				NBR	B	19.2	0.05	7	64
				SBL	C	21.1	0.15	12	14
				SBT	C	24.2	0.43	64	-
				SBR	B	19.0	0.04	3	50

Intersection	Intersection			Individual Movement					
	LOS	Delay (s)	v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
Weekday PM Peak Hour									
Albert Street & Columbia Street West	E	63.6	0.92	EBL	C	20.5	0.29	10	52
				EBTR	F	121.4	1.18	169	-
				WBL	C	33.6	0.73	39	51
				WBTR	C	33.3	0.82	115	-
				NBL	C	20.6	0.34	20	34
				NBTR	D	41.6	0.79	104	-
				SBL	C	22.4	0.58	31	45
				SBT	C	30.9	0.62	86	-
				SBR	C	21.6	0.05	2	-
Albert Street & University Avenue West	C	30.3	0.69	EBL	C	24.2	0.50	26	41
				EBTR	D	35.9	0.71	94	-
				WBL	C	24.6	0.39	20	33
				WBTR	D	37.3	0.72	91	-
				NBL	D	39.2	0.67	54	-
				NBT	B	19.7	0.34	59	-
				NBR	B	16.9	0.10	10	64
				SBL	B	18.0	0.17	17	14
				SBT	C	26.6	0.66	131	-
				SBR	B	16.7	0.09	11	50

Note: Red font represents a lane/movement which exceeds critical operational thresholds.

As shown in **Exhibit 4-6**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observations are noted during the Weekday AM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The shared westbound through/right-turn movement was found to operate above critical thresholds with an average control delay per vehicle of 55.5 seconds; and
 - The 95th percentile queue length for the northbound left-turn movement was found to exceed the available storage lane capacity by approximately one car length;
 - The eastbound left-turn, westbound left-turn, northbound left-turn, and southbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

- At the Albert Street and University Avenue West intersection:
 - The eastbound left-turn, westbound left-turn, northbound right-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

Furthermore, the following observations are noted during the Weekday PM Peak Hour:

- At the Albert Street and Columbia Street West intersection:
 - The shared eastbound through/right-turn movement was found to operate above critical thresholds with an average control delay per vehicle of 121.4 seconds; and
 - The eastbound left-turn, westbound left-turn, northbound left-turn, and southbound left-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.
- At the Albert Street and University Avenue West intersection:
 - The 95th percentile queue length for the southbound left-turn movement was found to exceed the available storage lane capacity by approximately one car length; and
 - The eastbound left-turn, westbound left-turn, southbound left-turn, and southbound right-turn lane entrances may be inaccessible due to 95th percentile queues in adjacent through lanes.

4.3.2 Unsignalized Intersections

The results of the 2027 Future Total Conditions traffic operations analysis for the study area unsignalized intersections are presented in **Exhibit 4-7**.

Exhibit 4-7: 2027 Future Total Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Storage Capacity (m)
Weekday AM Peak Hour							
Albert Street & Hickory Street West	3.8	EB	C	20.4	0.18	5	-
		WB	C	16.9	0.23	7	-
		NBL	A	0.2	0.01	0	-
		SBL	A	1.4	0.04	1	-
Sunview Street & Hickory Street West	4.5	WBL	A	3.1	0.01	0	-
		NBL	A	8.7	0.03	1	-
Sunview Street & University Avenue West	0.7	EBL	A	0.4	0.01	0	-
		WBL	A	0.2	0.00	0	-
		NB	B	13.4	0.01	0	-
		SB	C	23.8	0.10	3	-
Sunview Street & Proposed Site Access	3.5	EBLR	A	8.7	0.03	1	-
		NBL	A	0.3	0.00	0	-
Weekday PM Peak Hour							
Albert Street & Hickory Street West	18.4	EB	E	46.8	0.57	24	-
		WB	F	126.5	1.00	60	-
		NBL	A	0.9	0.03	1	-
		SBL	A	1.3	0.05	1	-
Sunview Street & Hickory Street West	3.3	WBL	A	2.9	0.02	1	-
		NBL	A	9.4	0.05	1	-
Sunview Street & University Avenue West	6.8	EBL	A	1.7	0.05	1	-
		WBL	A	0.4	0.01	0	-
		NB	E	49.9	0.16	4	-
		SB	F	231.2	0.91	29	-
Sunview Street & Proposed Site Access	1.1	EBLR	A	8.8	0.01	0	-
		NBL	A	1.1	0.01	0	-

Note: Red font represents a lane/movement which exceeds critical operational thresholds.

As shown in **Exhibit 4-7**, no intersections were found to be operating above overall critical operational thresholds during both the Weekday AM and Weekday PM Peak hours.

With respect to individual movements, the following observation was noted during the Weekday PM Peak Hour:

- At the Albert Street and Hickory Street West intersection, the westbound movement was found to operate above critical thresholds with an average control delay per vehicle of 126.5 seconds; and

- At the Sunview Street and University Avenue West intersection, the southbound movement was found to operate above critical thresholds with an average control delay per vehicle of 231.2 seconds.

4.4 Existing Access Impacts

As stipulated by the Region of Waterloo **Transportation Impact Study Guidelines** (July 2014), a movement is considered critical if a 95th percentile queue blocks an existing access. These instances are noted in **Exhibit 4-8**.

Exhibit 4-8: Existing Access Impacts

Intersection	Movement	2022 Existing		2027 Future Background		2027 Future Total	
		95th Percentile Queue (m)	Furthest Access Blocked	95th Percentile Queue (m)	Furthest Access Blocked	95th Percentile Queue (m)	Furthest Access Blocked
Weekday AM Peak Hour							
Albert Street and Columbia Street West	NBTR	69	338 Albert Street	82	338 Albert Street	88	338 Albert Street
	EBTR	72	344 Batavia Pl ace	79	Batavia Place	80	Batavia Place
	SBTR	0	-	0	-	0	-
	WBR	131	86 Columbia Street West	142	84 Columbia Street West	142	84 Columbia Street West
Albert Street and University Avenue West	NBTR	6	-	7	-	7	-
	EBTR	47	205 Albert Street	52	205 Albert Street	52	205 Albert Street
	SBTR	0	-	3	-	3	-
	WBR	49	233 Hemlock Street	52	233 Hemlock Street	52	233 Hemlock Street
Albert Street and Hickory Street West	EB	2	-	3	-	5	-
	WB	3	-	7	-	7	-
	NBL	0	-	0	-	0	-
	SBL	1	-	1	-	1	-
Sunview Street and Hickory Street West	WBL	0	-	0	-	0	-
	NBL	0	-	0	-	1	-
Sunview Street and University Avenue West	EBL	0	-	0	-	0	-
	WBL	0	-	0	-	0	-
	NB	0	-	0	-	0	-
	SB	1	-	1	-	3	-

Intersection	Movement	2022 Existing		2027 Future Background		2027 Future Total	
		95th Percentile Queue (m)	Furthest Access Blocked	95th Percentile Queue (m)	Furthest Access Blocked	95th Percentile Queue (m)	Furthest Access Blocked
Weekday PM Peak Hour							
Albert Street and Columbia Street West	NBTR	86	338 Albert Street	102	332 Albert Street	104	332 Albert Street
	EBTR	152	127 Columbia Street West	168	127 Columbia Street West	169	127 Columbia Street West
	SBTR	1	-	2	-	2	-
	WBR	96	96 Columbia Street West	115	94 Columbia Street West	115	94 Columbia Street West
Albert Street and University Avenue West	NBTR	10		10	-	10	-
	EBR	87	Sunview Street	94	Sunview Street	94	Sunview Street
	SBTR	10		11	-	11	-
	WBTR	82	Hemlock Street	91	Hemlock Street	91	Hemlock Street
Albert Street and Hickory Street West	EB	12	-	21	-	24	-
	WB	22	284 Albert Street	58	86 Hickory Street West	60	86 Hickory Street West
	NBL	1	-	1	-	1	-
	SBL	1	-	1	-	1	-
Sunview Street and Hickory Street West	WBL	0	-	0	-	1	-
	NBL	1	-	1	-	1	-
Sunview Street and University Avenue West	EBL	1	-	1	-	1	-
	WBL	0	-	0	-	0	-
	NB	3	-	4	-	4	-
	SB	20	-	26	-	29	-

Based on the analysis presented in **Exhibit 4-8**, the noted accesses are consistently impacted across the Existing, Future Background, and Future Total Conditions scenarios. As the traffic generated by the proposed development is expected to have minimal impact on overall traffic operations, increases to 95th percentile queue lengths for individual movement are minor. As such, no additional existing access are expected to be impacted after development site traffic is added to the transportation network.

5 Traffic Operations Mitigation Measures

As noted in **Section 2.6**, **Section 3.5**, and **Section 4.3**, several movement-specific traffic operations are observed and/or expected to exceed critical operational thresholds under existing and future conditions. The following subsections discuss these constraints in greater detail, as well as potential measures to mitigate these constraints, as appropriate. Full Highway Capacity Manual analysis results for the Future Total and Future Background Mitigated Conditions analysis are presented in **Appendix G**.

5.1 Albert Street and Columbia Street West

Under the 2027 Future Total Conditions scenario, the shared eastbound through/right-turn movement at this intersection is anticipated to operate above critical thresholds (average control delay per vehicle of 55.5 and 121.4 seconds) during the Weekday AM and PM Peak hour. It is important to note that the traffic count at this intersection was collected in 2019. According to the 2019 and 2022 traffic volume comparison at Albert Street and University Avenue West intersection, the 2019 traffic volume is generally greater than the 2022 traffic volume. Therefore, new traffic counts may result in lower average control delay per vehicle.

To improve traffic operations for the constrained movements noted above, adjustments to the existing signal timing plan for the Albert Street and Columbia Street West intersection during the Weekday AM and PM Peak hour were made. These adjustments are summarized in **Exhibit 5-1**.

Exhibit 5-1: Summary of Signal Timing Plan Adjustments for Traffic Operations Mitigation

Signal Phase	Albert Street and Columbia Street West
Weekday AM Peak Hour	
EBTR	36.0 s to 36.8 s (+0.8 s)
WBTR	36.0 s to 46.0 s (+0.8 s)
EBL	10.8 s to 10 s (-0.8 s)
WBL	10.8 s to 10 s (-0.8 s)
Cycle Length	No Change
Weekday PM Peak Hour	
EBTR	36.0 s to 46.0 s (+10.0 s)
WBTR	36.0 s to 46.0 s (+10.0 s)
NBL	10.8 s to 10 s (-0.8 s)
SBL	10.8 s to 10 s (-0.8 s)
NBTR	32.4 s to 33.2 s (+0.8 s)
SBTR	32.4 s to 33.2 s (+0.8 s)
Cycle Length	90.0 s to 100.0 s (+10.0 s)

A comparison of Unmitigated and Mitigated 2027 Future Total Conditions traffic operations at the Albert Street and Columbia Street West intersection during the Weekday AM and PM Peak hours resulting from these signal timing plan adjustments is presented in **Exhibit 5-2**.

Exhibit 5-2: 2027 Future Total Conditions Traffic Operations, Unmitigated and Mitigated, Signal Timing Plan Adjustments

Intersection	Movement	Unmitigated Conditions	Mitigated Conditions
		Delay (s)	Delay (s)
Weekday AM Peak Hour			
Albert Street and Columbia Street West	EBL	20.6	20.6
	EBTR	29.8	29.0
	WBL	19.0	19.0
	WBTR	55.5	51.3
	NBL	20.6	20.6
	NBTR	33.8	33.8
	SBL	20.5	20.5
	SBT	26.3	26.3
SBR	22.2	22.2	
Weekday PM Peak Hour			
Albert Street and Columbia Street West	EBL	20.5	18.2
	EBTR	121.4	51.3
	WBL	33.6	43.9
	WBTR	33.3	26.9
	NBL	20.6	25.9
	NBTR	41.6	53.2
	SBL	22.4	37.8
	SBT	30.9	37.8
	SBR	21.6	25.7

Note: *Red font represents a lane/movement which exceeds critical operational thresholds.*

As shown in **Exhibit 5-2**, these signal timing plan adjustments are expected to reduce delay to below critical thresholds.

6 Traffic Analysis Summary

Based on the analysis presented in this Transportation Impact Study, the proposed development is expected to generate up to 29 and 27 net new automobile trips during the Weekday AM and Weekday PM Peak hours, respectively – though these forecasts are expected to be conservative due to the anticipated demographic of future residents.

Overall, the results of the traffic operations analysis indicate that no instances of vehicle delay exceeding critical thresholds are anticipated under mitigated conditions for signalized intersections; and that turn lane storage, accessibility, and access blockage instances are largely comparable between scenarios. This indicates that the proposed development is expected to have minimal impacts on traffic operations within the study area. For unsignalized intersections, although there are some movements that exceed the vehicle delay critical thresholds, the forecasted traffic volumes for these movements is low and v/c ratios remain less than or equal to 1.00. Given that these are, in general, unsignalized approaches to high-volume arterial roads, high delay is not unexpected.

To demonstrate the potential impacts of development site traffic to background traffic operations within the study area signalized intersections, a comparison of signalized intersection operations under the 2027 Future Background Conditions and Future Total Conditions scenarios is presented in **Exhibit 6-1**.

**Exhibit 6-1: 2027 Future Background (Mitigated) Conditions and Future
Total (Mitigated) Conditions Traffic Operations Comparison –
Signalized Intersections**

Intersection	Delay (s)			Movement	Delay (s)		
	2027 FB	2027 FT	Difference		2027 FB	2027 FT	Difference
Weekday AM Peak Hour							
Albert Street & Columbia Street West	36.2	36.3	+0.1	EBL	20.6	20.6	0.0
				EBTR	28.9	29.0	+0.1
				WBL	19.0	19.0	0.0
				WBTR	51.3	51.3	0.0
				NBL	20.4	20.6	+0.2
				NBTR	33.2	33.8	+0.6
				SBL	20.5	20.5	0.0
				SBT	26.3	26.3	0.0
				SBR	22.2	22.2	0.0
Albert Street & University Avenue West	22.9	23	+0.1	EBL	16.3	16.3	0.0
				EBTR	22.7	22.8	+0.1
				WBL	16.8	16.8	0.0
				WBTR	22.7	22.7	0.0
				NBL	23.1	23.1	0.0
				NBT	26.6	26.6	0.0
				NBR	19.2	19.2	0.0
				SBL	21.1	21.1	0.0
				SBT	24.2	24.2	0.0
				SBR	19.0	19.0	0.0

Intersection	Delay (s)			Movement	Delay (s)		
	2027 FB	2027 FT	Difference		2027 FB	2027 FT	Difference
Weekday PM Peak Hour							
Albert Street & Columbia Street West	40.0	40.6	+0.6	EBL	18.2	18.2	0.0
				EBTR	50.3	51.3	+1.0
				WBL	40.8	43.9	+3.1
				WBTR	26.9	26.9	0.0
				NBL	25.9	25.9	0.0
				NBTR	52.4	53.2	+0.8
				SBL	37.3	37.8	+0.5
				SBT	37.6	37.8	+0.2
				SBR	25.7	25.7	0.0
Albert Street & University Avenue West	30.2	30.3	+0.1	EBL	24.1	24.2	+0.1
				EBTR	35.9	35.9	0.0
				WBL	24.6	24.6	0.0
				WBTR	37.2	37.3	+0.1
				NBL	38.4	39.2	+0.8
				NBT	19.7	19.7	0.0
				NBR	16.9	16.9	0.0
				SBL	18.0	18.0	0.0
				SBT	26.6	26.6	0.0
				SBR	16.7	16.7	0.0

Note: *Red* font represents a lane/movement which exceeds critical operational thresholds.

Based on the comparison of 2027 Future Background and 2027 Future Total Mitigated Conditions, as presented in **Exhibit 6-1**, the maximum delay expected to be experienced by any movement is 3.1 seconds per vehicle for signalized intersections. As this increase is likely to be imperceptible to the average road user, and as no new critical movements are created after the addition of development site traffic to the transportation network, this underscores the conclusions that the proposed development will have minimal impacts on traffic operations within the study area signalized intersections.

To demonstrate the potential impacts of development site traffic to background traffic operations within the study area unsignalized intersections, a comparison of unsignalized intersection operations under the 2027 Future Background Conditions and Future Total Conditions scenarios is presented in **Exhibit 6-2**.

Exhibit 6-2: 2027 Future Background Conditions and Future Total Conditions Traffic Operations Comparison – Unsignalized Intersections

Intersection	v/c Ratio			Movement	v/c Ratio		
	2027 FB	2027 FT	Difference		2027 FB	2027 FT	Difference
Weekday AM Peak Hour							
Albert Street & Hickory Street West	3.4	3.8	+0.4	EB	17.2	20.4	+3.2
				WB	16.9	16.9	0.0
				NBL	0.2	0.2	0.0
				SBL	1.5	1.4	-0.1
Sunview Street & Hickory Street West	3.6	4.5	+0.9	WBL	2.9	3.1	+0.2
				NBL	8.7	8.7	0.0
Sunview Street & University Avenue West	0.5	0.7	+0.2	EBL	0.4	0.4	0.0
				WBL	0.2	0.2	0.0
				NB	13.4	13.4	0.0
				SB	22.0	23.8	+1.8
Weekday PM Peak Hour							
Albert Street & Hickory Street West	17.5	18.4	+0.9	EB	42.5	46.8	+4.3
				WB	120.7	126.5	+5.8
				NBL	0.9	0.9	0.0
				SBL	1.3	1.3	0.0
Sunview Street & Hickory Street West	2.9	3.3	+0.4	WBL	2.2	2.9	+0.7
				NBL	9.4	9.4	0.0
Sunview Street & University Avenue West	5.5	6.8	+1.3	EBL	1.5	1.7	+0.2
				WBL	0.4	0.4	0.0
				NB	48.8	49.9	+1.1
				SB	198.3	231.2	+32.9

Based on the comparison of 2027 Future Background and 2027 Future Total Conditions, as presented in **Exhibit 6-2**, the westbound movement at the Albert Street and Hickory Street West intersection and the southbound movement at the Sunview Street and University Avenue West intersection were found to operate above critical delay thresholds under both 2027 Future Background and 2027 Future Total Conditions. However, high delay for these movements are not unexpected given that they are unsignalized approaches to intersecting high-volume arterial roads. As previously noted, forecasted traffic volumes for these movements is low and v/c ratios remain less than or equal to 1.00.

7 Conclusions

This section summarizes the key findings of this Transportation Impact Study.

7.1 Traffic Operations Analysis

Based on the analysis presented in the Transportation Impact Study, the proposed development is expected to generate up to 29 and 27 net new automobile trips during the Weekday AM and Weekday PM Peak hours, respectively – though these forecasts are expected to be conservative due to the anticipated demographic of future residents.

Overall, the results of the traffic operations analysis for signalized intersections indicate that no instances of vehicle delay exceeding critical thresholds are anticipated under mitigated conditions; and that turn lane storage, accessibility, and access blockage instances are largely comparable between scenarios.

To demonstrate the potential impacts of development site traffic to traffic operations within the study area signalized intersections, a comparison of operations under the mitigated 2027 Future Background and Future Total Conditions scenarios was undertaken. This comparison indicated that the maximum delay expected to be experienced by any movement is 3.1 seconds per vehicle for signalized intersections.

The results of the traffic operations analysis for unsignalized intersections indicate that the westbound movement at the Albert Street and Hickory Street West intersection and the southbound movement at the Sunview Street and University Avenue West intersection were found to operate above critical delay thresholds under both 2027 Future Background and 2027 Future Total Conditions. However, high delay for these movements are not unexpected given that they are unsignalized approaches to intersecting high-volume arterial roads. As previously noted, forecasted traffic volumes for these movements is low and v/c ratios remain less than or equal to 1.00.

As the noticed increases (especially for signalized intersections) are likely to be imperceptible to the average road user, and as no new critical movements are created after the addition of development site traffic to the transportation network, this underscores the conclusions that the proposed development will have minimal impacts on traffic operations within the study area.

Appendix A

Turning Movement Counts

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File Name : Albert Street at Hickory Street West
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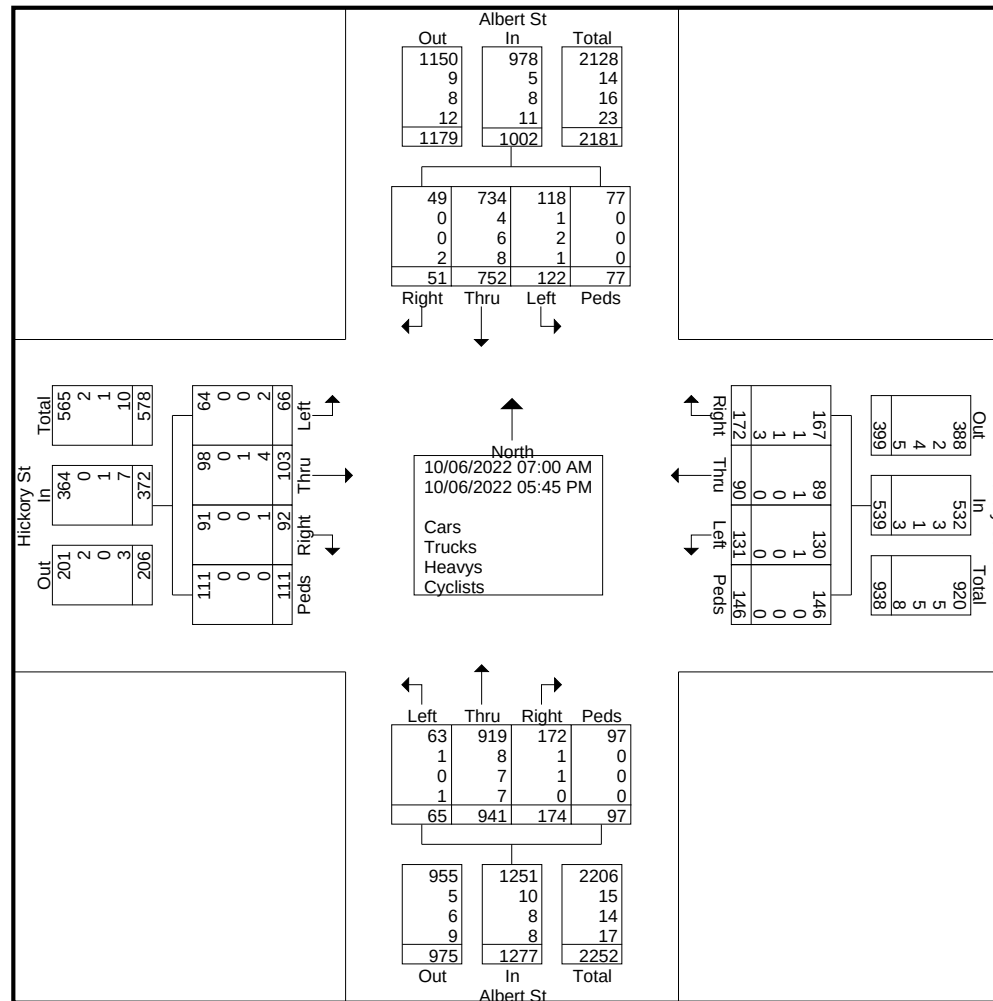
Groups Printed- Cars - Trucks - Heavys - Cyclists

	Albert St From North					Hickory St From East					Albert St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	1	34	18	3	56	31	7	7	11	56	33	44	2	3	82	5	4	2	5	16	210
07:15 AM	1	62	9	1	73	15	2	8	6	31	10	53	0	4	67	4	6	4	6	20	191
07:30 AM	0	46	3	3	52	6	5	1	2	14	5	42	2	3	52	4	2	1	3	10	128
07:45 AM	1	31	4	8	44	3	2	3	4	12	3	39	2	4	48	1	0	3	8	12	116
Total	3	173	34	15	225	55	16	19	23	113	51	178	6	14	249	14	12	10	22	58	645
08:00 AM	4	37	5	7	53	6	1	3	2	12	4	39	0	2	45	2	1	3	10	16	126
08:15 AM	1	32	5	0	38	5	3	6	5	19	4	37	3	4	48	6	6	1	4	17	122
08:30 AM	3	31	6	4	44	8	4	5	14	31	10	38	4	9	61	1	2	3	11	17	153
08:45 AM	0	23	3	3	29	5	1	3	13	22	11	53	3	4	71	3	1	1	8	13	135
Total	8	123	19	14	164	24	9	17	34	84	29	167	10	19	225	12	10	8	33	63	536
04:00 PM	2	77	4	4	87	10	7	12	13	42	8	68	4	13	93	6	7	9	5	27	249
04:15 PM	5	82	5	5	97	12	9	15	9	45	18	76	8	8	110	11	12	8	8	39	291
04:30 PM	5	73	12	4	94	17	11	14	7	49	9	91	6	10	116	8	13	6	7	34	293
04:45 PM	6	56	13	8	83	9	5	9	14	37	16	86	8	5	115	12	8	3	6	29	264
Total	18	288	34	21	361	48	32	50	43	173	51	321	26	36	434	37	40	26	26	129	1097
05:00 PM	3	46	10	4	63	8	7	17	7	39	8	86	7	7	108	10	7	1	2	20	230
05:15 PM	8	40	6	13	67	15	7	7	8	37	13	57	4	6	80	9	7	5	9	30	214
05:30 PM	6	38	12	5	61	13	10	10	17	50	8	55	6	7	76	5	13	6	10	34	221
05:45 PM	5	44	7	5	61	9	9	11	14	43	14	77	6	8	105	5	14	10	9	38	247
Total	22	168	35	27	252	45	33	45	46	169	43	275	23	28	369	29	41	22	30	122	912
Grand Total	51	752	122	77	1002	172	90	131	146	539	174	941	65	97	1277	92	103	66	111	372	3190
Apprch %	5.1	75	12.2	7.7		31.9	16.7	24.3	27.1		13.6	73.7	5.1	7.6		24.7	27.7	17.7	29.8		
Total %	1.6	23.6	3.8	2.4	31.4	5.4	2.8	4.1	4.6	16.9	5.5	29.5	2	3	40	2.9	3.2	2.1	3.5	11.7	
Cars	49	734	118	77	978	167	89	130	146	532	172	919	63	97	1251	91	98	64	111	364	3125
% Cars	96.1	97.6	96.7	100	97.6	97.1	98.9	99.2	100	98.7	98.9	97.7	96.9	100	98	98.9	95.1	97	100	97.8	98
Trucks	0	4	1	0	5	1	1	1	0	3	1	8	1	0	10	0	0	0	0	0	18
% Trucks	0	0.5	0.8	0	0.5	0.6	1.1	0.8	0	0.6	0.6	0.9	1.5	0	0.8	0	0	0	0	0	0.6
Heavys	0	6	2	0	8	1	0	0	0	1	1	7	0	0	8	0	1	0	0	1	18
% Heavys	0	0.8	1.6	0	0.8	0.6	0	0	0	0.2	0.6	0.7	0	0	0.6	0	1	0	0	0.3	0.6
Cyclists	2	8	1	0	11	3	0	0	0	3	0	7	1	0	8	1	4	2	0	7	29
% Cyclists	3.9	1.1	0.8	0	1.1	1.7	0	0	0	0.6	0	0.7	1.5	0	0.6	1.1	3.9	3	0	1.9	0.9

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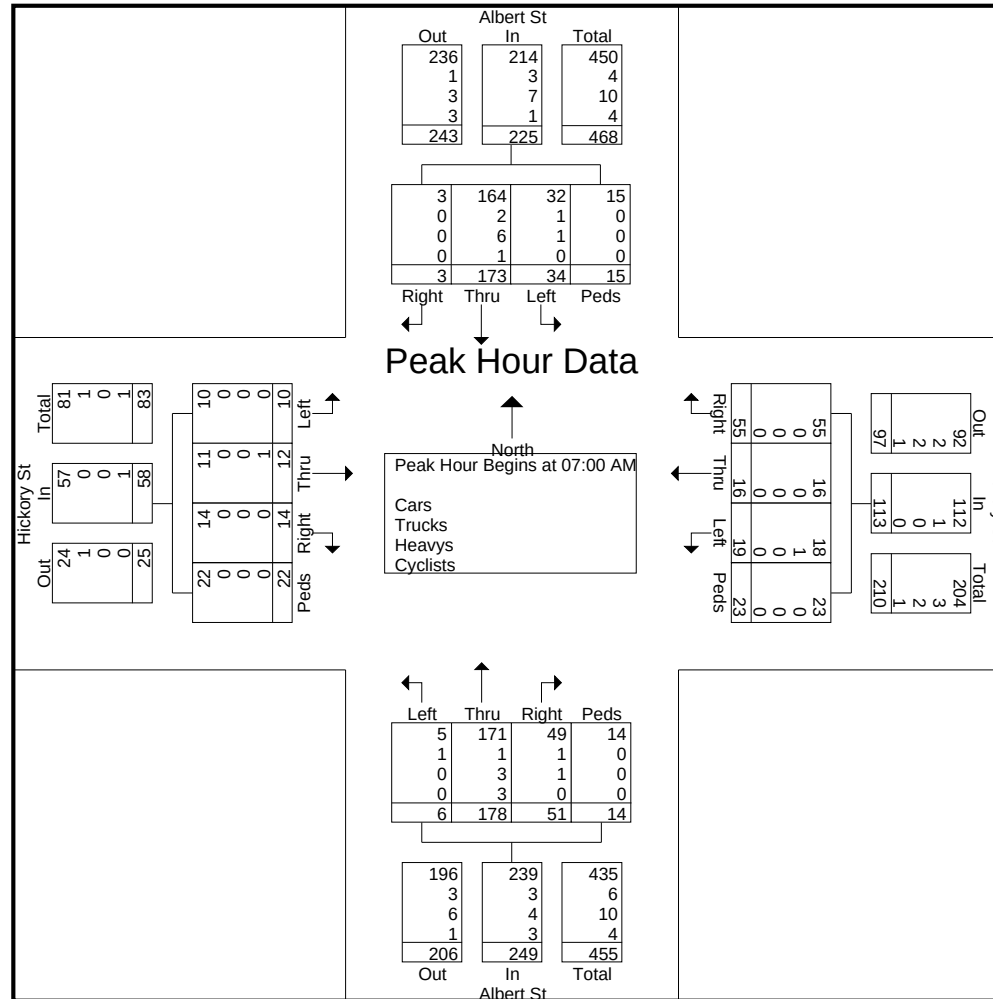
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 Site Code : 00000000
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	Albert St From North					Hickory St From East					Albert St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	34	18	3	56	31	7	7	11	56	33	44	2	3	82	5	4	2	5	16	210
07:15 AM	1	62	9	1	73	15	2	8	6	31	10	53	0	4	67	4	6	4	6	20	191
07:30 AM	0	46	3	3	52	6	5	1	2	14	5	42	2	3	52	4	2	1	3	10	128
07:45 AM	1	31	4	8	44	3	2	3	4	12	3	39	2	4	48	1	0	3	8	12	116
Total Volume	3	173	34	15	225	55	16	19	23	113	51	178	6	14	249	14	12	10	22	58	645
% App. Total	1.3	76.9	15.1	6.7		48.7	14.2	16.8	20.4		20.5	71.5	2.4	5.6		24.1	20.7	17.2	37.9		
PHF	.750	.698	.472	.469	.771	.444	.571	.594	.523	.504	.386	.840	.750	.875	.759	.700	.500	.625	.688	.725	.768
Cars	3	164	32	15	214	55	16	18	23	112	49	171	5	14	239	14	11	10	22	57	622
% Cars	100	94.8	94.1	100	95.1	100	100	94.7	100	99.1	96.1	96.1	83.3	100	96.0	100	91.7	100	100	98.3	96.4
Trucks	0	2	1	0	3	0	0	1	0	1	1	1	1	0	3	0	0	0	0	0	7
% Trucks	0	1.2	2.9	0	1.3	0	0	5.3	0	0.9	2.0	0.6	16.7	0	1.2	0	0	0	0	0	1.1
Heavyvs	0	6	1	0	7	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	11
% Heavyvs	0	3.5	2.9	0	3.1	0	0	0	0	0	2.0	1.7	0	0	1.6	0	0	0	0	0	1.7
Cyclists	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	5
% Cyclists	0	0.6	0	0	0.4	0	0	0	0	0	0	1.7	0	0	1.2	0	8.3	0	0	1.7	0.8

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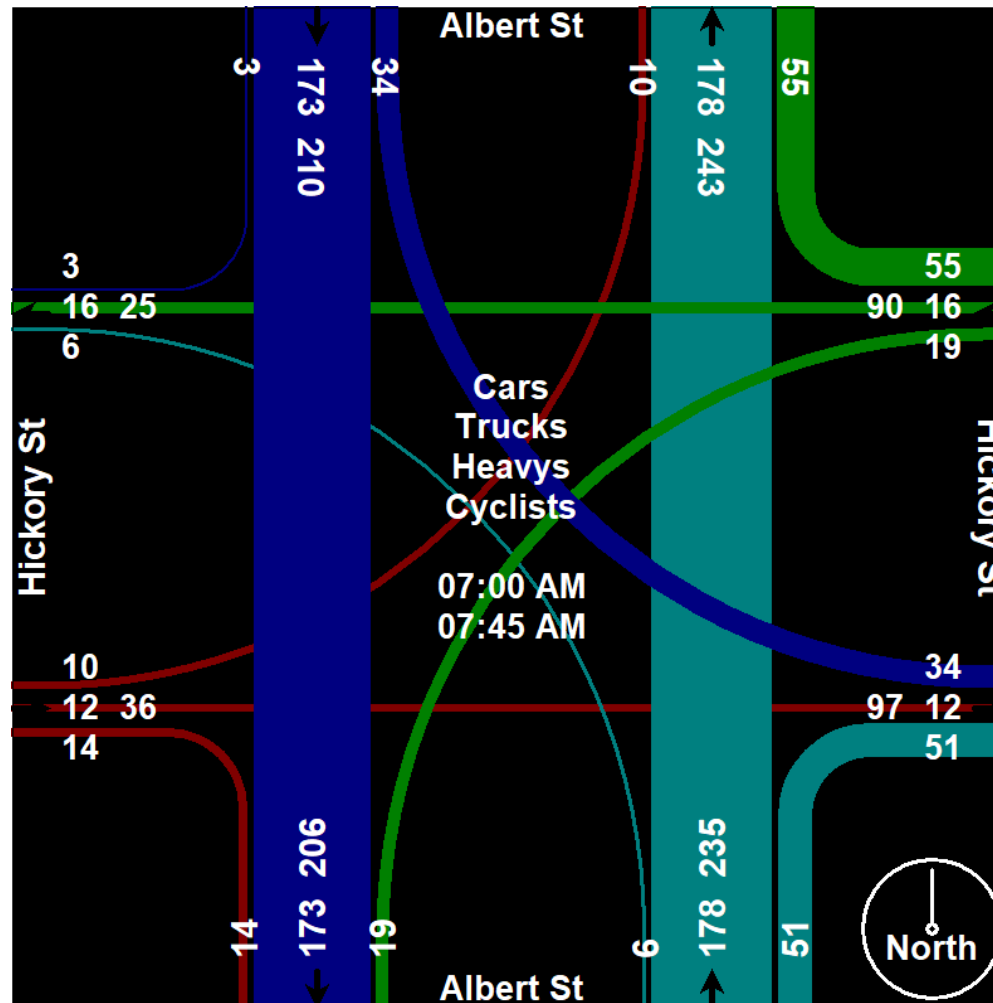
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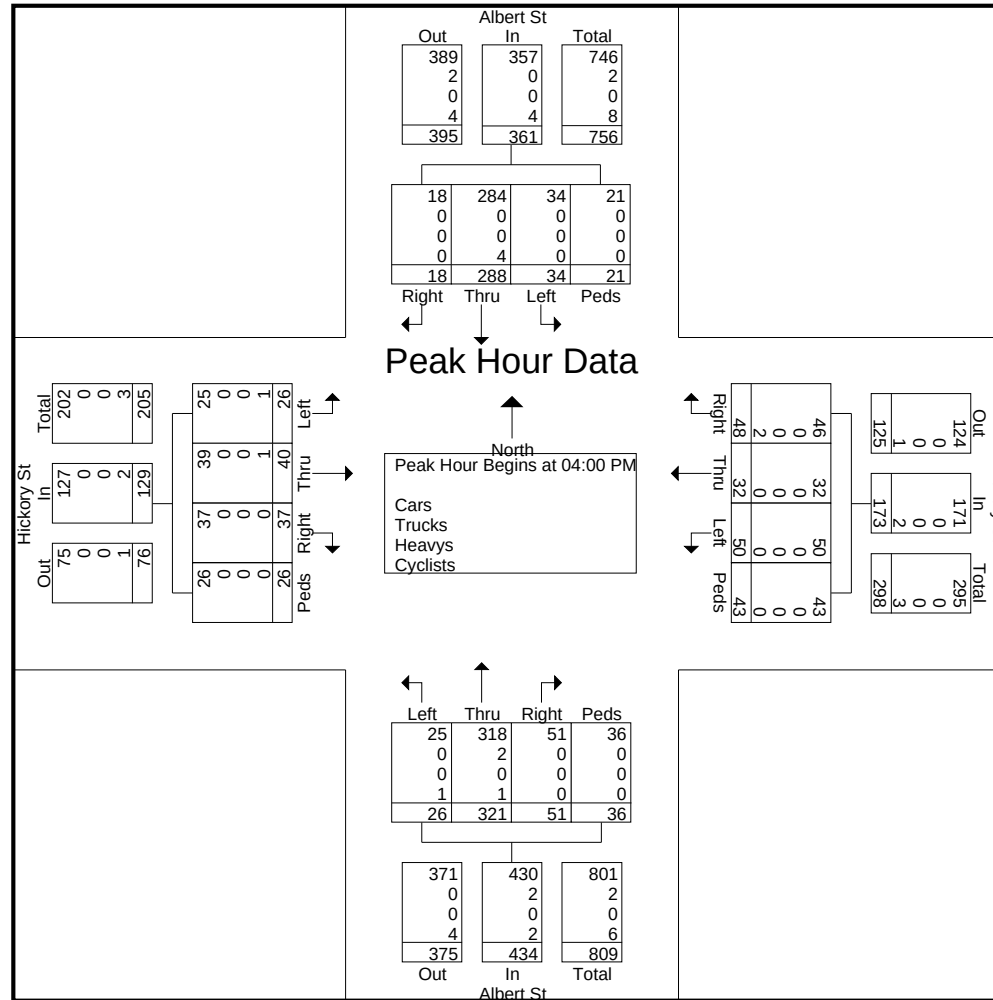
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 Site Code : 00000000
 Start Date : 10/06/2022
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	Albert St From North					Hickory St From East					Albert St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	2	77	4	4	87	10	7	12	13	42	8	68	4	13	93	6	7	9	5	27	249
04:15 PM	5	82	5	5	97	12	9	15	9	45	18	76	8	8	110	11	12	8	8	39	291
04:30 PM	5	73	12	4	94	17	11	14	7	49	9	91	6	10	116	8	13	6	7	34	293
04:45 PM	6	56	13	8	83	9	5	9	14	37	16	86	8	5	115	12	8	3	6	29	264
Total Volume	18	288	34	21	361	48	32	50	43	173	51	321	26	36	434	37	40	26	26	129	1097
% App. Total	5	79.8	9.4	5.8		27.7	18.5	28.9	24.9		11.8	74	6	8.3		28.7	31	20.2	20.2		
PHF	.750	.878	.654	.656	.930	.706	.727	.833	.768	.883	.708	.882	.813	.692	.935	.771	.769	.722	.813	.827	.936
Cars	18	284	34	21	357	46	32	50	43	171	51	318	25	36	430	37	39	25	26	127	1085
% Cars	100	98.6	100	100	98.9	95.8	100	100	100	98.8	100	99.1	96.2	100	99.1	100	97.5	96.2	100	98.4	98.9
Trucks	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0.5	0	0	0	0	0	0.2
Heavys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclists	0	4	0	0	4	2	0	0	0	2	0	1	1	0	2	0	1	1	0	2	10
% Cyclists	0	1.4	0	0	1.1	4.2	0	0	0	1.2	0	0.3	3.8	0	0.5	0	2.5	3.8	0	1.6	0.9

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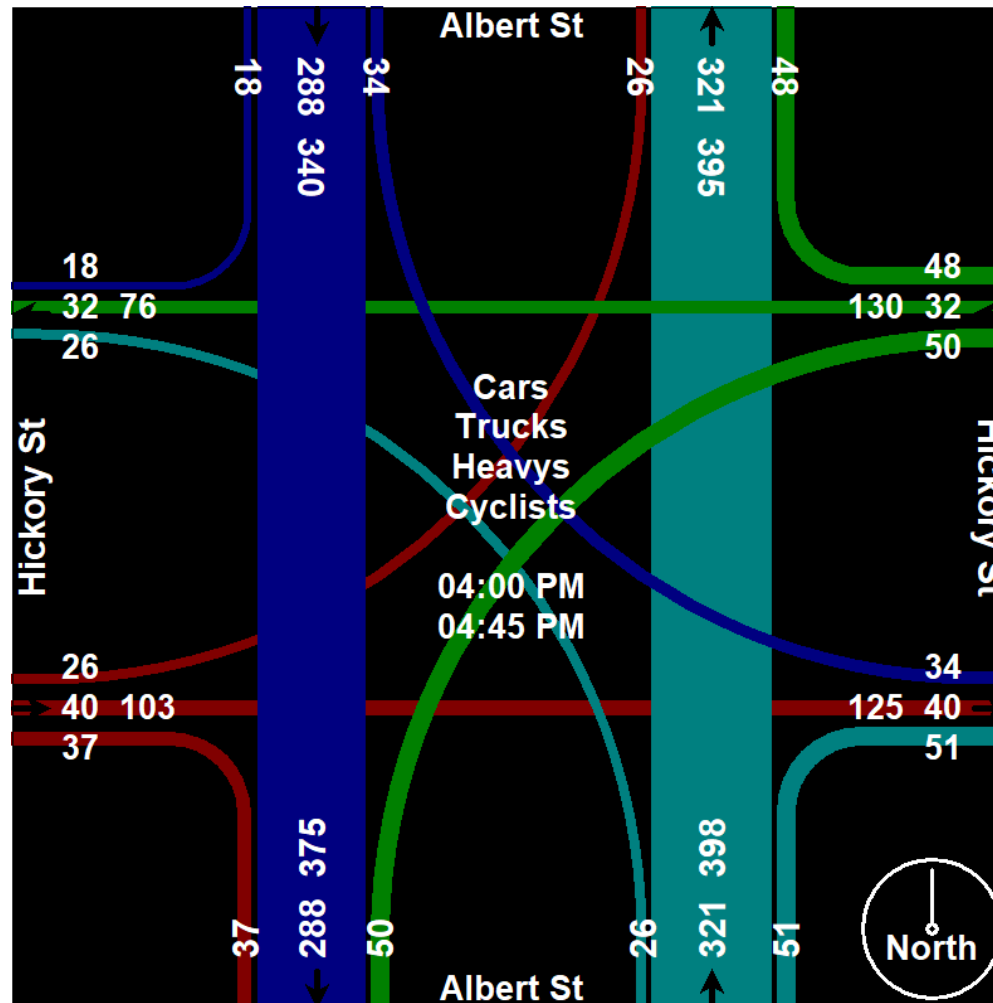
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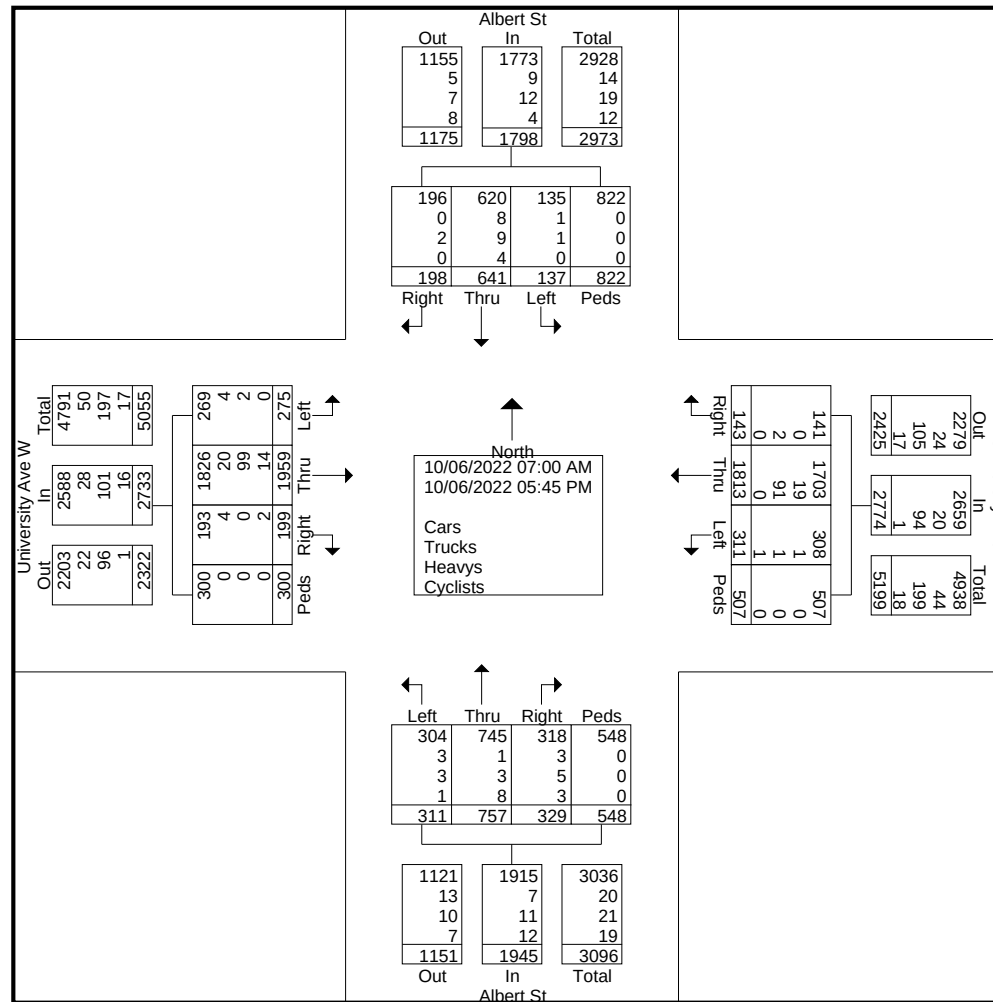
Groups Printed- Cars - Trucks - Heavys - Cyclists

	Albert St From North					University Ave W From East					Albert St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	1	14	6	9	30	3	47	8	2	60	5	10	4	2	21	2	34	6	3	45	156
07:15 AM	5	14	4	3	26	2	44	7	1	54	8	11	4	5	28	2	53	3	3	61	169
07:30 AM	1	17	5	11	34	5	56	13	5	79	9	23	4	4	40	4	62	10	3	79	232
07:45 AM	7	31	6	17	61	2	68	16	13	99	11	45	6	6	68	4	101	14	8	127	355
Total	14	76	21	40	151	12	215	44	21	292	33	89	18	17	157	12	250	33	17	312	912
08:00 AM	8	33	6	53	100	9	120	30	31	190	19	43	21	25	108	3	109	31	14	157	555
08:15 AM	12	59	5	81	157	15	124	41	75	255	25	38	30	71	164	20	114	13	41	188	764
08:30 AM	6	35	8	16	65	0	103	11	17	131	11	37	15	24	87	8	119	10	15	152	435
08:45 AM	6	29	4	17	56	7	109	16	10	142	8	24	12	13	57	8	99	9	10	126	381
Total	32	156	23	167	378	31	456	98	133	718	63	142	78	133	416	39	441	63	80	623	2135
04:00 PM	16	47	6	97	166	10	143	24	34	211	41	72	22	52	187	13	146	20	24	203	767
04:15 PM	11	29	11	65	116	9	142	21	41	213	28	72	26	41	167	21	146	23	16	206	702
04:30 PM	18	41	14	56	129	12	153	25	27	217	17	65	23	42	147	21	185	19	21	246	739
04:45 PM	19	60	10	58	147	4	111	16	35	166	24	47	21	33	125	28	165	18	21	232	670
Total	64	177	41	276	558	35	549	86	137	807	110	256	92	168	626	83	642	80	82	887	2878
05:00 PM	24	53	13	73	163	18	140	11	52	221	24	53	25	46	148	22	153	21	26	222	754
05:15 PM	26	70	14	118	228	8	141	23	92	264	41	78	37	97	253	13	166	22	45	246	991
05:30 PM	20	59	15	78	172	17	150	30	37	234	28	64	34	45	171	19	139	31	33	222	799
05:45 PM	18	50	10	70	148	22	162	19	35	238	30	75	27	42	174	11	168	25	17	221	781
Total	88	232	52	339	711	65	593	83	216	957	123	270	123	230	746	65	626	99	121	911	3325
Grand Total	198	641	137	822	1798	143	1813	311	507	2774	329	757	311	548	1945	199	1959	275	300	2733	9250
Apprch %	11	35.7	7.6	45.7		5.2	65.4	11.2	18.3		16.9	38.9	16	28.2		7.3	71.7	10.1	11		
Total %	2.1	6.9	1.5	8.9	19.4	1.5	19.6	3.4	5.5	30	3.6	8.2	3.4	5.9	21	2.2	21.2	3	3.2	29.5	
Cars	196	620	135	822	1773	141	1703	308	507	2659	318	745	304	548	1915	193	1826	269	300	2588	8935
% Cars	99	96.7	98.5	100	98.6	98.6	93.9	99	100	95.9	96.7	98.4	97.7	100	98.5	97	93.2	97.8	100	94.7	96.6
Trucks	0	8	1	0	9	0	19	1	0	20	3	1	3	0	7	4	20	4	0	28	64
% Trucks	0	1.2	0.7	0	0.5	0	1	0.3	0	0.7	0.9	0.1	1	0	0.4	2	1	1.5	0	1	0.7
Heavys	2	9	1	0	12	2	91	1	0	94	5	3	3	0	11	0	99	2	0	101	218
% Heavys	1	1.4	0.7	0	0.7	1.4	5	0.3	0	3.4	1.5	0.4	1	0	0.6	0	5.1	0.7	0	3.7	2.4
Cyclists	0	4	0	0	4	0	0	1	0	1	3	8	1	0	12	2	14	0	0	16	33
% Cyclists	0	0.6	0	0	0.2	0	0	0.3	0	0	0.9	1.1	0.3	0	0.6	1	0.7	0	0	0.6	0.4

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File Name : Albert Street at University Avenue West
Site Code : 00000000
Start Date : 10/06/2022
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	Albert St From North					University Ave W From East					Albert St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	8	33	6	53	100	9	120	30	31	190	19	43	21	25	108	3	109	31	14	157	555
08:15 AM	12	59	5	81	157	15	124	41	75	255	25	38	30	71	164	20	114	13	41	188	764
08:30 AM	6	35	8	16	65	0	103	11	17	131	11	37	15	24	87	8	119	10	15	152	435
08:45 AM	6	29	4	17	56	7	109	16	10	142	8	24	12	13	57	8	99	9	10	126	381
Total Volume	32	156	23	167	378	31	456	98	133	718	63	142	78	133	416	39	441	63	80	623	2135
% App. Total	8.5	41.3	6.1	44.2		4.3	63.5	13.6	18.5		15.1	34.1	18.8	32		6.3	70.8	10.1	12.8		
PHF	.667	.661	.719	.515	.602	.517	.919	.598	.443	.704	.630	.826	.650	.468	.634	.488	.926	.508	.488	.828	.699
Cars	32	148	22	167	369	31	413	97	133	674	59	138	72	133	402	38	396	61	80	575	2020
% Cars	100	94.9	95.7	100	97.6	100	90.6	99.0	100	93.9	93.7	97.2	92.3	100	96.6	97.4	89.8	96.8	100	92.3	94.6
Trucks	0	3	0	0	3	0	8	1	0	9	1	0	2	0	3	1	11	1	0	13	28
% Trucks	0	1.9	0	0	0.8	0	1.8	1.0	0	1.3	1.6	0	2.6	0	0.7	2.6	2.5	1.6	0	2.1	1.3
Heavys	0	5	1	0	6	0	35	0	0	35	2	3	3	0	8	0	26	1	0	27	76
% Heavys	0	3.2	4.3	0	1.6	0	7.7	0	0	4.9	3.2	2.1	3.8	0	1.9	0	5.9	1.6	0	4.3	3.6
Cyclists	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	0	8	0	0	8	11
% Cyclists	0	0	0	0	0	0	0	0	0	0	1.6	0.7	1.3	0	0.7	0	1.8	0	0	1.3	0.5

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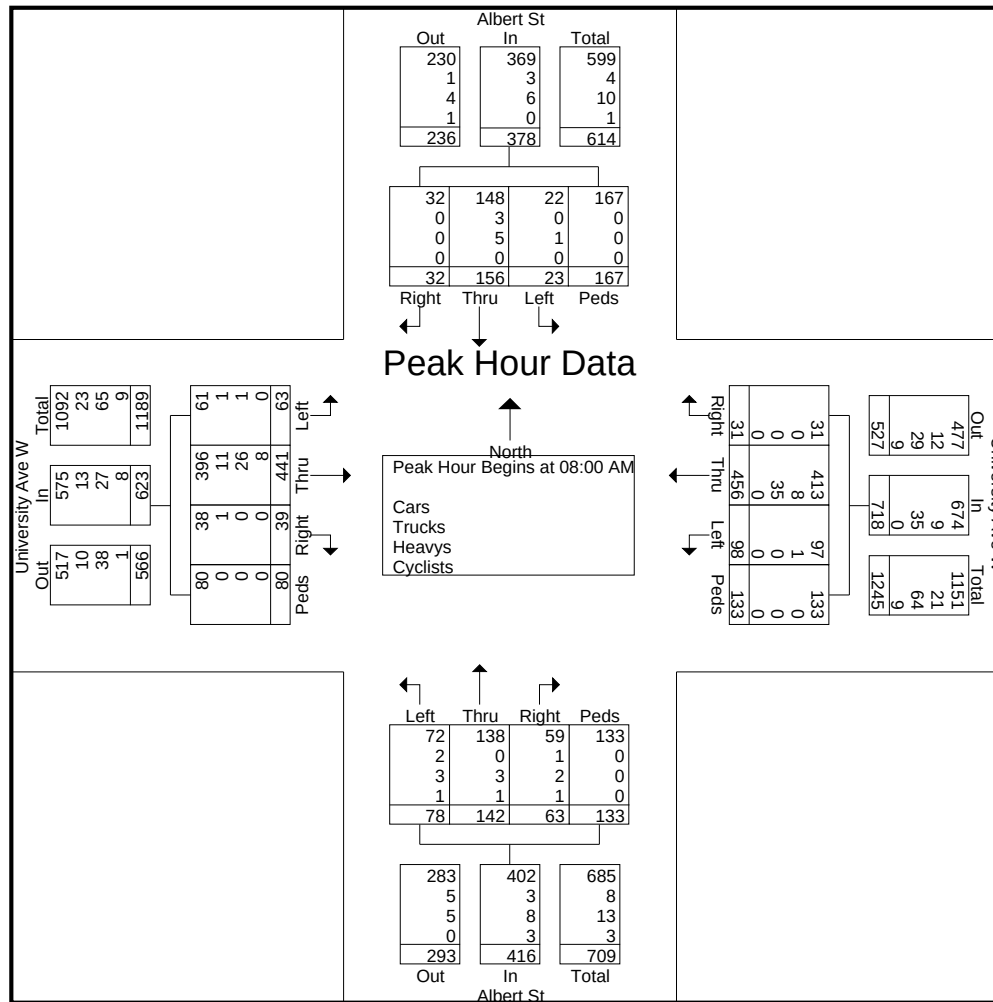
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File Name : Albert Street at University Avenue West

Site Code : 00000000

Start Date : 10/06/2022

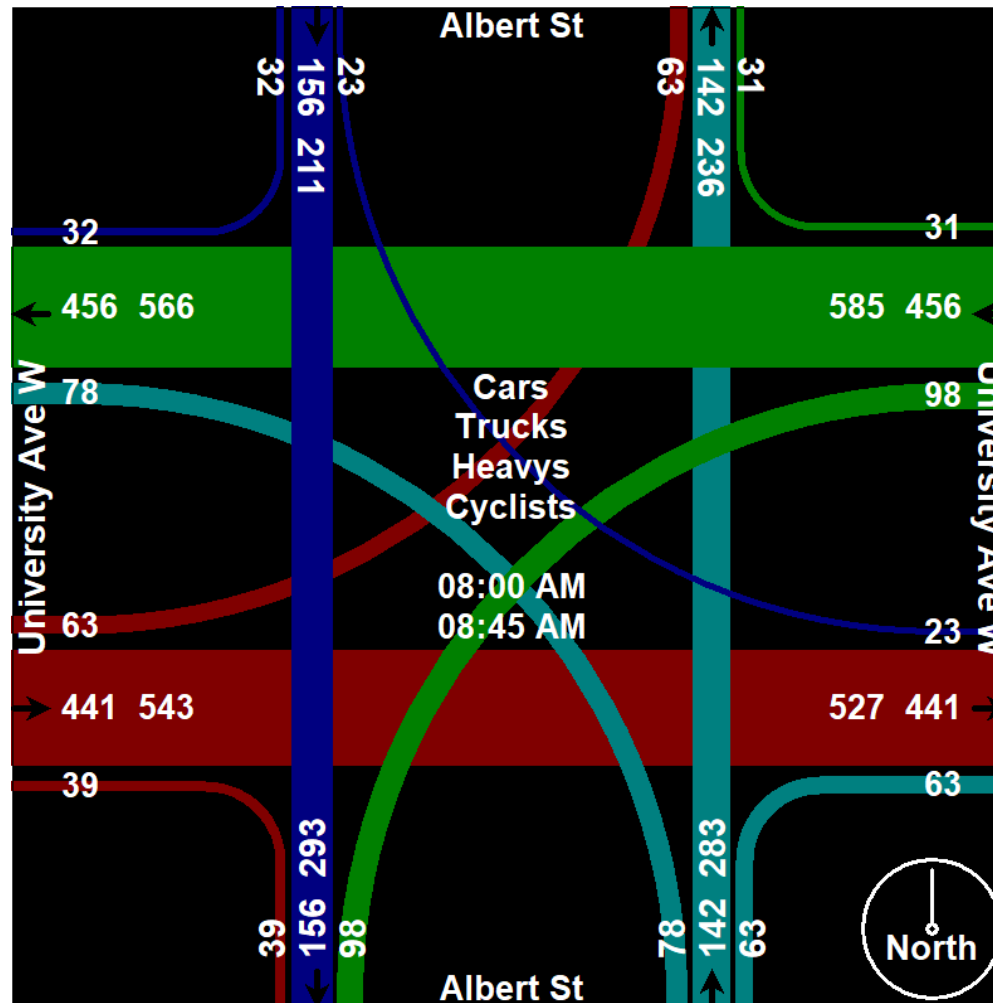
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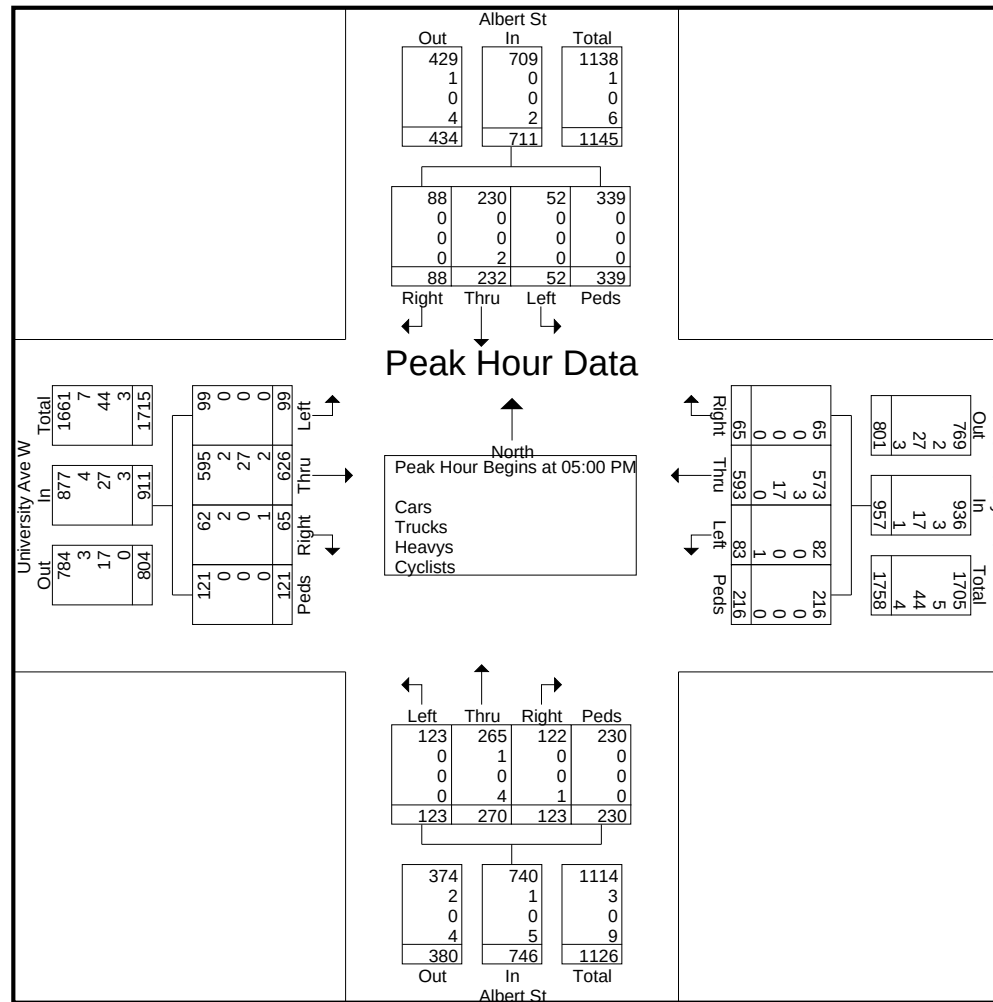
File Name : Albert Street at University Avenue West
 Site Code : 00000000
 Start Date : 10/06/2022
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	Albert St From North					University Ave W From East					Albert St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	24	53	13	73	163	18	140	11	52	221	24	53	25	46	148	22	153	21	26	222	754
05:15 PM	26	70	14	118	228	8	141	23	92	264	41	78	37	97	253	13	166	22	45	246	991
05:30 PM	20	59	15	78	172	17	150	30	37	234	28	64	34	45	171	19	139	31	33	222	799
05:45 PM	18	50	10	70	148	22	162	19	35	238	30	75	27	42	174	11	168	25	17	221	781
Total Volume	88	232	52	339	711	65	593	83	216	957	123	270	123	230	746	65	626	99	121	911	3325
% App. Total	12.4	32.6	7.3	47.7		6.8	62	8.7	22.6		16.5	36.2	16.5	30.8		7.1	68.7	10.9	13.3		
PHF	.846	.829	.867	.718	.780	.739	.915	.692	.587	.906	.750	.865	.831	.593	.737	.739	.932	.798	.672	.926	.839
Cars	88	230	52	339	709	65	573	82	216	936	122	265	123	230	740	62	595	99	121	877	3262
% Cars	100	99.1	100	100	99.7	100	96.6	98.8	100	97.8	99.2	98.1	100	100	99.2	95.4	95.0	100	100	96.3	98.1
Trucks	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	2	2	0	0	4	8
% Trucks	0	0	0	0	0	0	0.5	0	0	0.3	0	0.4	0	0	0.1	3.1	0.3	0	0	0.4	0.2
Heavys	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	27	0	0	27	44
% Heavys	0	0	0	0	0	0	2.9	0	0	1.8	0	0	0	0	0	0	4.3	0	0	3.0	1.3
Cyclists	0	2	0	0	2	0	0	1	0	1	1	4	0	0	5	1	2	0	0	3	11
% Cyclists	0	0.9	0	0	0.3	0	0	1.2	0	0.1	0.8	1.5	0	0	0.7	1.5	0.3	0	0	0.3	0.3

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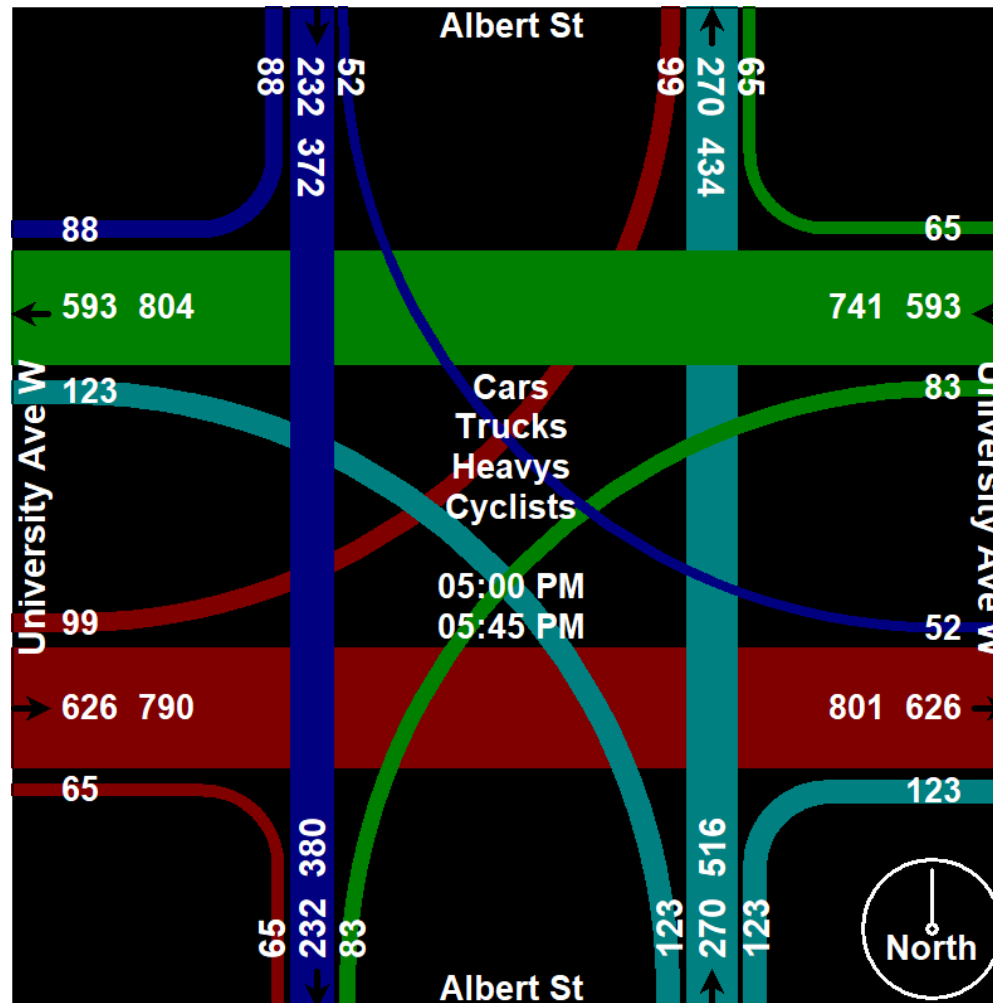
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 Site Code : 00000000
 Start Date : 10/06/2022
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File Name : Sunview Street at Hickory Street
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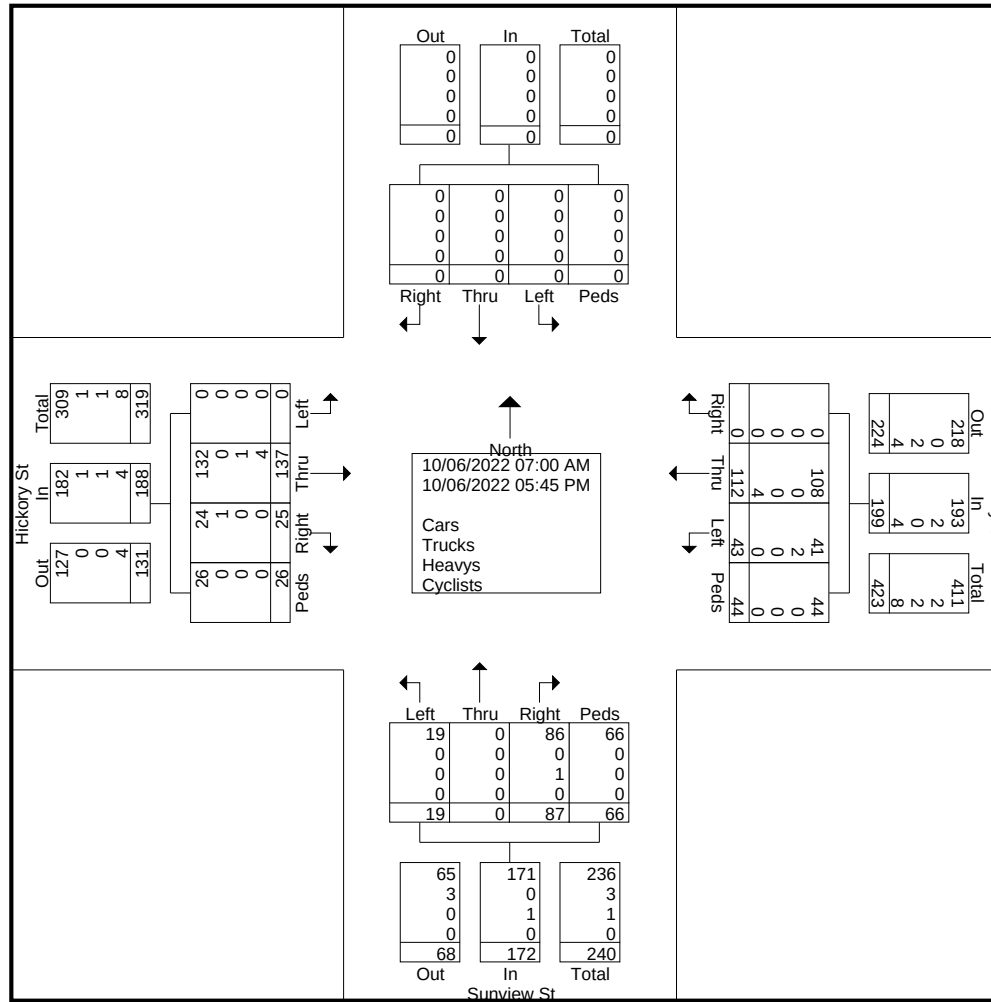
Groups Printed- Cars - Trucks - Heavys - Cyclists

	From North					Hickory St From East					Sunview St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	2	2	1	0	0	0	1	1	1	0	0	2	5
07:15 AM	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	0	2	0	3	5	9
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	3
07:45 AM	0	0	0	0	0	0	2	1	3	6	4	0	1	1	6	1	3	0	0	4	16
Total	0	0	0	0	0	0	3	1	5	9	7	0	2	1	10	3	8	0	3	14	33
08:00 AM	0	0	0	0	0	0	5	3	6	14	7	0	0	1	8	0	4	0	0	4	26
08:15 AM	0	0	0	0	0	0	3	0	2	5	7	0	1	4	12	0	6	0	1	7	24
08:30 AM	0	0	0	0	0	0	6	1	5	12	2	0	0	1	3	0	3	0	2	5	20
08:45 AM	0	0	0	0	0	0	2	3	3	8	2	0	0	5	7	2	2	0	0	4	19
Total	0	0	0	0	0	0	16	7	16	39	18	0	1	11	30	2	15	0	3	20	89
04:00 PM	0	0	0	0	0	0	13	1	2	16	10	0	2	6	18	2	16	0	0	18	52
04:15 PM	0	0	0	0	0	0	10	6	1	17	6	0	0	6	12	1	7	0	2	10	39
04:30 PM	0	0	0	0	0	0	10	3	2	15	6	0	3	4	13	1	12	0	3	16	44
04:45 PM	0	0	0	0	0	0	5	4	5	14	6	0	1	7	14	2	13	0	6	21	49
Total	0	0	0	0	0	0	38	14	10	62	28	0	6	23	57	6	48	0	11	65	184
05:00 PM	0	0	0	0	0	0	9	3	5	17	11	0	1	9	21	1	13	0	1	15	53
05:15 PM	0	0	0	0	0	0	19	4	1	24	8	0	0	7	15	3	19	0	1	23	62
05:30 PM	0	0	0	0	0	0	14	9	5	28	9	0	5	8	22	7	17	0	6	30	80
05:45 PM	0	0	0	0	0	0	13	5	2	20	6	0	4	7	17	3	17	0	1	21	58
Total	0	0	0	0	0	0	55	21	13	89	34	0	10	31	75	14	66	0	9	89	253
Grand Total	0	0	0	0	0	0	112	43	44	199	87	0	19	66	172	25	137	0	26	188	559
Apprch %	0	0	0	0		0	56.3	21.6	22.1		50.6	0	11	38.4		13.3	72.9	0	13.8		
Total %	0	0	0	0	0	0	20	7.7	7.9	35.6	15.6	0	3.4	11.8	30.8	4.5	24.5	0	4.7	33.6	
Cars	0	0	0	0	0	0	108	41	44	193	86	0	19	66	171	24	132	0	26	182	546
% Cars	0	0	0	0	0	0	96.4	95.3	100	97	98.9	0	100	100	99.4	96	96.4	0	100	96.8	97.7
Trucks	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	1	3
% Trucks	0	0	0	0	0	0	0	4.7	0	1	0	0	0	0	0	4	0	0	0	0.5	0.5
Heavys	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
% Heavys	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0	0.6	0	0.7	0	0	0.5	0.4
Cyclists	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	8
% Cyclists	0	0	0	0	0	0	3.6	0	0	2	0	0	0	0	0	0	2.9	0	0	2.1	1.4

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File Name : Sunview Street at Hickory Street
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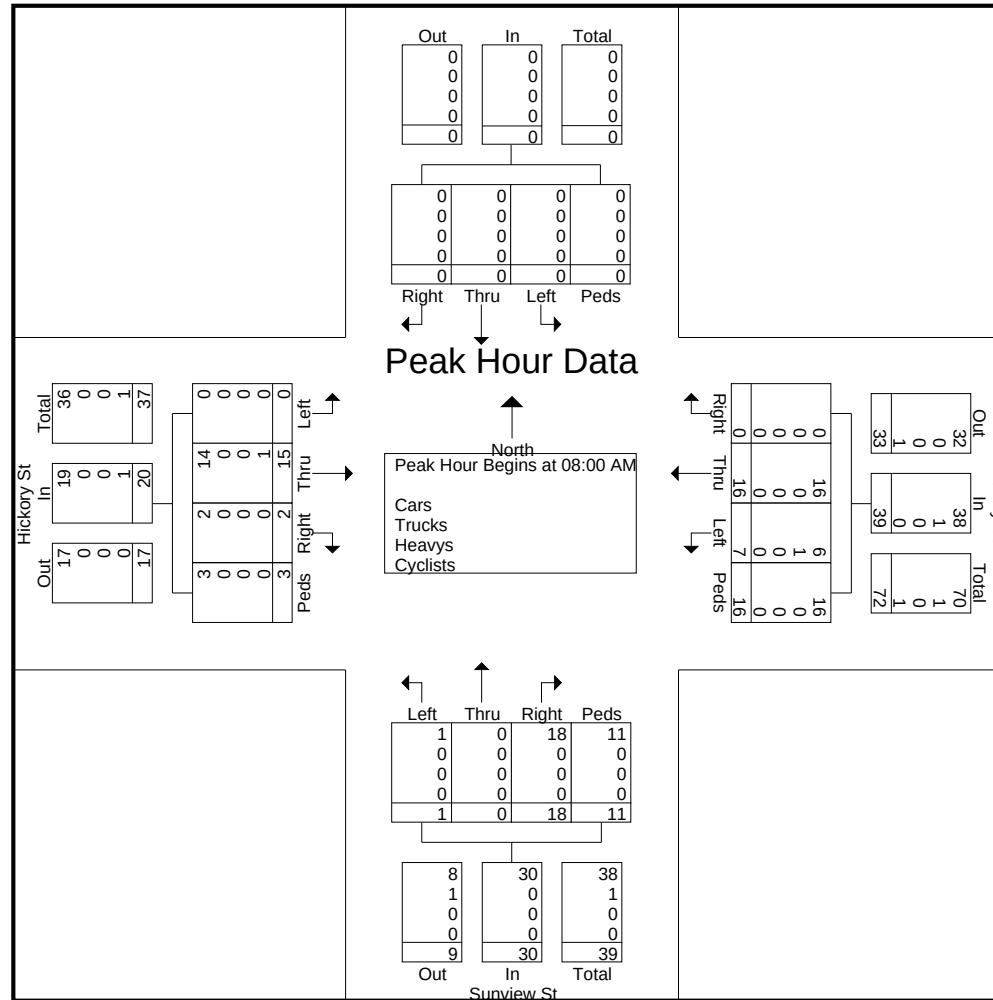
File Name : Sunview Street at Hickory Street
Site Code : 00000000
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	From North					Hickory St From East					Sunview St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	5	3	6	14	7	0	0	1	8	0	4	0	0	4	26
08:15 AM	0	0	0	0	0	0	3	0	2	5	7	0	1	4	12	0	6	0	1	7	24
08:30 AM	0	0	0	0	0	0	6	1	5	12	2	0	0	1	3	0	3	0	2	5	20
08:45 AM	0	0	0	0	0	0	2	3	3	8	2	0	0	5	7	2	2	0	0	4	19
Total Volume	0	0	0	0	0	0	16	7	16	39	18	0	1	11	30	2	15	0	3	20	89
% App. Total	0	0	0	0	0	0	41	17.9	41		60	0	3.3	36.7		10	75	0	15		
PHF	.000	.000	.000	.000	.000	.000	.667	.583	.667	.696	.643	.000	.250	.550	.625	.250	.625	.000	.375	.714	.856
Cars	0	0	0	0	0	0	16	6	16	38	18	0	1	11	30	2	14	0	3	19	87
% Cars	0	0	0	0	0	0	100	85.7	100	97.4	100	0	100	100	100	100	93.3	0	100	95.0	97.8
Trucks	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
% Trucks	0	0	0	0	0	0	0	14.3	0	2.6	0	0	0	0	0	0	0	0	0	0	1.1
Heavyvs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavyvs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.7	0	0	5.0	1.1

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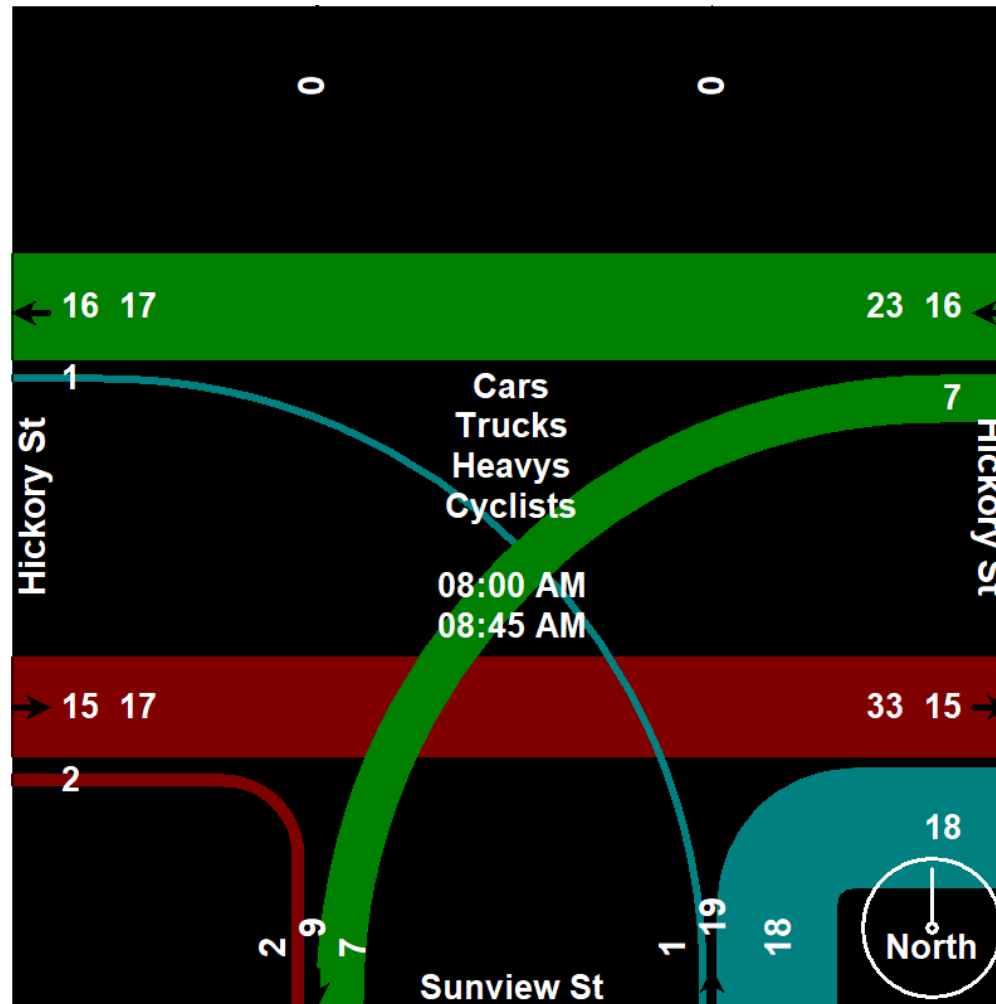
File Name : Sunview Street at Hickory Street
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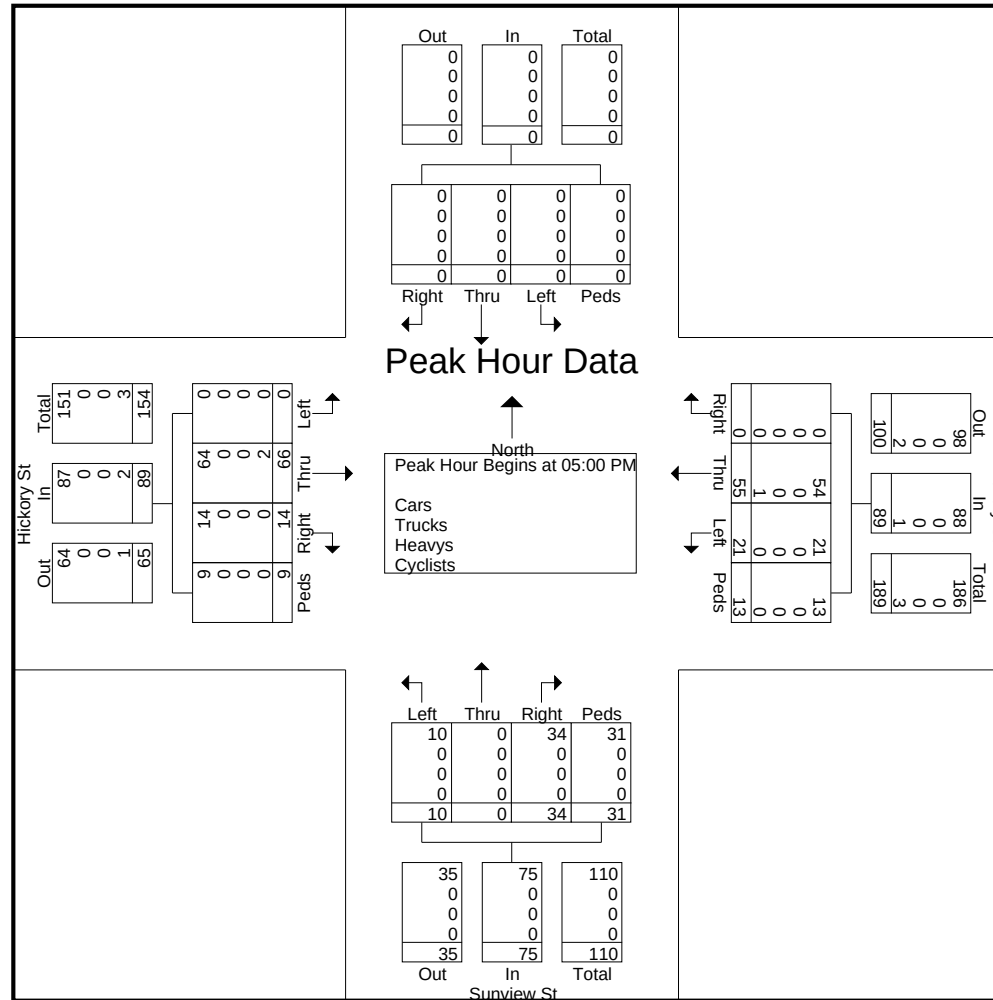
File Name : Sunview Street at Hickory Street
 Site Code : 00000000
 Start Date : 10/06/2022
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	From North					Hickory St From East					Sunview St From South					Hickory St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	9	3	5	17	11	0	1	9	21	1	13	0	1	15	53
05:15 PM	0	0	0	0	0	0	19	4	1	24	8	0	0	7	15	3	19	0	1	23	62
05:30 PM	0	0	0	0	0	0	14	9	5	28	9	0	5	8	22	7	17	0	6	30	80
05:45 PM	0	0	0	0	0	0	13	5	2	20	6	0	4	7	17	3	17	0	1	21	58
Total Volume	0	0	0	0	0	0	55	21	13	89	34	0	10	31	75	14	66	0	9	89	253
% App. Total	0	0	0	0	0	0	61.8	23.6	14.6		45.3	0	13.3	41.3		15.7	74.2	0	10.1		
PHF	.000	.000	.000	.000	.000	.000	.724	.583	.650	.795	.773	.000	.500	.861	.852	.500	.868	.000	.375	.742	.791
Cars	0	0	0	0	0	0	54	21	13	88	34	0	10	31	75	14	64	0	9	87	250
% Cars	0	0	0	0	0	0	98.2	100	100	98.9	100	0	100	100	100	100	97.0	0	100	97.8	98.8
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclists	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
% Cyclists	0	0	0	0	0	0	1.8	0	0	1.1	0	0	0	0	0	0	3.0	0	0	2.2	1.2

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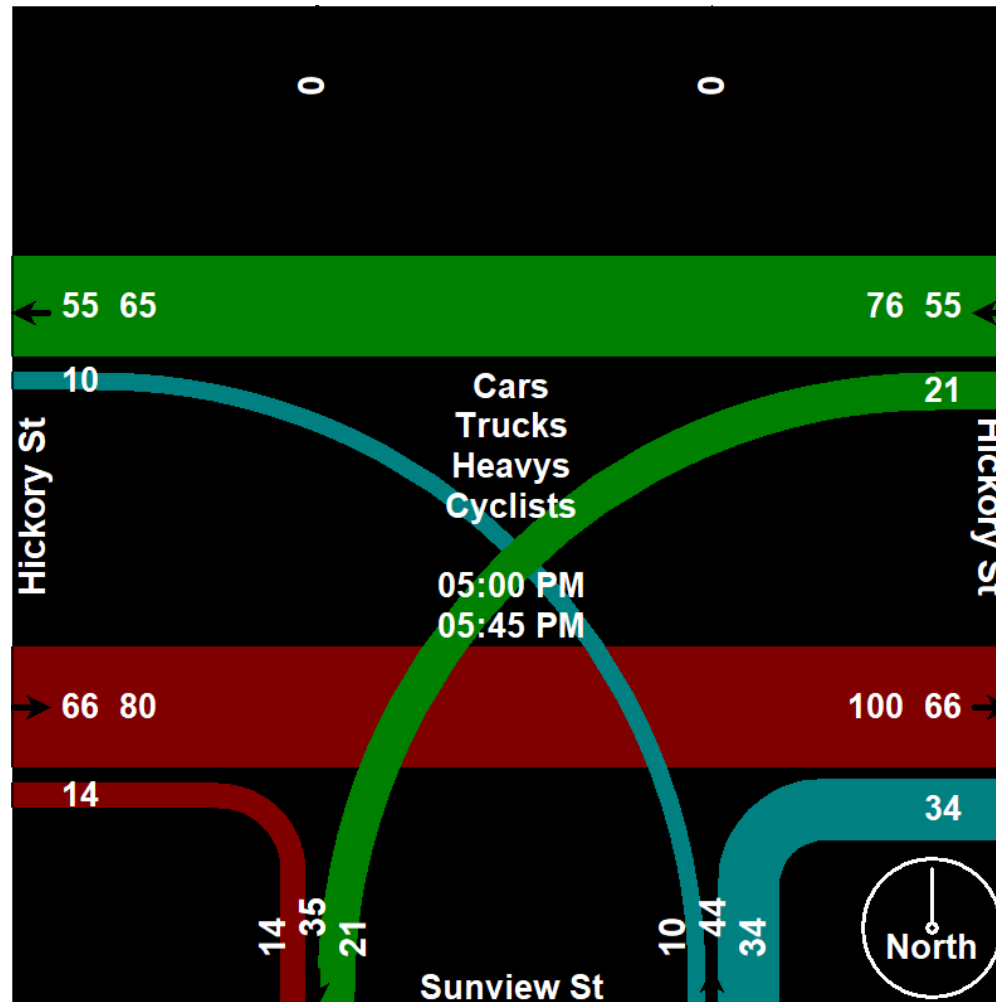
File Name : Sunview Street at Hickory Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 7



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File Name : Sunview Street at Hickory Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 8



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File Name : University Avenue West at Sunview Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 1

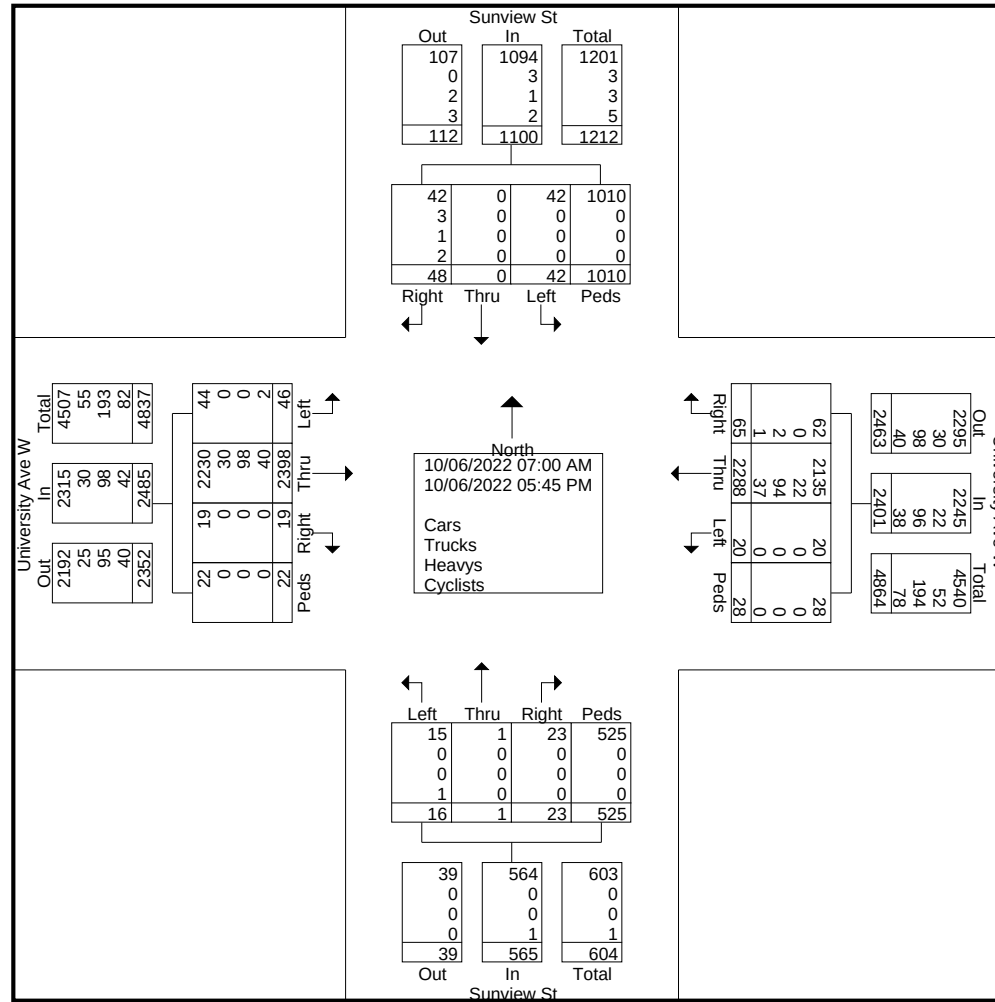
Groups Printed- Cars - Trucks - Heavys - Cyclists

	Sunview St From North					University Ave W From East					Sunview St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	7	7	0	49	0	0	49	0	0	1	6	7	1	37	1	0	39	102
07:15 AM	1	0	0	4	5	1	56	0	2	59	0	1	0	7	8	1	58	1	2	62	134
07:30 AM	1	0	2	16	19	2	57	1	2	62	1	0	0	5	6	0	75	0	0	75	162
07:45 AM	2	0	4	25	31	0	87	0	1	88	0	0	0	7	7	1	122	0	1	124	250
Total	4	0	6	52	62	3	249	1	5	258	1	1	1	25	28	3	292	2	3	300	648
08:00 AM	3	0	1	74	78	3	147	0	0	150	0	0	0	19	19	0	135	2	1	138	385
08:15 AM	1	0	2	88	91	5	156	3	1	165	1	0	2	51	54	1	153	3	3	160	470
08:30 AM	3	0	2	23	28	0	130	0	2	132	4	0	0	19	23	1	122	1	0	124	307
08:45 AM	3	0	3	20	26	1	129	1	3	134	1	0	0	13	14	1	114	2	0	117	291
Total	10	0	8	205	223	9	562	4	6	581	6	0	2	102	110	3	524	8	4	539	1453
04:00 PM	3	0	4	121	128	8	173	4	2	187	2	0	0	62	64	2	190	3	0	195	574
04:15 PM	3	0	0	84	87	4	176	1	1	182	1	0	3	29	33	1	194	2	2	199	501
04:30 PM	3	0	2	55	60	8	194	0	1	203	2	0	1	43	46	3	210	6	4	223	532
04:45 PM	3	0	4	58	65	2	149	3	3	157	1	0	2	45	48	1	210	8	3	222	492
Total	12	0	10	318	340	22	692	8	7	729	6	0	6	179	191	7	804	19	9	839	2099
05:00 PM	4	0	3	96	103	3	185	2	0	190	3	0	3	51	57	1	203	5	1	210	560
05:15 PM	5	0	5	146	156	7	205	1	1	214	2	0	4	76	82	0	211	2	0	213	665
05:30 PM	11	0	1	108	120	11	191	2	2	206	1	0	0	36	37	3	180	3	2	188	551
05:45 PM	2	0	9	85	96	10	204	2	7	223	4	0	0	56	60	2	184	7	3	196	575
Total	22	0	18	435	475	31	785	7	10	833	10	0	7	219	236	6	778	17	6	807	2351
Grand Total	48	0	42	1010	1100	65	2288	20	28	2401	23	1	16	525	565	19	2398	46	22	2485	6551
Apprch %	4.4	0	3.8	91.8		2.7	95.3	0.8	1.2		4.1	0.2	2.8	92.9		0.8	96.5	1.9	0.9		
Total %	0.7	0	0.6	15.4	16.8	1	34.9	0.3	0.4	36.7	0.4	0	0.2	8	8.6	0.3	36.6	0.7	0.3	37.9	
Cars	42	0	42	1010	1094	62	2135	20	28	2245	23	1	15	525	564	19	2230	44	22	2315	6218
% Cars	87.5	0	100	100	99.5	95.4	93.3	100	100	93.5	100	100	93.8	100	99.8	100	93	95.7	100	93.2	94.9
Trucks	3	0	0	0	3	0	22	0	0	22	0	0	0	0	0	0	30	0	0	30	55
% Trucks	6.2	0	0	0	0.3	0	1	0	0	0.9	0	0	0	0	0	0	1.3	0	0	1.2	0.8
Heavys	1	0	0	0	1	2	94	0	0	96	0	0	0	0	0	0	98	0	0	98	195
% Heavys	2.1	0	0	0	0.1	3.1	4.1	0	0	4	0	0	0	0	0	0	4.1	0	0	3.9	3
Cyclists	2	0	0	0	2	1	37	0	0	38	0	0	1	0	1	0	40	2	0	42	83
% Cyclists	4.2	0	0	0	0.2	1.5	1.6	0	0	1.6	0	0	6.2	0	0.2	0	1.7	4.3	0	1.7	1.3

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File Name : University Avenue West at Sunview Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 2



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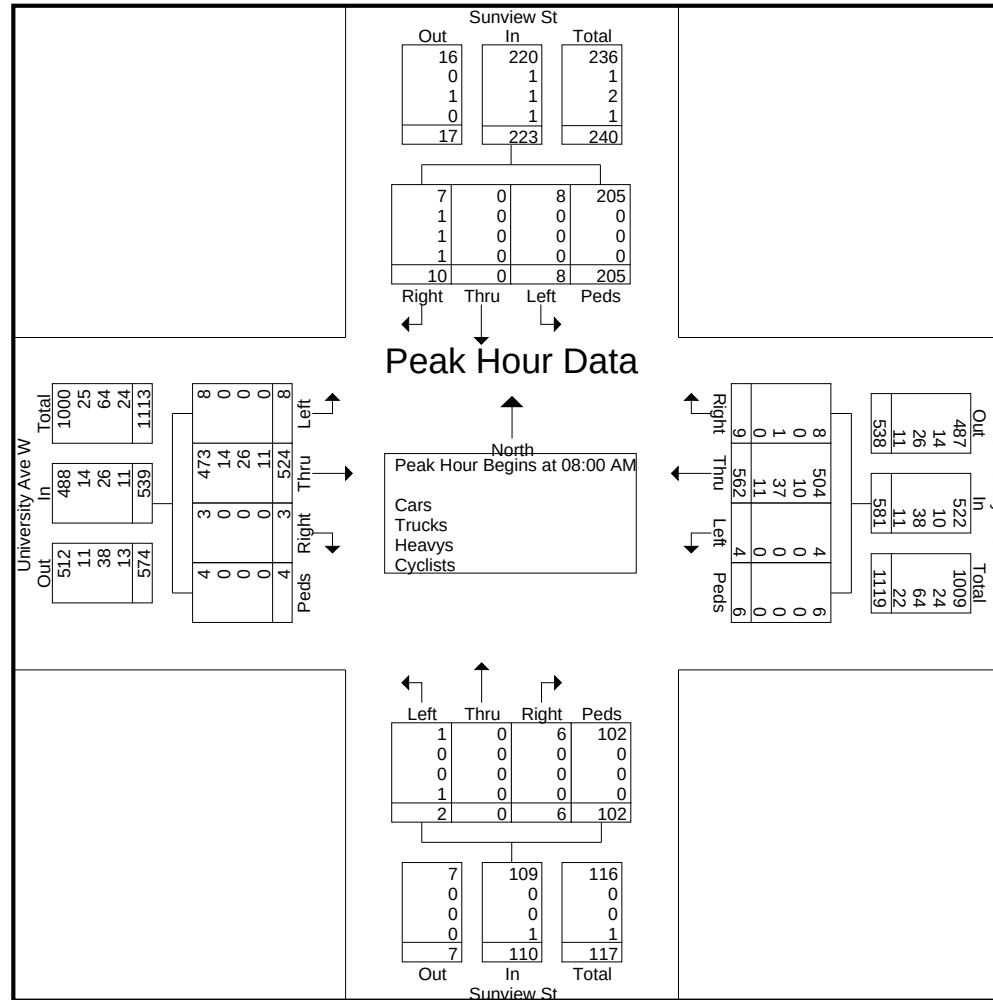
File Name : University Avenue West at Sunview Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 3

	Sunview St From North					University Ave W From East					Sunview St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	3	0	1	74	78	3	147	0	0	150	0	0	0	19	19	0	135	2	1	138	385
08:15 AM	1	0	2	88	91	5	156	3	1	165	1	0	2	51	54	1	153	3	3	160	470
08:30 AM	3	0	2	23	28	0	130	0	2	132	4	0	0	19	23	1	122	1	0	124	307
08:45 AM	3	0	3	20	26	1	129	1	3	134	1	0	0	13	14	1	114	2	0	117	291
Total Volume	10	0	8	205	223	9	562	4	6	581	6	0	2	102	110	3	524	8	4	539	1453
% App. Total	4.5	0	3.6	91.9		1.5	96.7	0.7	1		5.5	0	1.8	92.7		0.6	97.2	1.5	0.7		
PHF	.833	.000	.667	.582	.613	.450	.901	.333	.500	.880	.375	.000	.250	.500	.509	.750	.856	.667	.333	.842	.773
Cars	7	0	8	205	220	8	504	4	6	522	6	0	1	102	109	3	473	8	4	488	1339
% Cars	70.0	0	100	100	98.7	88.9	89.7	100	100	89.8	100	0	50.0	100	99.1	100	90.3	100	100	90.5	92.2
Trucks	1	0	0	0	1	0	10	0	0	10	0	0	0	0	0	0	14	0	0	14	25
% Trucks	10.0	0	0	0	0.4	0	1.8	0	0	1.7	0	0	0	0	0	0	2.7	0	0	2.6	1.7
Heavyvs	1	0	0	0	1	1	37	0	0	38	0	0	0	0	0	0	26	0	0	26	65
% Heavyvs	10.0	0	0	0	0.4	11.1	6.6	0	0	6.5	0	0	0	0	0	0	5.0	0	0	4.8	4.5
Cyclists	1	0	0	0	1	0	11	0	0	11	0	0	1	0	1	0	11	0	0	11	24
% Cyclists	10.0	0	0	0	0.4	0	2.0	0	0	1.9	0	0	50.0	0	0.9	0	2.1	0	0	2.0	1.7

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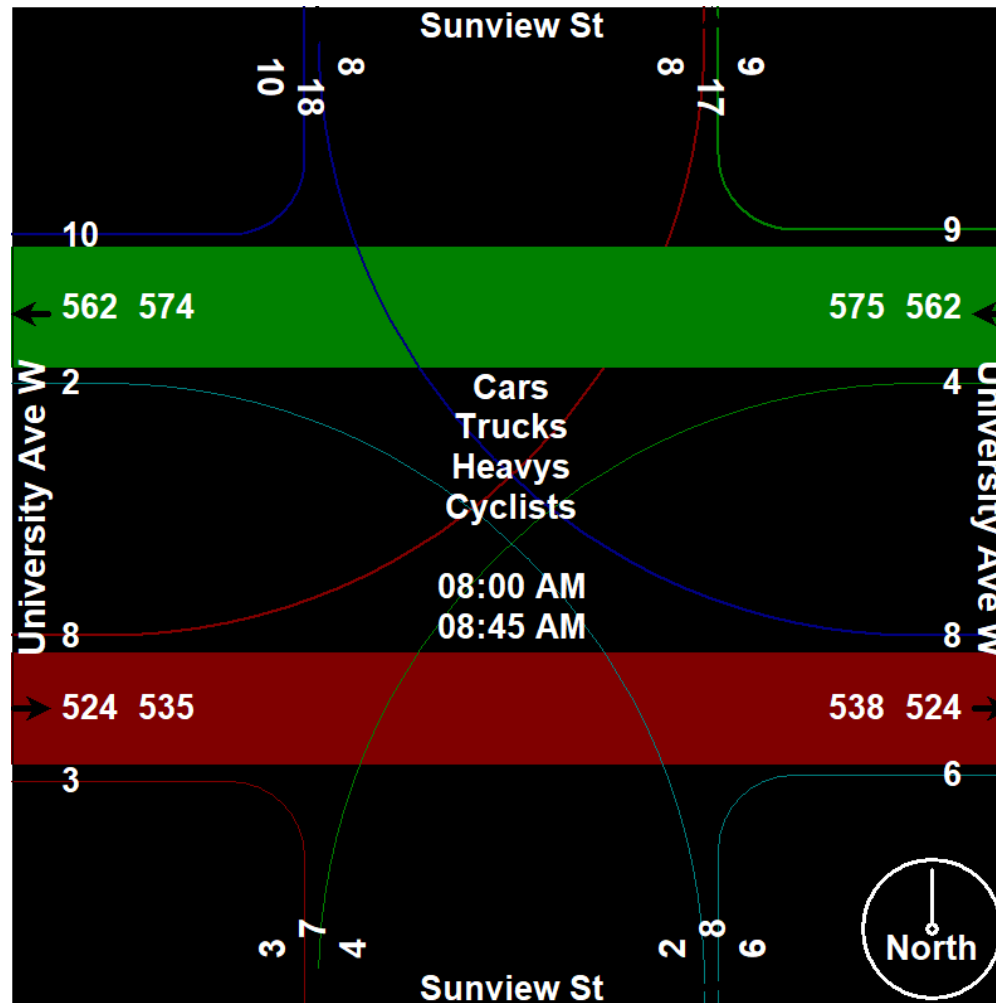
File Name : University Avenue West at Sunview Street
 Site Code : 00000000
 Start Date : 10/06/2022
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File Name : University Avenue West at Sunview Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 5



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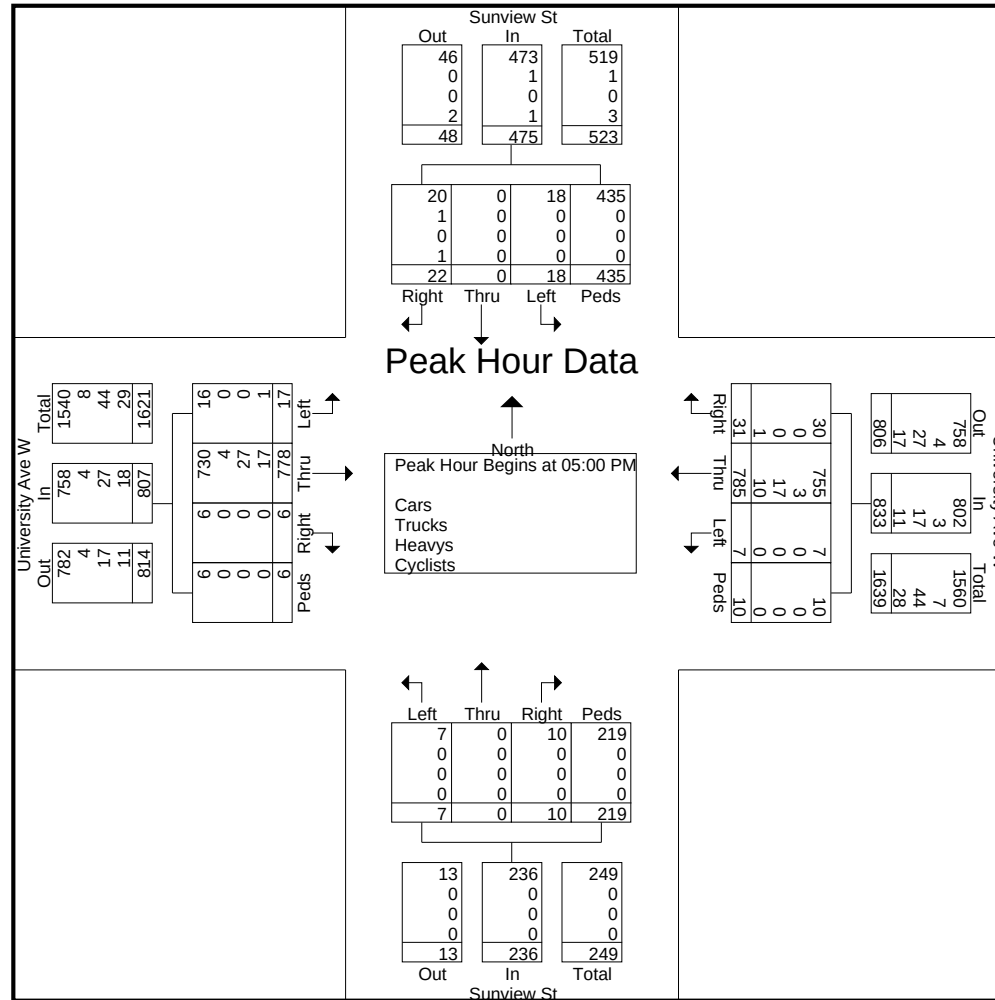
File Name : University Avenue West at Sunview Street
 Site Code : 00000000
 Start Date : 10/06/2022
 Page No : 6

	Sunview St From North					University Ave W From East					Sunview St From South					University Ave W From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	4	0	3	96	103	3	185	2	0	190	3	0	3	51	57	1	203	5	1	210	560
05:15 PM	5	0	5	146	156	7	205	1	1	214	2	0	4	76	82	0	211	2	0	213	665
05:30 PM	11	0	1	108	120	11	191	2	2	206	1	0	0	36	37	3	180	3	2	188	551
05:45 PM	2	0	9	85	96	10	204	2	7	223	4	0	0	56	60	2	184	7	3	196	575
Total Volume	22	0	18	435	475	31	785	7	10	833	10	0	7	219	236	6	778	17	6	807	2351
% App. Total	4.6	0	3.8	91.6		3.7	94.2	0.8	1.2		4.2	0	3	92.8		0.7	96.4	2.1	0.7		
PHF	.500	.000	.500	.745	.761	.705	.957	.875	.357	.934	.625	.000	.438	.720	.720	.500	.922	.607	.500	.947	.884
Cars	20	0	18	435	473	30	755	7	10	802	10	0	7	219	236	6	730	16	6	758	2269
% Cars	90.9	0	100	100	99.6	96.8	96.2	100	100	96.3	100	0	100	100	100	100	93.8	94.1	100	93.9	96.5
Trucks	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	8
% Trucks	4.5	0	0	0	0.2	0	0.4	0	0	0.4	0	0	0	0	0	0	0.5	0	0	0.5	0.3
Heavys	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	27	0	0	27	44
% Heavys	0	0	0	0	0	0	2.2	0	0	2.0	0	0	0	0	0	0	3.5	0	0	3.3	1.9
Cyclists	1	0	0	0	1	1	10	0	0	11	0	0	0	0	0	0	17	1	0	18	30
% Cyclists	4.5	0	0	0	0.2	3.2	1.3	0	0	1.3	0	0	0	0	0	0	2.2	5.9	0	2.2	1.3

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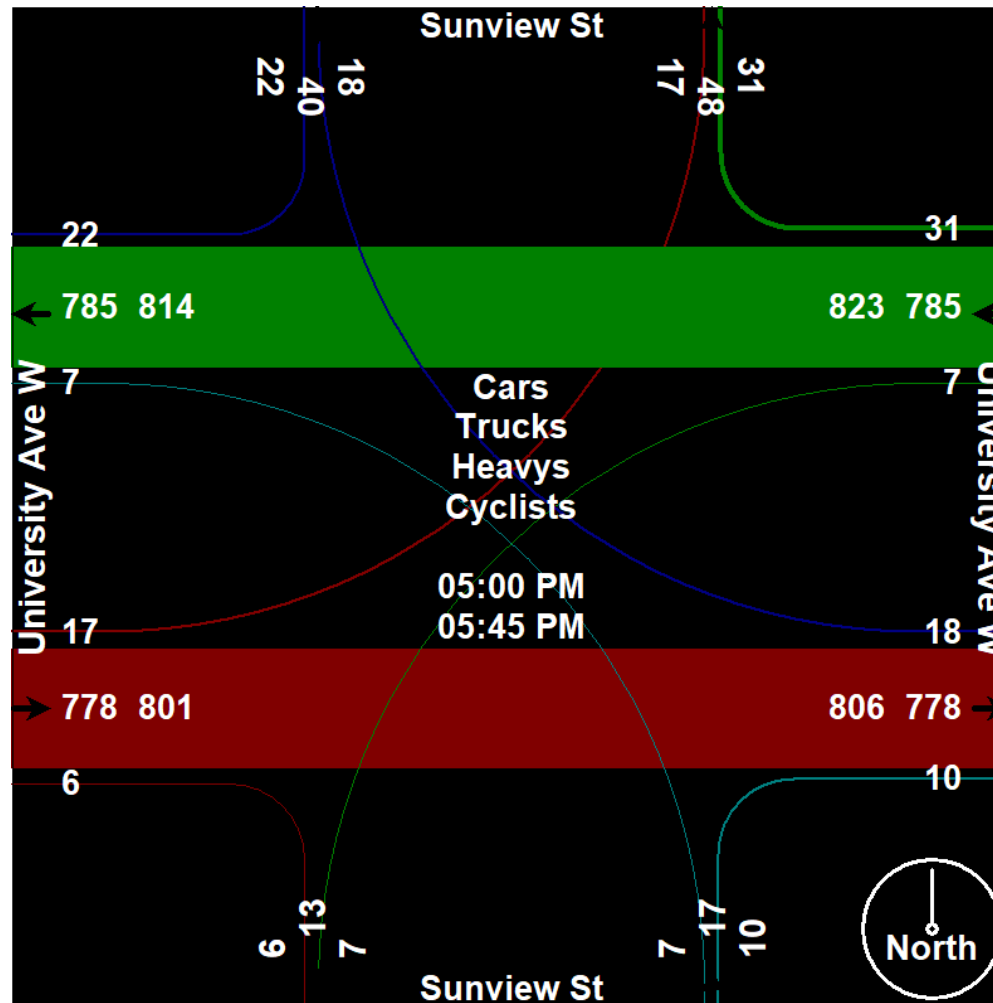
File Name : University Avenue West at Sunview Street
 Site Code : 00000000
 Start Date : 10/06/2022
 Page No : 7



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File Name : University Avenue West at Sunview Street
Site Code : 00000000
Start Date : 10/06/2022
Page No : 8





Turning Movement Count (186 . COLUMBIA ST W & ALBERT ST)

Start Time	N Approach Albert Street						E Approach Columbia Street West						S Approach Albert Street						W Approach Columbia Street West						Int. Total (15 min)	Int. Total (1 hr)
	Right N-W	Thru N-S	Left N-E	U-Turn N-N	Peds N:	Approach Total	Right E-N	Thru E-W	Left E-S	U-Turn E-E	Peds E:	Approach Total	Right S-E	Thru S-N	Left S-W	U-Turn S-S	Peds S:	Approach Total	Right W-S	Thru W-E	Left W-N	U-Turn W-W	Peds W:	Approach Total		
07:30:00	4	33	9	0	5	46	13	105	9	0	2	127	6	27	8	0	3	41	9	98	7	0	1	114	328	
07:45:00	6	51	26	0	8	83	24	171	22	0	6	217	19	45	23	0	10	87	11	171	14	0	4	196	583	
08:00:00	7	46	29	0	26	82	39	225	22	0	25	286	11	43	44	0	17	98	30	139	8	0	10	177	643	
08:15:00	9	45	25	0	7	79	36	212	16	0	5	264	12	68	56	0	8	136	9	151	18	0	3	178	657	2211
08:30:00	5	47	29	0	7	81	40	213	19	0	6	272	10	66	37	0	14	113	15	180	14	0	12	209	675	2558
08:45:00	9	49	19	0	10	77	34	223	20	0	2	277	9	74	42	0	7	125	14	164	13	0	2	191	670	2645
09:00:00	10	31	21	0	12	62	20	197	12	0	11	229	11	52	18	0	8	81	8	137	7	0	6	152	524	2526
09:15:00	14	44	19	0	13	77	26	191	21	0	5	238	9	51	26	0	10	86	15	126	9	0	12	150	551	2420
09:30:00	9	41	12	0	12	62	21	150	16	0	13	187	12	42	24	0	19	78	14	122	12	0	6	148	475	2220
09:45:00	17	35	15	0	24	67	18	150	19	0	7	187	7	43	21	0	10	71	11	132	5	0	5	148	473	2023
10:00:00	6	23	15	0	3	44	11	128	7	0	12	146	13	38	18	0	20	69	15	106	13	0	6	134	393	1892
10:15:00	9	35	8	0	6	52	17	126	9	0	4	152	22	35	16	0	8	73	11	95	7	0	5	113	390	1731
BREAK																										
12:00:00	15	58	29	0	11	102	11	135	20	0	7	166	20	28	23	0	9	71	28	179	9	0	15	216	555	
12:15:00	19	33	25	0	7	77	21	140	11	0	9	172	16	56	20	0	11	92	21	168	11	0	7	200	541	
12:30:00	17	33	24	0	8	74	12	146	19	0	12	177	13	49	16	0	6	78	20	153	16	0	4	189	518	
12:45:00	18	47	16	0	21	81	18	140	26	0	16	184	16	63	27	0	16	106	19	141	11	0	8	171	542	2156
13:00:00	11	46	20	0	12	77	22	160	16	0	8	198	17	55	23	0	16	95	12	173	15	0	9	200	570	2171
13:15:00	14	41	19	0	8	74	18	137	14	0	10	169	16	72	23	0	22	111	17	145	11	0	9	173	527	2157
13:30:00	6	40	14	0	19	60	8	128	16	0	3	152	20	61	30	0	18	111	17	142	13	0	7	172	495	2134
13:45:00	12	39	15	0	8	66	10	121	19	0	5	150	15	45	26	0	11	86	13	126	10	0	11	149	451	2043
BREAK																										
15:00:00	13	32	25	0	6	70	16	138	24	0	6	178	21	58	14	0	11	93	16	206	9	0	4	231	572	
15:15:00	13	40	22	0	12	75	19	128	17	1	8	165	17	32	20	0	17	69	19	165	8	0	11	192	501	
15:30:00	8	37	17	0	13	62	17	153	19	0	10	189	18	47	24	0	7	89	22	173	14	0	12	209	549	
15:45:00	18	44	25	0	9	87	9	162	22	0	6	193	22	50	23	0	16	95	22	225	17	0	11	264	639	2261
16:00:00	13	61	30	0	11	104	19	159	17	0	5	195	28	66	21	0	13	115	26	245	6	0	15	277	691	2380
16:15:00	10	64	37	0	10	111	9	206	23	0	6	238	26	59	19	0	12	104	17	216	7	0	17	240	693	2572
16:30:00	15	75	37	0	14	127	14	203	33	3	13	253	29	58	19	0	10	106	41	265	12	0	13	318	804	2827
16:45:00	18	78	36	0	13	132	12	190	38	0	8	240	24	62	19	0	21	105	50	260	7	0	18	317	794	2982
17:00:00	25	97	43	0	3	165	10	225	23	0	13	258	22	46	25	0	19	93	46	212	10	0	6	268	784	3075
17:15:00	12	87	46	0	22	145	16	219	29	0	10	264	21	61	22	0	20	104	44	209	17	0	23	270	783	3165
17:30:00	25	63	43	0	21	131	17	216	23	0	12	256	21	60	28	0	11	109	47	228	9	0	8	284	780	3141
17:45:00	15	60	27	1	14	103	15	181	26	0	10	222	31	47	30	0	26	108	39	220	4	0	19	263	696	3043
Grand Total	402	1555	777	1	375	2735	592	5378	627	4	275	6601	554	1659	785	0	426	2998	698	5472	343	0	299	6513	18847	-
Approach%	14.7%	56.9%	28.4%	0%		-	9%	81.5%	9.5%	0.1%		-	18.5%	55.3%	26.2%	0%		-	10.7%	84%	5.3%	0%		-	-	-
Totals %	2.1%	8.3%	4.1%	0%		14.5%	3.1%	28.5%	3.3%	0%		35%	2.9%	8.8%	4.2%	0%		15.9%	3.7%	29%	1.8%	0%		34.6%	-	-
Heavy	14	26	15	0		-	14	192	18	0		-	5	23	7	0		-	12	185	6	0		-	-	-
Heavy %	3.5%	1.7%	1.9%	0%		-	2.4%	3.6%	2.9%	0%		-	0.9%	1.4%	0.9%	0%		-	1.7%	3.4%	1.7%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-



Turning Movement Count
Location Name: COLUMBIA ST W & ALBERT ST
Date: Thu, Apr 04, 2019 Deployment Lead: Peter Ilias

Peak Hour: 08:00 AM - 09:00 AM Weather:

Start Time	N Approach Albert Street						E Approach Columbia Street West						S Approach Albert Street						W Approach Columbia Street West						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:00:00	7	46	29	0	26	82	39	225	22	0	25	286	11	43	44	0	17	98	30	139	8	0	10	177	643
08:15:00	9	45	25	0	7	79	36	212	16	0	5	264	12	68	56	0	8	136	9	151	18	0	3	178	657
08:30:00	5	47	29	0	7	81	40	213	19	0	6	272	10	66	37	0	14	113	15	180	14	0	12	209	675
08:45:00	9	49	19	0	10	77	34	223	20	0	2	277	9	74	42	0	7	125	14	164	13	0	2	191	670
Grand Total	30	187	102	0	50	319	149	873	77	0	38	1099	42	251	179	0	46	472	68	634	53	0	27	755	2645
Approach%	9.4%	58.6%	32%	0%	-	-	13.6%	79.4%	7%	0%	-	-	8.9%	53.2%	37.9%	0%	-	-	9%	84%	7%	0%	-	-	-
Totals %	1.1%	7.1%	3.9%	0%	12.1%	12.1%	5.6%	33%	2.9%	0%	41.6%	41.6%	1.6%	9.5%	6.8%	0%	17.8%	17.8%	2.6%	24%	2%	0%	28.5%	28.5%	-
PHF	0.83	0.95	0.88	0	0.97	0.97	0.93	0.97	0.88	0	0.96	0.96	0.88	0.85	0.8	0	0.87	0.87	0.57	0.88	0.74	0	0.9	0.9	-
Heavy	1	1	1	0	3	3	3	30	4	0	37	37	1	2	1	0	4	4	3	24	0	0	27	27	-
Heavy %	3.3%	0.5%	1%	0%	0.9%	0.9%	2%	3.4%	5.2%	0%	3.4%	3.4%	2.4%	0.8%	0.6%	0%	0.8%	0.8%	4.4%	3.8%	0%	0%	3.6%	3.6%	-
Cars & Light Goods	28	184	101	0	313	313	146	842	73	0	1061	1061	41	249	178	0	468	468	65	608	53	0	726	726	-
Cars & Light Goods %	93.3%	98.4%	99%	0%	98.1%	98.1%	98%	96.4%	94.8%	0%	96.5%	96.5%	97.6%	99.2%	99.4%	0%	99.2%	99.2%	95.6%	95.9%	100%	0%	96.2%	96.2%	-
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	-
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%	-
Single-Unit Trucks	1	0	1	0	2	2	1	8	0	0	9	9	0	1	0	0	1	1	1	5	0	0	6	6	-
Single-Unit Trucks %	3.3%	0%	1%	0%	0.6%	0.6%	0.7%	0.9%	0%	0%	0.8%	0.8%	0%	0.4%	0%	0%	0.2%	0.2%	1.5%	0.8%	0%	0%	0.8%	0.8%	-
Buses	0	1	0	0	1	1	2	20	4	0	26	26	1	1	1	0	3	3	2	17	0	0	19	19	-
Buses %	0%	0.5%	0%	0%	0.3%	0.3%	1.3%	2.3%	5.2%	0%	2.4%	2.4%	2.4%	0.4%	0.6%	0%	0.6%	0.6%	2.9%	2.7%	0%	0%	2.5%	2.5%	-
Articulated Trucks	0	0	0	0	0	0	0	2	0	0	2	2	0	0	0	0	0	0	0	2	0	0	2	2	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	0%	0.2%	0%	0%	0.2%	0.2%	0%	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0.3%	0.3%	-
Bicycles on Road	1	2	0	0	3	3	0	1	0	0	1	1	0	0	0	0	0	0	0	2	0	0	2	2	-
Bicycles on Road %	3.3%	1.1%	0%	0%	0.9%	0.9%	0%	0.1%	0%	0%	0.1%	0.1%	0%	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0.3%	0.3%	-
Pedestrians	-	-	-	-	50	-	-	-	-	-	38	-	-	-	-	-	46	-	-	-	-	-	27	-	-
Pedestrians%	-	-	-	-	31.1%	-	-	-	-	-	23.6%	-	-	-	-	-	28.6%	-	-	-	-	-	16.8%	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-



Peak Hour: 12:15 PM - 01:15 PM Weather:

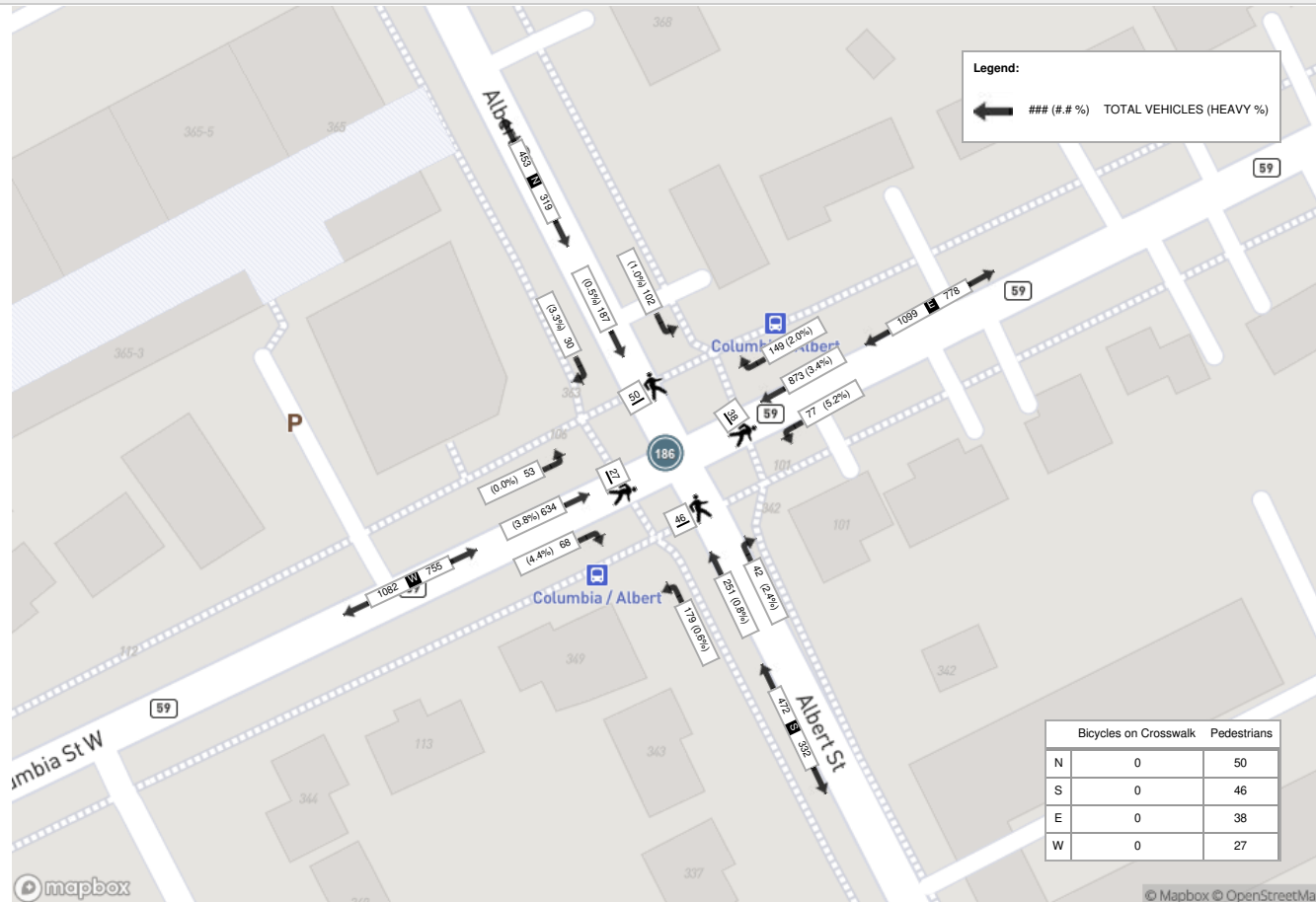
Start Time	N Approach Albert Street						E Approach Columbia Street West						S Approach Albert Street						W Approach Columbia Street West						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
12:15:00	19	33	25	0	7	77	21	140	11	0	9	172	16	56	20	0	11	92	21	168	11	0	7	200	541
12:30:00	17	33	24	0	8	74	12	146	19	0	12	177	13	49	16	0	6	78	20	153	16	0	4	189	518
12:45:00	18	47	16	0	21	81	18	140	26	0	16	184	16	63	27	0	16	106	19	141	11	0	8	171	542
13:00:00	11	46	20	0	12	77	22	160	16	0	8	198	17	55	23	0	16	95	12	173	15	0	9	200	570
Grand Total	65	159	85	0	48	309	73	586	72	0	45	731	62	223	86	0	49	371	72	635	53	0	28	760	2171
Approach%	21%	51.5%	27.5%	0%		-	10%	80.2%	9.8%	0%		-	16.7%	60.1%	23.2%	0%		-	9.5%	83.6%	7%	0%		-	-
Totals %	3%	7.3%	3.9%	0%		14.2%	3.4%	27%	3.3%	0%		33.7%	2.9%	10.3%	4%	0%		17.1%	3.3%	29.2%	2.4%	0%		35%	-
PHF	0.86	0.85	0.85	0		0.95	0.83	0.92	0.69	0		0.92	0.91	0.88	0.8	0		0.88	0.86	0.92	0.83	0		0.95	-
Heavy	3	3	3	0		9	1	20	1	0		22	1	3	2	0		6	1	21	2	0		24	-
Heavy %	4.6%	1.9%	3.5%	0%		2.9%	1.4%	3.4%	1.4%	0%		3%	1.6%	1.3%	2.3%	0%		1.6%	1.4%	3.3%	3.8%	0%		3.2%	-
Cars & Light Goods	62	155	82	0		299	72	564	71	0		707	61	219	84	0		364	71	613	51	0		735	-
Cars & Light Goods %	95.4%	97.5%	96.5%	0%		96.8%	98.6%	96.2%	98.6%	0%		96.7%	98.4%	98.2%	97.7%	0%		98.1%	98.6%	96.5%	96.2%	0%		96.7%	-
Motorcycles	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	1	0	0		1	-
Motorcycles %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.3%	0%	0.2%	0%	0%		0.1%	-
Single-Unit Trucks	2	1	0	0		3	1	10	1	0		12	0	2	1	0		3	0	11	1	0		12	-
Single-Unit Trucks %	3.1%	0.6%	0%	0%		1%	1.4%	1.7%	1.4%	0%		1.6%	0%	0.9%	1.2%	0%		0.8%	0%	1.7%	1.9%	0%		1.6%	-
Buses	0	2	2	0		4	0	10	0	0		10	1	1	1	0		3	1	9	1	0		11	-
Buses %	0%	1.3%	2.4%	0%		1.3%	0%	1.7%	0%	0%		1.4%	1.6%	0.4%	1.2%	0%		0.8%	1.4%	1.4%	1.9%	0%		1.4%	-
Articulated Trucks	1	0	1	0		2	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Articulated Trucks %	1.5%	0%	1.2%	0%		0.6%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.1%	-
Bicycles on Road	0	1	0	0		1	0	2	0	0		2	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0.6%	0%	0%		0.3%	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	46	-	-	-	-	-	45	-	-	-	-	-	49	-	-	-	-	-	26	-	-
Pedestrians%	-	-	-	-	27.1%	-	-	-	-	-	26.5%	-	-	-	-	-	28.8%	-	-	-	-	-	15.3%	-	-
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
Bicycles on Crosswalk%	-	-	-	-	1.2%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	1.2%	-	-



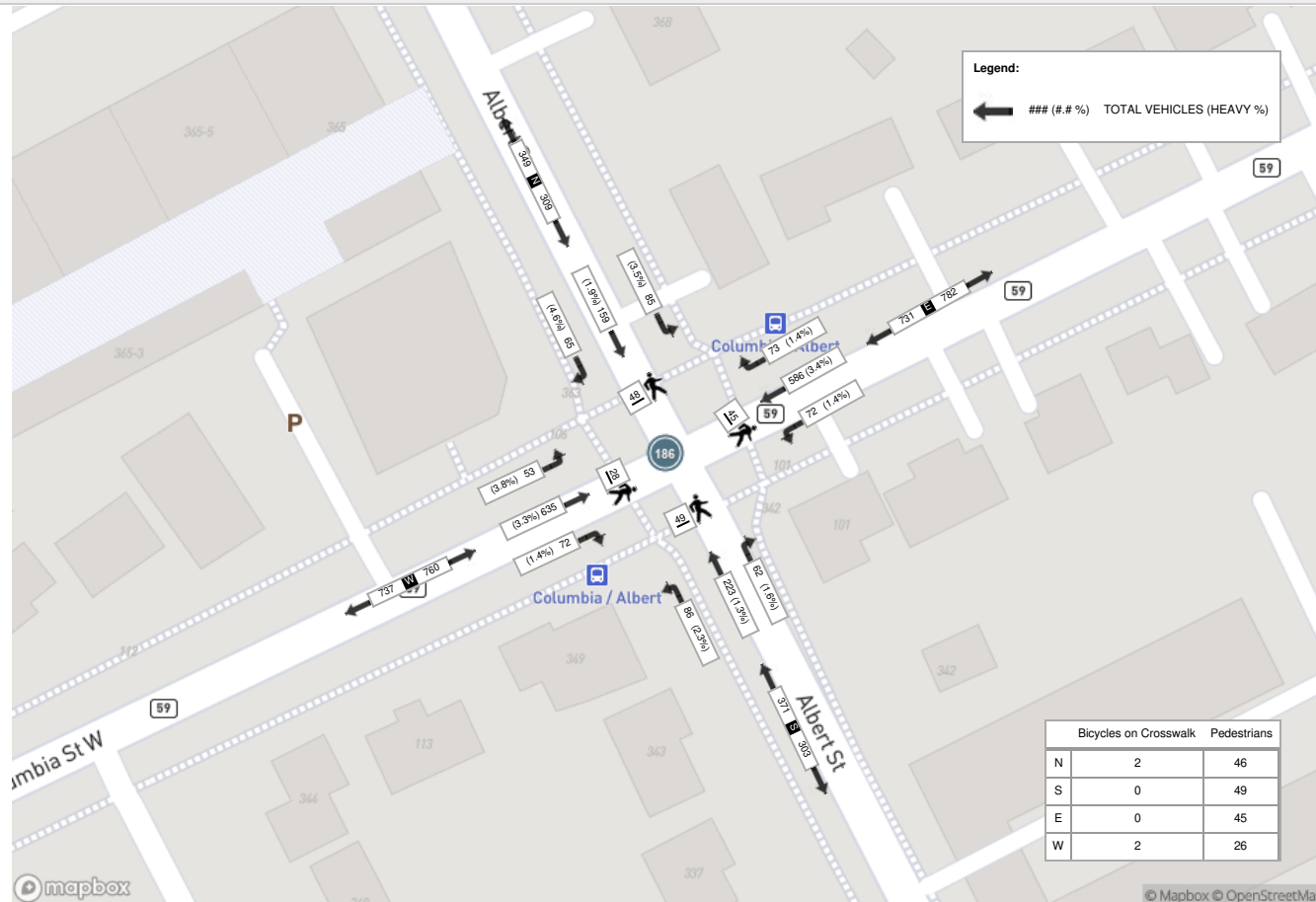
Peak Hour: 04:30 PM - 05:30 PM Weather:

Start Time	N Approach Albert Street						E Approach Columbia Street West						S Approach Albert Street						W Approach Columbia Street West						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	15	75	37	0	14	127	14	203	33	3	13	253	29	58	19	0	10	106	41	265	12	0	13	318	804
16:45:00	18	78	36	0	13	132	12	190	38	0	8	240	24	62	19	0	21	105	50	260	7	0	18	317	794
17:00:00	25	97	43	0	3	165	10	225	23	0	13	258	22	46	25	0	19	93	46	212	10	0	6	268	784
17:15:00	12	87	46	0	22	145	16	219	29	0	10	264	21	61	22	0	20	104	44	209	17	0	23	270	783
Grand Total	70	337	162	0	52	569	52	837	123	3	44	1015	96	227	85	0	70	408	181	946	46	0	60	1173	3165
Approach%	12.3%	59.2%	28.5%	0%	-	-	5.1%	82.5%	12.1%	0.3%	-	-	23.5%	55.6%	20.8%	0%	-	-	15.4%	80.6%	3.9%	0%	-	-	-
Totals %	2.2%	10.6%	5.1%	0%	18%	1.6%	26.4%	3.9%	0.1%	32.1%	0.96	0.83	0.92	0.85	0	0.96	0.91	0.89	0.68	0	0.92	0.92	0.92	0.92	-
PHF	0.7	0.87	0.88	0	0.86	0.81	0.93	0.81	0.25	0.96	0.83	0.92	0.85	0	0.96	0.91	0.89	0.68	0	0.92	0.92	0.92	0.92	0.92	-
Heavy	0	1	1	0	2	0	17	1	0	18	0	1	0	0	1	0	19	1	0	20	0	0	20	0	-
Heavy %	0%	0.3%	0.6%	0%	0.4%	0%	2%	0.8%	0%	1.8%	0%	0.4%	0%	0%	0.2%	0%	2%	2.2%	0%	1.7%	0%	0%	1.7%	0%	-
Cars & Light Goods	70	336	161	0	567	52	817	122	3	994	96	226	85	0	407	181	924	45	0	1150	0	0	1150	0	-
Cars & Light Goods %	100%	99.7%	99.4%	0%	99.6%	100%	97.6%	99.2%	100%	97.9%	100%	99.6%	100%	0%	99.8%	100%	97.7%	97.8%	0%	98%	0%	0%	98%	0%	-
Motorcycles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Motorcycles %	0%	0%	0%	0%	0%	0%	0%	0.1%	0%	0.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
Single-Unit Trucks	0	1	0	0	1	0	2	0	0	2	0	1	0	0	1	0	5	1	0	6	0	0	6	0	-
Single-Unit Trucks %	0%	0.3%	0%	0%	0.2%	0%	0.2%	0%	0%	0.2%	0%	0.4%	0%	0%	0.2%	0%	0.5%	2.2%	0%	0.5%	0%	0%	0.5%	0%	-
Buses	0	0	0	0	0	0	15	1	0	16	0	0	0	0	0	0	14	0	0	14	0	0	14	0	-
Buses %	0%	0%	0%	0%	0%	0%	1.8%	0.8%	0%	1.6%	0%	0%	0%	0%	0%	0%	1.5%	0%	0%	1.2%	0%	0%	1.2%	0%	-
Articulated Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Articulated Trucks %	0%	0%	0.6%	0%	0.2%	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	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	3	0	-
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0.2%	0%	0%	0.2%	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0.3%	0%	0%	0.3%	0%	-
Pedestrians	-	-	-	-	50	-	-	-	-	43	-	-	-	-	69	-	-	-	-	60	-	-	-	-	-
Pedestrians%	-	-	-	-	22.1%	-	-	-	-	19%	-	-	-	-	30.5%	-	-	-	-	26.5%	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	1	-	-	-	-	1	-	-	-	-	0	-	-	-	-	-
Bicycles on Crosswalk%	-	-	-	-	0.9%	-	-	-	-	0.4%	-	-	-	-	0.4%	-	-	-	-	0%	-	-	-	-	-

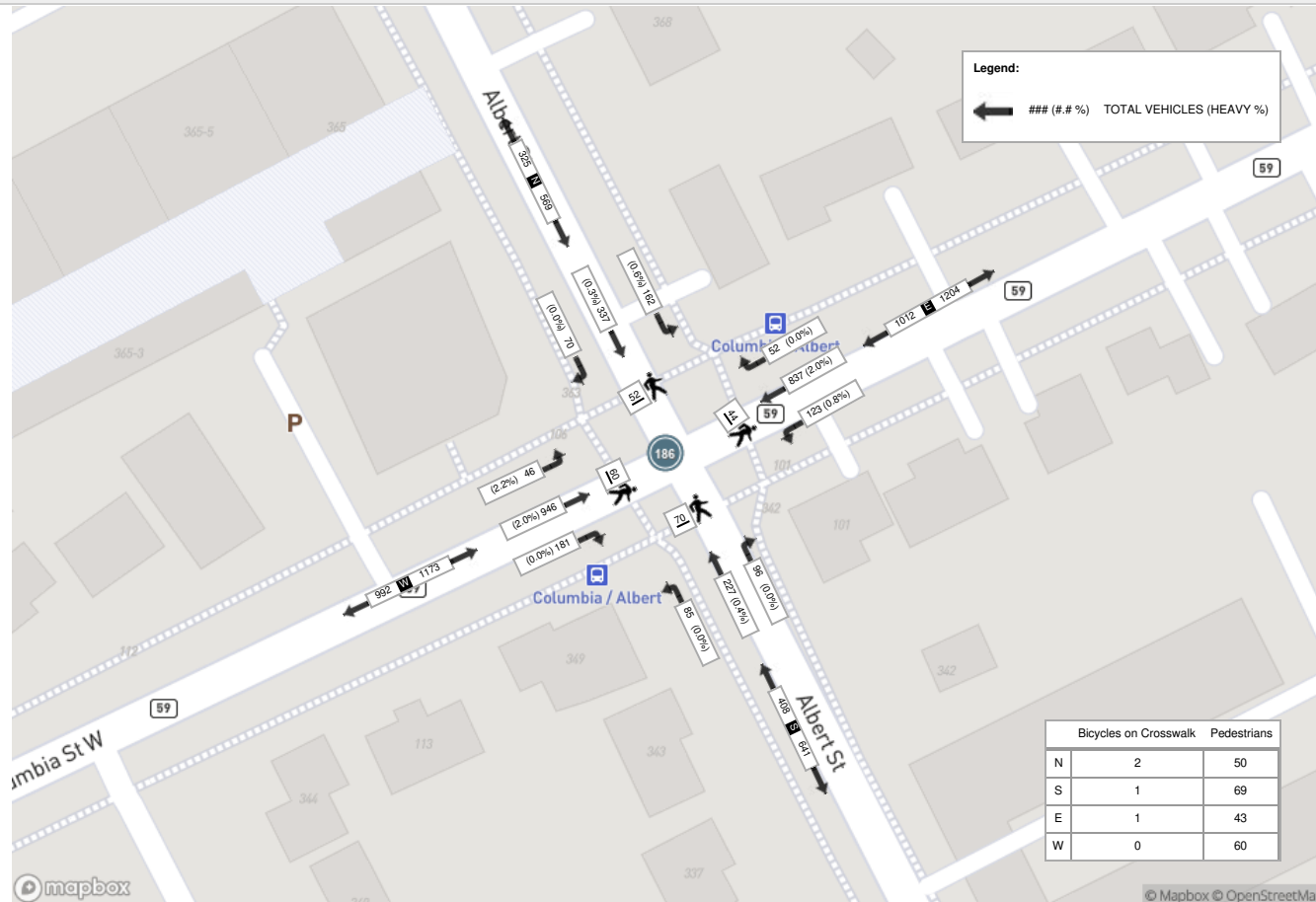
Peak Hour: 08:00 AM - 09:00 AM Weather:



Peak Hour: 12:15 PM - 01:15 PM Weather:



Peak Hour: 04:30 PM - 05:30 PM Weather:





Turning Movement Count (193 . ALBERT ST & UNIVERSITY AVE W)

Start Time	N Approach Albert Street						E Approach University Avenue						S Approach Albert Street						W Approach University Avenue						Int. Total (15 min)	Int. Total (1 hr)	
	Right N-W	Thru N-S	Left N-E	U-Turn N-N	Peds N:	Approach Total	Right E-N	Thru E-W	Left E-S	U-Turn E-E	Peds E:	Approach Total	Right S-E	Thru S-N	Left S-W	U-Turn S-S	Peds S:	Approach Total	Right W-S	Thru W-E	Left W-N	U-Turn W-W	Peds W:	Approach Total			
07:30:00	7	33	11	0	8	51	3	81	7	0	4	91	19	41	10	0	3	70	4	79	16	0	1	99	311		
07:45:00	7	46	10	0	7	63	15	108	13	0	6	136	25	64	14	0	3	103	4	116	31	0	7	151	453		
08:00:00	7	65	11	0	31	83	15	130	34	0	15	179	25	53	21	0	8	99	7	108	30	0	9	145	506		
08:15:00	12	50	9	0	48	71	19	169	31	0	30	219	30	69	28	0	27	127	6	123	11	0	23	140	557	1827	
08:30:00	6	59	7	0	26	72	17	122	20	0	16	159	37	78	27	0	13	142	5	130	17	0	11	152	525	2041	
08:45:00	8	50	7	0	17	65	12	127	18	0	8	157	18	63	29	0	18	110	9	131	20	0	11	160	492	2080	
09:00:00	11	49	8	0	17	68	11	140	29	0	5	180	23	80	17	0	7	120	7	102	16	0	9	125	493	2067	
09:15:00	15	29	9	0	17	53	10	133	23	0	14	166	35	61	16	0	15	112	8	108	17	0	5	133	464	1974	
09:30:00	11	39	4	1	42	55	10	117	17	0	50	144	29	41	17	0	18	87	3	97	15	0	10	115	401	1850	
09:45:00	18	58	5	2	55	83	9	127	28	0	43	164	29	65	23	0	38	117	8	119	9	0	23	136	500	1858	
10:00:00	13	32	9	0	33	54	7	111	9	0	27	127	26	49	18	0	13	93	5	118	10	0	9	133	407	1772	
10:15:00	12	38	3	0	25	53	7	108	8	0	18	123	26	31	12	0	10	69	7	91	8	0	6	106	351	1659	
BREAK																											
12:00:00	16	50	10	0	35	76	9	116	11	0	16	136	43	67	23	0	22	133	15	112	7	1	23	135	480		
12:15:00	13	47	8	0	37	68	13	119	17	0	27	149	54	66	21	0	29	141	10	113	10	0	21	133	491		
12:30:00	16	45	9	0	50	70	14	143	29	0	27	186	39	60	17	0	35	116	9	119	15	0	16	143	515		
12:45:00	15	43	9	0	96	67	12	134	19	0	75	165	57	67	21	0	58	145	12	132	18	0	31	162	539	2025	
13:00:00	15	47	12	0	30	74	10	130	17	0	21	157	44	52	19	0	25	115	17	139	15	0	21	171	517	2062	
13:15:00	21	29	10	0	21	60	11	132	12	0	20	155	46	60	18	0	18	124	12	102	17	0	9	131	470	2041	
13:30:00	11	36	8	0	38	55	12	131	14	0	19	157	38	42	12	0	29	92	11	131	6	1	14	149	453	1979	
13:45:00	11	44	7	0	31	62	9	134	23	0	16	166	31	50	11	0	23	92	7	138	14	0	13	159	479	1919	
BREAK																											
15:00:00	14	45	10	0	40	69	10	136	15	0	26	161	43	87	23	0	26	153	8	141	14	0	15	163	546		
15:15:00	13	29	8	0	30	50	11	132	25	0	24	168	25	43	16	0	31	84	12	128	13	0	18	153	455		
15:30:00	20	37	11	0	46	68	14	119	20	0	29	153	29	60	8	0	30	97	9	133	14	0	18	156	474		
15:45:00	15	61	12	0	78	88	4	146	21	0	84	171	53	70	21	0	50	144	12	147	21	0	42	180	583	2058	
16:00:00	18	54	19	0	59	91	7	131	18	0	29	156	45	74	25	0	28	144	14	175	17	0	26	206	597	2109	
16:15:00	21	61	11	0	41	93	10	153	25	0	25	188	38	83	20	0	26	141	14	150	25	0	11	189	611	2265	
16:30:00	27	77	16	0	36	120	13	158	28	0	23	199	53	76	19	0	24	148	14	193	18	0	25	225	692	2483	
16:45:00	23	86	21	0	49	130	12	156	23	0	22	191	35	67	30	0	27	132	23	198	22	0	20	243	696	2596	
17:00:00	25	93	34	0	58	152	8	166	23	0	22	197	43	72	19	0	31	134	16	187	24	0	20	227	710	2709	
17:15:00	24	106	41	0	84	171	16	180	26	0	87	222	40	75	25	0	41	140	11	169	19	0	35	199	732	2830	
17:30:00	17	69	24	0	68	110	9	150	25	0	38	184	41	59	23	0	47	123	12	151	17	0	31	180	597	2735	
17:45:00	19	67	9	0	41	95	10	172	20	0	27	202	43	71	16	0	33	130	18	149	24	0	18	191	618	2657	
Grand Total	481	1674	382	3	1294	2540	349	4311	648	0	893	5308	1162	1996	619	0	806	3777	329	4229	530	2	551	5090	16715	-	
Approach%	18.9%	65.9%	15%	0.1%		-	6.6%	81.2%	12.2%	0%		-	30.8%	52.8%	16.4%	0%		-	6.5%	83.1%	10.4%	0%		-	-	-	
Totals %	2.9%	10%	2.3%	0%		15.2%	2.1%	25.8%	3.9%	0%		31.8%	7%	11.9%	3.7%	0%		22.6%	2%	25.3%	3.2%	0%		30.5%	-	-	
Heavy	20	22	15	0		-	6	343	11	0		-	17	25	11	0		-	4	336	5	0		-	-	-	
Heavy %	4.2%	1.3%	3.9%	0%		-	1.7%	8%	1.7%	0%		-	1.5%	1.3%	1.8%	0%		-	1.2%	7.9%	0.9%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Turning Movement Count
Location Name: ALBERT ST & UNIVERSITY AVE W
Date: Tue, Apr 02, 2019 Deployment Lead: Peter Ilias

Peak Hour: 08:00 AM - 09:00 AM Weather:

Start Time	N Approach Albert Street						E Approach University Avenue						S Approach Albert Street						W Approach University Avenue						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:00:00	7	65	11	0	31	83	15	130	34	0	15	179	25	53	21	0	8	99	7	108	30	0	9	145	506
08:15:00	12	50	9	0	48	71	19	169	31	0	30	219	30	69	28	0	27	127	6	123	11	0	23	140	557
08:30:00	6	59	7	0	26	72	17	122	20	0	16	159	37	78	27	0	13	142	5	130	17	0	11	152	525
08:45:00	8	50	7	0	17	65	12	127	18	0	8	157	18	63	29	0	18	110	9	131	20	0	11	160	492
Grand Total	33	224	34	0	122	291	63	548	103	0	69	714	110	263	105	0	66	478	27	492	78	0	54	597	2080
Approach%	11.3%	77%	11.7%	0%		-	8.8%	76.8%	14.4%	0%		-	23%	55%	22%	0%		-	4.5%	82.4%	13.1%	0%		-	-
Totals %	1.6%	10.8%	1.6%	0%		14%	3%	26.3%	5%	0%		34.3%	5.3%	12.6%	5%	0%		23%	1.3%	23.7%	3.8%	0%		28.7%	-
PHF	0.69	0.86	0.77	0		0.88	0.83	0.81	0.76	0		0.82	0.74	0.84	0.91	0		0.84	0.75	0.94	0.65	0		0.93	-
Heavy	2	4	4	0		10	2	55	0	0		57	1	6	2	0		9	0	57	0	0		57	-
Heavy %	6.1%	1.8%	11.8%	0%		3.4%	3.2%	10%	0%	0%		8%	0.9%	2.3%	1.9%	0%		1.9%	0%	11.6%	0%	0%		9.5%	-
Cars & Light Goods	31	218	30	0		279	61	493	103	0		657	109	256	102	0		467	27	434	78	0		539	-
Cars & Light Goods %	93.9%	97.3%	88.2%	0%		95.9%	96.8%	90%	100%	0%		92%	99.1%	97.3%	97.1%	0%		97.7%	100%	88.2%	100%	0%		90.3%	-
Motorcycles	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%	-
Single-Unit Trucks	2	1	2	0		5	0	9	0	0		9	1	3	2	0		6	0	17	0	0		17	-
Single-Unit Trucks %	6.1%	0.4%	5.9%	0%		1.7%	0%	1.6%	0%	0%		1.3%	0.9%	1.1%	1.9%	0%		1.3%	0%	3.5%	0%	0%		2.8%	-
Buses	0	3	2	0		5	0	43	0	0		43	0	3	0	0		3	0	40	0	0		40	-
Buses %	0%	1.3%	5.9%	0%		1.7%	0%	7.8%	0%	0%		6%	0%	1.1%	0%	0%		0.6%	0%	8.1%	0%	0%		6.7%	-
Articulated Trucks	0	0	0	0		0	2	3	0	0		5	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	3.2%	0.5%	0%	0%		0.7%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Bicycles on Road	0	2	0	0		2	0	0	0	0		0	0	1	1	0		2	0	1	0	0		1	-
Bicycles on Road %	0%	0.9%	0%	0%		0.7%	0%	0%	0%	0%		0%	0%	0.4%	1%	0%		0.4%	0%	0.2%	0%	0%		0.2%	-
Pedestrians	-	-	-	-	122	-	-	-	-	-	69	-	-	-	-	-	66	-	-	-	-	-	54	-	-
Pedestrians%	-	-	-	-	39.2%	-	-	-	-	-	22.2%	-	-	-	-	-	21.2%	-	-	-	-	-	17.4%	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-



Peak Hour: 12:15 PM - 01:15 PM Weather:

Start Time	N Approach Albert Street						E Approach University Avenue						S Approach Albert Street						W Approach University Avenue						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
12:15:00	13	47	8	0	37	68	13	119	17	0	27	149	54	66	21	0	29	141	10	113	10	0	21	133	491
12:30:00	16	45	9	0	50	70	14	143	29	0	27	186	39	60	17	0	35	116	9	119	15	0	16	143	515
12:45:00	15	43	9	0	96	67	12	134	19	0	75	165	57	67	21	0	58	145	12	132	18	0	31	162	539
13:00:00	15	47	12	0	30	74	10	130	17	0	21	157	44	52	19	0	25	115	17	139	15	0	21	171	517
Grand Total	59	182	38	0	213	279	49	526	82	0	150	657	194	245	78	0	147	517	48	503	58	0	89	609	2062
Approach%	21.1%	65.2%	13.6%	0%	-	-	7.5%	80.1%	12.5%	0%	-	-	37.5%	47.4%	15.1%	0%	-	-	7.9%	82.6%	9.5%	0%	-	-	-
Totals %	2.9%	8.8%	1.8%	0%	13.5%	2.4%	25.5%	4%	0%	31.9%	9.4%	11.9%	3.8%	0%	25.1%	2.3%	24.4%	2.8%	0%	29.5%	-	-	-	-	-
PHF	0.92	0.97	0.79	0	0.94	0.88	0.92	0.71	0	0.88	0.85	0.91	0.93	0	0.89	0.71	0.9	0.81	0	0.89	-	-	-	-	-
Heavy	1	1	0	0	2	0	36	3	0	39	2	3	4	0	9	1	29	0	0	30	-	-	-	-	-
Heavy %	1.7%	0.5%	0%	0%	0.7%	0%	6.8%	3.7%	0%	5.9%	1%	1.2%	5.1%	0%	1.7%	2.1%	5.8%	0%	0%	4.9%	-	-	-	-	-
Cars & Light Goods	58	180	38	0	276	49	486	79	0	614	192	242	74	0	508	46	474	58	0	578	-	-	-	-	-
Cars & Light Goods %	98.3%	98.9%	100%	0%	98.9%	100%	92.4%	96.3%	0%	93.5%	99%	98.8%	94.9%	0%	98.3%	95.8%	94.2%	100%	0%	94.9%	-	-	-	-	-
Motorcycles	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%	-	-	-	-	-
Single-Unit Trucks	0	1	0	0	1	0	11	3	0	14	1	1	3	0	5	1	5	0	0	6	-	-	-	-	-
Single-Unit Trucks %	0%	0.5%	0%	0%	0.4%	0%	2.1%	3.7%	0%	2.1%	0.5%	0.4%	3.8%	0%	1%	2.1%	1%	0%	0%	1%	-	-	-	-	-
Buses	1	0	0	0	1	0	23	0	0	23	0	1	0	0	1	0	23	0	0	23	-	-	-	-	-
Buses %	1.7%	0%	0%	0%	0.4%	0%	4.4%	0%	0%	3.5%	0%	0.4%	0%	0%	0.2%	0%	4.6%	0%	0%	3.8%	-	-	-	-	-
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	1	1	1	0	3	0	1	0	0	1	-	-	-	-	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	0.4%	0%	0%	0.3%	0.5%	0.4%	1.3%	0%	0.6%	0%	0.2%	0%	0%	0.2%	-	-	-	-	-
Bicycles on Road	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	1	0	0	0	1	-	-	-	-	-
Bicycles on Road %	0%	0.5%	0%	0%	0.4%	0%	0.8%	0%	0%	0.6%	0%	0%	0%	0%	0%	2.1%	0%	0%	0%	0.2%	-	-	-	-	-
Pedestrians	-	-	-	-	211	-	-	-	-	150	-	-	-	-	146	-	-	-	-	89	-	-	-	-	-
Pedestrians%	-	-	-	-	35.2%	-	-	-	-	25%	-	-	-	-	24.4%	-	-	-	-	14.9%	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-	-	-	-
Bicycles on Crosswalk%	-	-	-	-	0.3%	-	-	-	-	0%	-	-	-	-	0.2%	-	-	-	-	0%	-	-	-	-	-

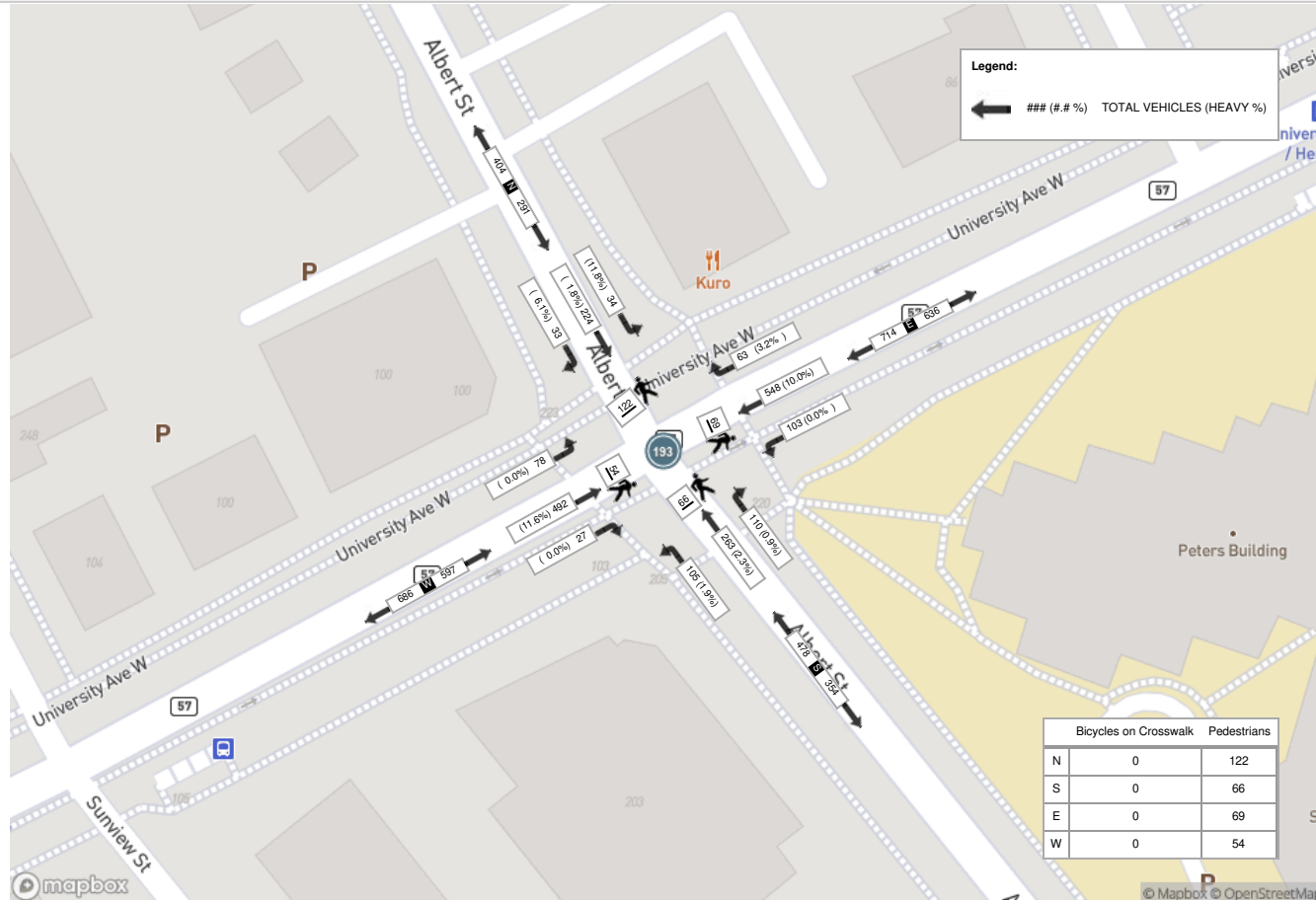


Turning Movement Count
Location Name: ALBERT ST & UNIVERSITY AVE W
Date: Tue, Apr 02, 2019 Deployment Lead: Peter Ilias

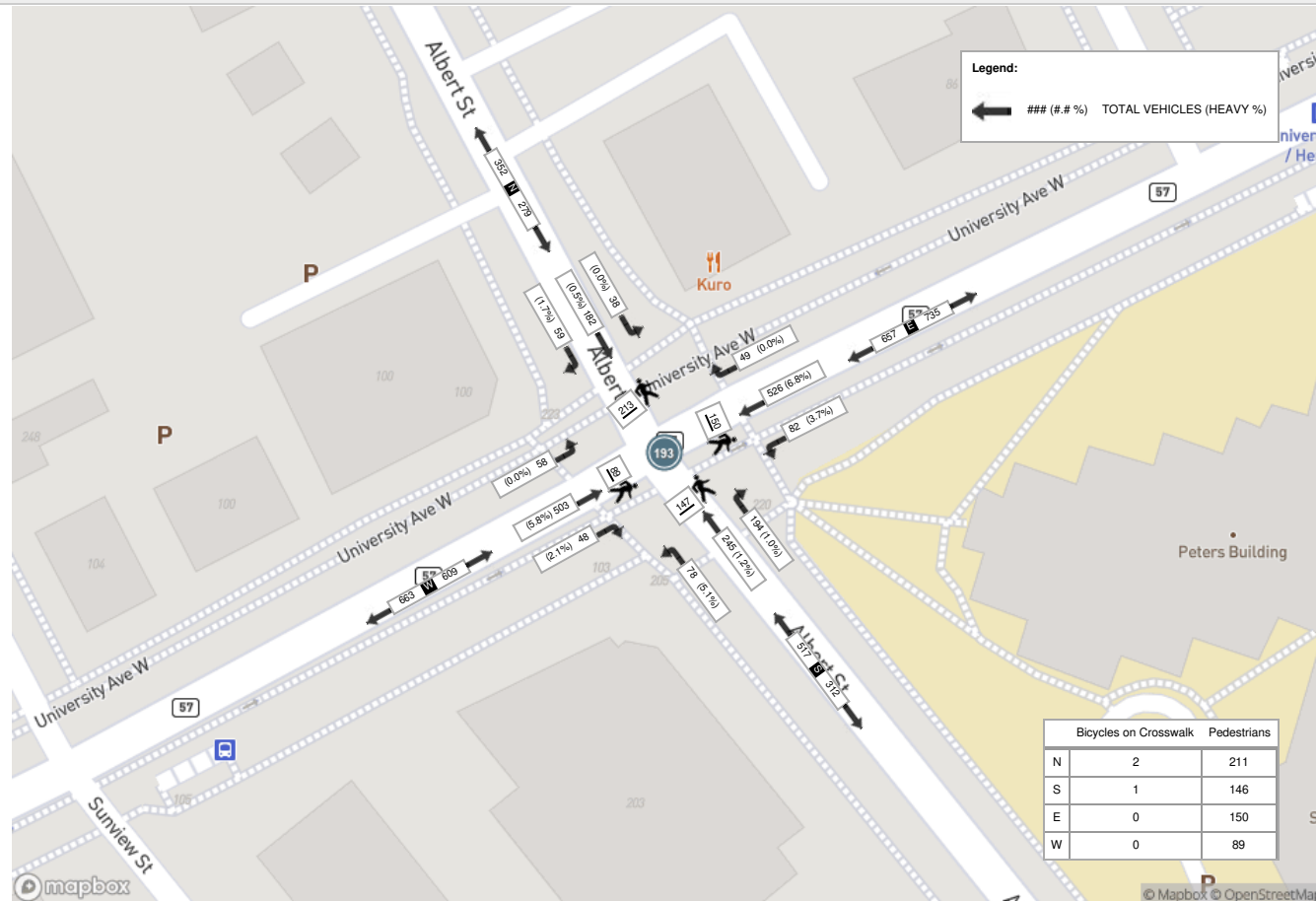
Peak Hour: 04:30 PM - 05:30 PM Weather:

Start Time	N Approach Albert Street						E Approach University Avenue						S Approach Albert Street						W Approach University Avenue						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	27	77	16	0	36	120	13	158	28	0	23	199	53	76	19	0	24	148	14	193	18	0	25	225	692
16:45:00	23	86	21	0	49	130	12	156	23	0	22	191	35	67	30	0	27	132	23	198	22	0	20	243	696
17:00:00	25	93	34	0	58	152	8	166	23	0	22	197	43	72	19	0	31	134	16	187	24	0	20	227	710
17:15:00	24	106	41	0	84	171	16	180	26	0	87	222	40	75	25	0	41	140	11	169	19	0	35	199	732
Grand Total	99	362	112	0	227	573	49	660	100	0	154	809	171	290	93	0	123	554	64	747	83	0	100	894	2830
Approach%	17.3%	63.2%	19.5%	0%	-	-	6.1%	81.6%	12.4%	0%	-	-	30.9%	52.3%	16.8%	0%	-	-	7.2%	83.6%	9.3%	0%	-	-	-
Totals %	3.5%	12.8%	4%	0%	20.2%	20.2%	1.7%	23.3%	3.5%	0%	28.6%	28.6%	6%	10.2%	3.3%	0%	19.6%	19.6%	2.3%	26.4%	2.9%	0%	31.6%	31.6%	-
PHF	0.92	0.85	0.68	0	0.84	0.84	0.77	0.92	0.89	0	0.91	0.91	0.81	0.95	0.78	0	0.94	0.94	0.7	0.94	0.86	0	0.92	0.92	-
Heavy	2	2	2	0	6	6	0	41	0	0	41	41	1	0	2	0	3	3	0	39	0	0	39	39	-
Heavy %	2%	0.6%	1.8%	0%	1%	1%	0%	6.2%	0%	0%	5.1%	5.1%	0.6%	0%	2.2%	0%	0.5%	0.5%	0%	5.2%	0%	0%	4.4%	4.4%	-
Cars & Light Goods	97	360	110	0	567	567	49	618	100	0	767	767	170	290	91	0	551	551	64	706	83	0	853	853	-
Cars & Light Goods %	98%	99.4%	98.2%	0%	99%	99%	100%	93.6%	100%	0%	94.8%	94.8%	99.4%	100%	97.8%	0%	99.5%	99.5%	100%	94.5%	100%	0%	95.4%	95.4%	-
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	-
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%	-
Single-Unit Trucks	2	2	2	0	6	6	0	9	0	0	9	9	1	0	2	0	3	3	0	4	0	0	4	4	-
Single-Unit Trucks %	2%	0.6%	1.8%	0%	1%	1%	0%	1.4%	0%	0%	1.1%	1.1%	0.6%	0%	2.2%	0%	0.5%	0.5%	0%	0.5%	0%	0%	0.4%	0.4%	-
Buses	0	0	0	0	0	0	0	32	0	0	32	32	0	0	0	0	0	0	0	34	0	0	34	34	-
Buses %	0%	0%	0%	0%	0%	0%	0%	4.8%	0%	0%	4%	4%	0%	0%	0%	0%	0%	0%	0%	4.6%	0%	0%	3.8%	3.8%	-
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%	0%	0%	0.1%	0.1%	-
Bicycles on Road	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	2	0	0	2	2	-
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0%	0.2%	0%	0%	0.1%	0.1%	0%	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0.2%	0.2%	-
Pedestrians	-	-	-	-	227	-	-	-	-	-	153	-	-	-	-	-	123	-	-	-	-	-	100	-	-
Pedestrians%	-	-	-	-	37.6%	-	-	-	-	-	25.3%	-	-	-	-	-	20.4%	-	-	-	-	-	16.6%	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	-	0.2%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

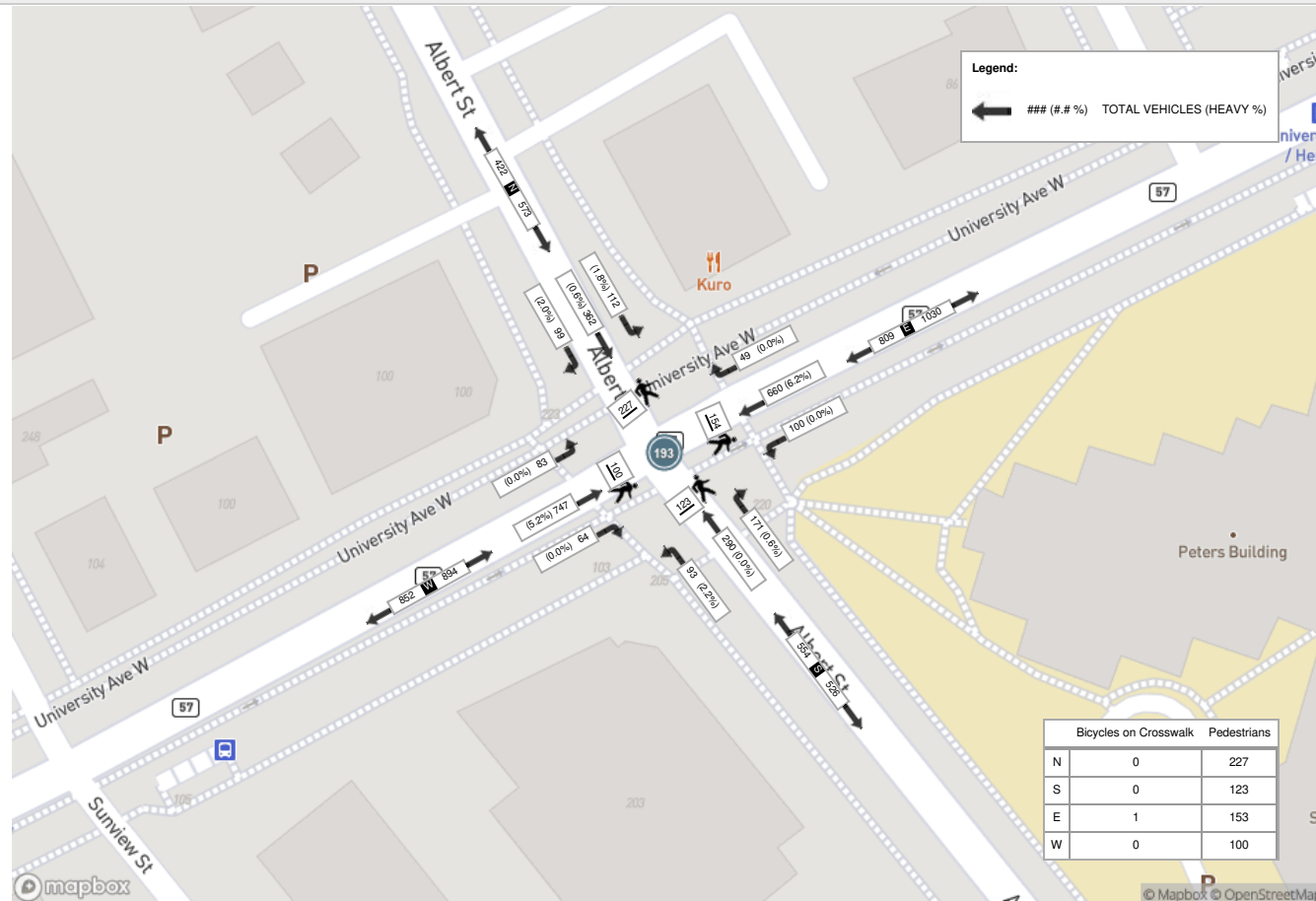
Peak Hour: 08:00 AM - 09:00 AM Weather:



Peak Hour: 12:15 PM - 01:15 PM Weather:



Peak Hour: 04:30 PM - 05:30 PM Weather:



Appendix B

Signal Timing Plans



CURRENT TRAFFIC SIGNAL TIMING

INT # **24**

COLUMBIA STREET @ Albert Street

T08-50/ **3W**

Date Prepared: **March 30, 2022**

Mode of Control **Fixed Time**

<u>Left Info</u>	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					



CURRENT TRAFFIC SIGNAL TIMING

INT # **543**

UNIVERSITY AVENUE @ Albert Avenue

T08-50/ **4W**

Date Prepared: **September 9, 2022**

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

EBL Green Arrow	Min	5.0	seconds	WBL Green Arrow	OFFSET		13%
	Ext	3.0	seconds		Min	5.0	seconds
	Max	7.0	seconds		Ext	3.0	seconds
EBL Amber Arrow	Max	7.0	seconds	WBL Amber Arrow			
		3.0	seconds		Min	5.0	seconds
		3.0	seconds		Ext	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					

Appendix B

2022 Existing Conditions Synchro Reports

Timings
1: Albert Street & Columbia Street West

AM Peak period
2022 Existing Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	53	632	77	872	179	251	102	185	29
Future Volume (vph)	53	632	77	872	179	251	102	185	29
Lane Group Flow (vph)	53	700	77	1021	179	293	102	185	29
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	39.5	32.2	40.4	34.3	36.0	28.6	35.1	26.4	26.4
Actuated g/C Ratio	0.44	0.36	0.45	0.38	0.40	0.32	0.39	0.29	0.29
v/c Ratio	0.26	0.62	0.28	0.85	0.40	0.58	0.27	0.34	0.06
Control Delay	16.3	27.1	15.9	34.5	19.8	31.6	17.4	27.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.3	27.1	15.9	34.5	19.8	31.6	17.4	27.1	0.2
LOS	B	C	B	C	B	C	B	C	A
Approach Delay		26.4		33.2		27.1		21.5	
Approach LOS		C		C		C		C	
Queue Length 50th (m)	4.8	53.0	7.0	88.5	19.0	42.3	10.3	25.0	0.0
Queue Length 95th (m)	10.9	72.1	14.5	#130.7	32.8	69.1	19.8	42.5	0.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	209	1123	277	1208	446	502	384	545	495
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	0.25	0.62	0.28	0.85	0.40	0.58	0.27	0.34	0.06

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), 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: 28.8

Intersection LOS: C

Intersection Capacity Utilization 84.9%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

AM Peak period
2022 Existing Condition

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

 Ø1 10.8 s	 Ø2 (R) 36 s	 Ø3 10.8 s	 Ø4 32.4 s
 Ø5 10.8 s	 Ø6 (R) 36 s	 Ø7 10.8 s	 Ø8 32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

AM Peak period
2022 Existing Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	632	68	77	872	149	179	251	42	102	185	29
Future Volume (vph)	53	632	68	77	872	149	179	251	42	102	185	29
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1666	3120		1581	3133		1632	1567		1633	1860	1370
Flt Permitted	0.13	1.00		0.26	1.00		0.58	1.00		0.48	1.00	1.00
Satd. Flow (perm)	229	3120		429	3133		1001	1567		832	1860	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	53	632	68	77	872	149	179	251	42	102	185	29
RTOR Reduction (vph)	0	9	0	0	15	0	0	6	0	0	0	20
Lane Group Flow (vph)	53	691	0	77	1006	0	179	287	0	102	185	9
Confl. Peds. (#/hr)	50		46	46		50	27		38	38		27
Confl. Bikes (#/hr)			2			1						2
Heavy Vehicles (%)	0%	4%	4%	5%	3%	2%	1%	1%	2%	1%	1%	3%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	34.7	30.6		37.3	31.9		35.4	28.6		32.6	27.2	27.2
Effective Green, g (s)	34.7	30.6		37.3	31.9		35.4	28.6		32.6	27.2	27.2
Actuated g/C Ratio	0.39	0.34		0.41	0.35		0.39	0.32		0.36	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	153	1060		246	1110		441	497		349	562	414
v/s Ratio Prot	0.02	0.22		c0.02	c0.32		c0.03	c0.18		0.02	0.10	
v/s Ratio Perm	0.12			0.11			0.13			0.09		0.01
v/c Ratio	0.35	0.65		0.31	0.91		0.41	0.58		0.29	0.33	0.02
Uniform Delay, d1	19.4	25.2		16.9	27.6		18.6	25.6		19.7	24.3	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	3.1		0.7	12.2		0.6	4.8		0.5	1.6	0.1
Delay (s)	20.8	28.3		17.7	39.8		19.3	30.5		20.1	25.9	22.1
Level of Service	C	C		B	D		B	C		C	C	C
Approach Delay (s)		27.8			38.3			26.2			23.7	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			84.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

AM Peak period
2022 Existing Condition

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (veh/h)	10	11	14	19	16	55	6	407	51	34	293	3			
Future Volume (Veh/h)	10	11	14	19	16	55	6	407	51	34	293	3			
Sign Control	Stop			Stop			Free			Free					
Grade	0%			0%			0%			0%					
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			
Hourly flow rate (vph)	10	11	14	19	16	55	6	407	51	34	293	3			
Pedestrians	22			23			14			15					
Lane Width (m)	3.5			3.5			3.5			3.5					
Walking Speed (m/s)	1.1			1.1			1.1			1.1					
Percent Blockage	2			2			1			1					
Right turn flare (veh)	2			2											
Median type							None			None					
Median storage veh															
Upstream signal (m)							362			256					
pX, platoon unblocked	0.88	0.88	0.95	0.88	0.88	0.86	0.95				0.86				
vC, conflicting volume	880	878	330	856	854	470	318				481				
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vCu, unblocked vol	673	671	271	647	644	299	258				311				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3				4.2				
tC, 2 stage (s)															
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4				2.3				
p0 queue free %	96	96	98	93	95	91	99				97				
cM capacity (veh/h)	262	310	712	291	321	617	1142				1030				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1											
Volume Total	35	90	464	330											
Volume Left	10	19	6	34											
Volume Right	14	55	51	3											
cSH	478	784	1142	1030											
Volume to Capacity	0.07	0.11	0.01	0.03											
Queue Length 95th (m)	1.8	2.9	0.1	0.8											
Control Delay (s)	15.2	14.1	0.2	1.2											
Lane LOS	C	B	A	A											
Approach Delay (s)	15.2	14.1	0.2	1.2											
Approach LOS	C	B													
Intersection Summary															
Average Delay				2.5											
Intersection Capacity Utilization				62.3%	ICU Level of Service			B							
Analysis Period (min)				15											

Timings

3: Albert Street & University Avenue West

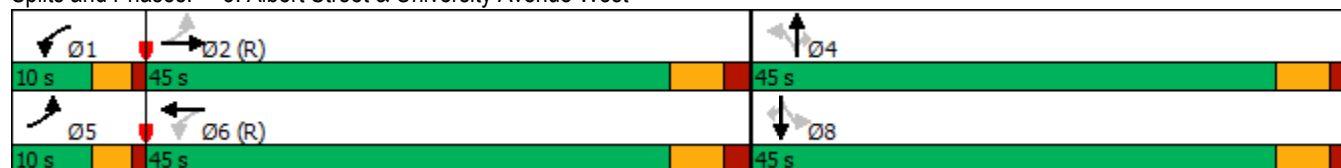
AM Peak period
2022 Existing Condition

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	63	433	98	456	77	370	62	23	271	32
Future Volume (vph)	63	433	98	456	77	370	62	23	271	32
Lane Group Flow (vph)	63	472	98	487	77	370	62	23	271	32
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	45.0	9.0	45.0	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	45.0
Total Split (%)	10.0%	45.0%	10.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.8	41.0	47.8	41.0	39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.48	0.41	0.48	0.41	0.39	0.39	0.39	0.39	0.39	0.39
v/c Ratio	0.17	0.38	0.25	0.39	0.24	0.52	0.12	0.09	0.39	0.06
Control Delay	13.8	21.9	14.6	22.2	23.1	26.5	4.0	20.7	24.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.8	21.9	14.6	22.2	23.1	26.5	4.0	20.7	24.0	0.2
LOS	B	C	B	C	C	C	A	C	C	A
Approach Delay		20.9		20.9		23.2			21.4	
Approach LOS		C		C		C			C	
Queue Length 50th (m)	6.0	33.3	9.4	34.9	9.9	53.8	0.0	2.8	37.0	0.0
Queue Length 95th (m)	12.5	46.5	17.9	48.5	21.0	80.6	6.1	8.1	58.0	0.4
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	370	1231	391	1235	321	718	531	252	697	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.38	0.25	0.39	0.24	0.52	0.12	0.09	0.39	0.06
Intersection Summary										
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: 0.52										
Intersection Signal Delay: 21.6					Intersection LOS: C					
Intersection Capacity Utilization 93.7%					ICU Level of Service F					
Analysis Period (min) 15										

Timings 3: Albert Street & University Avenue West

AM Peak period
2022 Existing Condition

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

AM Peak period
2022 Existing Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	433	39	98	456	31	77	370	62	23	271	32
Future Volume (vph)	63	433	39	98	456	31	77	370	62	23	271	32
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00	0.89	1.00	1.00	0.93
Flpb, ped/bikes	0.96	1.00		0.97	1.00		0.96	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1552	2987		1594	3002		1511	1842	1243	1518	1789	1365
Flt Permitted	0.43	1.00		0.44	1.00		0.52	1.00	1.00	0.41	1.00	1.00
Satd. Flow (perm)	700	2987		736	3002		826	1842	1243	648	1789	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	433	39	98	456	31	77	370	62	23	271	32
RTOR Reduction (vph)	0	7	0	0	5	0	0	0	38	0	0	20
Lane Group Flow (vph)	63	465	0	98	482	0	77	370	24	23	271	12
Confl. Peds. (#/hr)	167		133	133		167	80		133	133		80
Confl. Bikes (#/hr)			8						1			
Heavy Vehicles (%)	3%	9%	3%	1%	9%	0%	6%	2%	5%	4%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Effective Green, g (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.45	0.40		0.45	0.40		0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	355	1200		372	1206		322	718	484	252	697	532
v/s Ratio Prot	0.01	0.16		c0.01	c0.16			c0.20			0.15	
v/s Ratio Perm	0.07			0.11			0.09		0.02	0.04		0.01
v/c Ratio	0.18	0.39		0.26	0.40		0.24	0.52	0.05	0.09	0.39	0.02
Uniform Delay, d1	15.8	21.2		16.2	21.3		20.5	23.3	19.0	19.3	21.9	18.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.9		0.4	1.0		1.7	2.6	0.2	0.7	1.6	0.1
Delay (s)	16.1	22.1		16.6	22.3		22.3	25.9	19.2	20.0	23.6	18.9
Level of Service	B	C		B	C		C	C	B	C	C	B
Approach Delay (s)		21.4			21.3			24.5			22.9	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			93.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Sunview Street & Hickory Street West

AM Peak period
2022 Existing Condition

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	14	4	13	16	1	18
Future Volume (Veh/h)	14	4	13	16	1	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	4	13	16	1	18
Pedestrians	3			16	11	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	0			1	1	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			29		72	43
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			29		72	43
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1495		917	1009
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	18	29	19			
Volume Left	0	13	1			
Volume Right	4	0	18			
cSH	1700	1495	1065			
Volume to Capacity	0.01	0.01	0.02			
Queue Length 95th (m)	0.0	0.2	0.4			
Control Delay (s)	0.0	3.4	8.6			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.4	8.6			
Approach LOS			A			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			22.6%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Sunview Street & University Avenue West

AM Peak period
2022 Existing Condition

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (veh/h)	9	513	3	4	551	10	1	0	6	8	0	9		
Future Volume (Veh/h)	9	513	3	4	551	10	1	0	6	8	0	9		
Sign Control		Free			Free			Stop			Stop			
Grade		0%			0%			0%			0%			
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		
Hourly flow rate (vph)	9	513	3	4	551	10	1	0	6	8	0	9		
Pedestrians		4			6			102			205			
Lane Width (m)		3.5			3.5			3.5			3.5			
Walking Speed (m/s)		1.1			1.1			1.1			1.1			
Percent Blockage		0			1			9			18			
Right turn flare (veh)									2		2			
Median type	None			None										
Median storage (veh)														
Upstream signal (m)	103													
pX, platoon unblocked	0.90						0.90	0.90				0.90	0.90	0.90
vC, conflicting volume	766				618			926	1408	366	1050	1405	490	
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	529				618			706	1239	366	842	1236	223	
tC, single (s)	4.1				4.1			7.5	6.5	6.9	7.5	6.5	7.3	
tC, 2 stage (s)														
tF (s)	2.2				2.2			3.5	4.0	3.3	3.5	4.0	3.5	
p0 queue free %	99				100			100	100	99	95	100	98	
cM capacity (veh/h)	776				884			209	117	576	151	118	533	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1								
Volume Total	266	260	280	286	7	17								
Volume Left	9	0	4	0	1	8								
Volume Right	0	3	0	10	6	9								
cSH	776	1700	884	1700	672	320								
Volume to Capacity	0.01	0.15	0.00	0.17	0.01	0.05								
Queue Length 95th (m)	0.3	0.0	0.1	0.0	0.2	1.3								
Control Delay (s)	0.5	0.0	0.2	0.0	12.9	20.5								
Lane LOS	A			A			B	C						
Approach Delay (s)	0.2			0.1			12.9	20.5						
Approach LOS					B		C							
Intersection Summary														
Average Delay	0.5													
Intersection Capacity Utilization	38.4%			ICU Level of Service				A						
Analysis Period (min)	15													

Timings
1: Albert Street & Columbia Street West

PM Peak period
2022 Existing Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	46	943	123	834	85	244	162	337	70
Future Volume (vph)	46	943	123	834	85	244	162	337	70
Lane Group Flow (vph)	46	1124	123	886	85	340	162	337	70
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	38.5	30.1	40.4	34.3	35.0	26.4	36.0	28.6	28.6
Actuated g/C Ratio	0.43	0.33	0.45	0.38	0.39	0.29	0.40	0.32	0.32
v/c Ratio	0.20	1.06	0.61	0.72	0.24	0.73	0.50	0.57	0.13
Control Delay	15.0	75.1	28.1	28.8	17.2	37.4	22.5	31.0	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	75.1	28.1	28.8	17.2	37.4	22.5	31.0	0.9
LOS	B	E	C	C	B	D	C	C	A
Approach Delay		72.8		28.8		33.3		24.9	
Approach LOS		E		C		C		C	
Queue Length 50th (m)	4.1	~112.2	11.5	72.6	8.5	49.3	17.0	49.9	0.0
Queue Length 95th (m)	9.8	#151.7	#26.9	96.1	17.1	#86.4	29.9	77.4	1.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	240	1060	204	1232	351	466	323	596	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	0.19	1.06	0.60	0.72	0.24	0.73	0.50	0.57	0.13

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 44.9

Intersection LOS: D

Intersection Capacity Utilization 91.0%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

PM Peak period
2022 Existing Condition

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10.8 s	36 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10.8 s	36 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

PM Peak period
2022 Existing Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	943	181	123	834	52	85	244	96	162	337	70
Future Volume (vph)	46	943	181	123	834	52	85	244	96	162	337	70
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1632	3123		1649	3220		1646	1538		1639	1879	1365
Flt Permitted	0.19	1.00		0.13	1.00		0.42	1.00		0.36	1.00	1.00
Satd. Flow (perm)	331	3123		218	3220		727	1538		623	1879	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	46	943	181	123	834	52	85	244	96	162	337	70
RTOR Reduction (vph)	0	18	0	0	5	0	0	15	0	0	0	48
Lane Group Flow (vph)	46	1106	0	123	881	0	85	325	0	162	337	22
Confl. Peds. (#/hr)	52		70	70		52	60		44	44		60
Confl. Bikes (#/hr)			3			2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	0%	0%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	33.4	29.3		38.6	31.9		32.6	27.2		35.4	28.6	28.6
Effective Green, g (s)	33.4	29.3		38.6	31.9		32.6	27.2		35.4	28.6	28.6
Actuated g/C Ratio	0.37	0.33		0.43	0.35		0.36	0.30		0.39	0.32	0.32
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	1016		200	1141		318	464		321	597	433
v/s Ratio Prot	0.01	c0.35		c0.05	0.27		0.02	c0.21		c0.04	0.18	
v/s Ratio Perm	0.08			0.22			0.08			0.16		0.02
v/c Ratio	0.25	1.09		0.61	0.77		0.27	0.70		0.50	0.56	0.05
Uniform Delay, d1	19.1	30.4		20.1	25.8		19.6	27.8		19.1	25.5	21.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	55.7		5.5	5.1		0.5	8.5		1.2	3.8	0.2
Delay (s)	19.9	86.0		25.6	30.9		20.0	36.3		20.3	29.4	21.5
Level of Service	B	F		C	C		C	D		C	C	C
Approach Delay (s)		83.4			30.3			33.0			25.8	
Approach LOS		F			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			49.4			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			91.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

PM Peak period
2022 Existing Condition

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	25	39	37	50	32	46	25	354	51	34	589	18								
Future Volume (Veh/h)	25	39	37	50	32	46	25	354	51	34	589	18								
Sign Control	Stop			Stop			Free			Free										
Grade	0%			0%			0%			0%										
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								
Hourly flow rate (vph)	25	39	37	50	32	46	25	354	51	34	589	18								
Pedestrians	26			43			36			21										
Lane Width (m)	3.5			3.5			3.5			3.5										
Walking Speed (m/s)	1.1			1.1			1.1			1.1										
Percent Blockage	2			4			3			2										
Right turn flare (veh)	2			2																
Median type							None			None										
Median storage veh																				
Upstream signal (m)							362			256										
pX, platoon unblocked	0.88	0.88	0.85	0.88	0.88	0.94	0.85				0.94									
vC, conflicting volume	1182	1190	660	1212	1174	444	633				448									
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	987	997	516	1022	978	376	484				381									
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1									
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2									
p0 queue free %	83	80	92	60	84	92	97				97									
cM capacity (veh/h)	143	192	455	126	197	599	908				1075									
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	101	128	430	641																
Volume Left	25	50	25	34																
Volume Right	37	46	51	18																
cSH	273	240	908	1075																
Volume to Capacity	0.37	0.53	0.03	0.03																
Queue Length 95th (m)	12.4	21.6	0.6	0.7																
Control Delay (s)	28.8	37.7	0.8	0.8																
Lane LOS	D	E	A	A																
Approach Delay (s)	28.8	37.7	0.8	0.8																
Approach LOS	D	E																		
Intersection Summary																				
Average Delay				6.6																
Intersection Capacity Utilization				72.1%	ICU Level of Service			C												
Analysis Period (min)				15																

Timings

3: Albert Street & University Avenue West

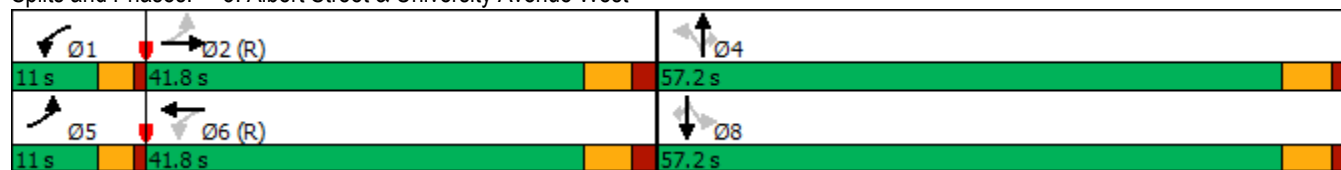
PM Peak period
2022 Existing Condition

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	99	624	82	593	123	266	122	52	536	88
Future Volume (vph)	99	624	82	593	123	266	122	52	536	88
Lane Group Flow (vph)	99	688	82	658	123	266	122	52	536	88
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	41.8	9.0	41.8	57.2	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	57.2
Total Split (%)	10.0%	38.0%	10.0%	38.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	45.6	38.0	44.7	35.9	51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.41	0.35	0.41	0.33	0.47	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.42	0.65	0.33	0.66	0.53	0.30	0.19	0.13	0.61	0.13
Control Delay	23.8	34.2	21.8	35.1	31.2	19.5	3.8	17.9	25.8	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	34.2	21.8	35.1	31.2	19.5	3.8	17.9	25.8	5.4
LOS	C	C	C	D	C	B	A	B	C	A
Approach Delay		32.9		33.6		18.6			22.5	
Approach LOS		C		C		B			C	
Queue Length 50th (m)	12.3	66.4	10.1	62.5	18.2	34.5	0.0	6.2	83.6	1.3
Queue Length 95th (m)	22.7	87.2	19.2	82.2	38.5	52.6	9.7	13.8	118.6	9.7
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	240	1052	251	998	232	874	647	404	874	664
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.65	0.33	0.66	0.53	0.30	0.19	0.13	0.61	0.13
Intersection Summary										
Cycle Length: 110										
Actuated Cycle Length: 110										
Offset: 13 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green										
Natural Cycle: 110										
Control Type: Actuated-Coordinated										
Maximum v/c Ratio: 0.66										
Intersection Signal Delay: 27.8					Intersection LOS: C					
Intersection Capacity Utilization 104.0%					ICU Level of Service G					
Analysis Period (min) 15										

Timings
 3: Albert Street & University Avenue West

PM Peak period
 2022 Existing Condition

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

PM Peak period
2022 Existing Condition

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	624	64	82	593	65	123	266	122	52	536	88
Future Volume (vph)	99	624	64	82	593	65	123	266	122	52	536	88
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.91
Flpb, ped/bikes	0.96	1.00		0.97	1.00		0.97	1.00	1.00	0.91	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1606	3030		1623	3037		1617	1879	1250	1514	1879	1340
Flt Permitted	0.26	1.00		0.27	1.00		0.29	1.00	1.00	0.55	1.00	1.00
Satd. Flow (perm)	443	3030		462	3037		498	1879	1250	871	1879	1340
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	624	64	82	593	65	123	266	122	52	536	88
RTOR Reduction (vph)	0	7	0	0	7	0	0	0	65	0	0	41
Lane Group Flow (vph)	99	681	0	82	651	0	123	266	57	52	536	47
Confl. Peds. (#/hr)	339		230	230		339	121		216	216		121
Confl. Bikes (#/hr)			2						4			2
Heavy Vehicles (%)	0%	5%	3%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	44.1	37.2		41.5	35.9		51.2	51.2	51.2	51.2	51.2	51.2
Effective Green, g (s)	44.1	37.2		41.5	35.9		51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.40	0.34		0.38	0.33		0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	250	1024		233	991		231	874	581	405	874	623
v/s Ratio Prot	c0.02	c0.22		0.02	0.21			0.14			c0.29	
v/s Ratio Perm	0.13			0.11			0.25		0.05	0.06		0.04
v/c Ratio	0.40	0.67		0.35	0.66		0.53	0.30	0.10	0.13	0.61	0.08
Uniform Delay, d1	21.9	31.1		23.1	31.8		20.9	18.3	16.5	16.7	22.0	16.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.4		0.9	3.4		8.5	0.9	0.3	0.7	3.2	0.2
Delay (s)	23.0	34.5		24.0	35.2		29.4	19.2	16.8	17.4	25.2	16.5
Level of Service	C	C		C	D		C	B	B	B	C	B
Approach Delay (s)		33.1			33.9			21.1			23.5	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			28.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			104.0%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Sunview Street & Hickory Street West

PM Peak period
2022 Existing Condition

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	64	16	23	54	10	36
Future Volume (Veh/h)	64	16	23	54	10	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	64	16	23	54	10	36
Pedestrians	9			13	31	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	1			1	3	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			111		212	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		212	116
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	96
cM capacity (veh/h)			1451		741	905
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	80	77	46			
Volume Left	0	23	10			
Volume Right	16	0	36			
cSH	1700	1451	1157			
Volume to Capacity	0.05	0.02	0.04			
Queue Length 95th (m)	0.0	0.4	0.9			
Control Delay (s)	0.0	2.3	9.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.3	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			24.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Sunview Street & University Avenue West

PM Peak period
2022 Existing Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	761	6	7	775	30	7	0	10	18	0	21
Future Volume (Veh/h)	16	761	6	7	775	30	7	0	10	18	0	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	16	761	6	7	775	30	7	0	10	18	0	21
Pedestrians		6			10			249			435	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			22			38	
Right turn flare (veh)									2			2
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					103							
pX, platoon unblocked	0.83						0.83	0.83		0.83	0.83	0.83
vC, conflicting volume	1240			1016			1463	2299	642	1662	2287	844
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	887			1016			1155	2158	642	1393	2144	411
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			87	100	97	38	100	93
cM capacity (veh/h)	396			539			53	18	326	29	19	297
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	396	386	394	418	17	39						
Volume Left	16	0	7	0	7	18						
Volume Right	0	6	0	30	10	21						
cSH	396	1700	539	1700	128	63						
Volume to Capacity	0.04	0.23	0.01	0.25	0.13	0.62						
Queue Length 95th (m)	1.0	0.0	0.3	0.0	3.4	20.0						
Control Delay (s)	1.3	0.0	0.4	0.0	44.0	125.3						
Lane LOS	A		A		E	F						
Approach Delay (s)	0.7		0.2		44.0	125.3						
Approach LOS					E	F						
Intersection Summary												
Average Delay			3.8									
Intersection Capacity Utilization			53.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Appendix C

2027 Future Background Conditions
Synchro Reports

Timings
1: Albert Street & Columbia Street West

AM Peak period
2027 Future Background Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	56	683	86	919	210	275	107	198	30
Future Volume (vph)	56	683	86	919	210	275	107	198	30
Lane Group Flow (vph)	56	758	86	1076	210	333	107	198	30
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	39.5	32.2	39.7	32.3	36.0	28.6	35.1	26.4	26.4
Actuated g/C Ratio	0.44	0.36	0.44	0.36	0.40	0.32	0.39	0.29	0.29
v/c Ratio	0.28	0.67	0.34	0.95	0.48	0.66	0.31	0.36	0.06
Control Delay	16.5	28.4	17.0	46.2	21.8	34.3	18.0	27.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	28.4	17.0	46.2	21.8	34.3	18.0	27.5	0.2
LOS	B	C	B	D	C	C	B	C	A
Approach Delay		27.6		44.0		29.5		22.0	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	5.0	58.8	7.9	~98.5	22.8	49.5	10.8	27.0	0.0
Queue Length 95th (m)	11.3	79.4	15.9	#141.9	38.3	#81.5	20.8	45.3	0.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	209	1123	259	1137	435	502	352	545	495
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	0.27	0.67	0.33	0.95	0.48	0.66	0.30	0.36	0.06

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 34.0

Intersection LOS: C

Intersection Capacity Utilization 88.4%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

AM Peak period
2027 Future Background Condition

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10.8 s	36 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10.8 s	36 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

AM Peak period

2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	683	75	86	919	157	210	275	58	107	198	30
Future Volume (vph)	56	683	75	86	919	157	210	275	58	107	198	30
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1667	3119		1582	3133		1633	1557		1637	1860	1370
Flt Permitted	0.13	1.00		0.23	1.00		0.56	1.00		0.43	1.00	1.00
Satd. Flow (perm)	229	3119		389	3133		969	1557		733	1860	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	683	75	86	919	157	210	275	58	107	198	30
RTOR Reduction (vph)	0	9	0	0	15	0	0	8	0	0	0	21
Lane Group Flow (vph)	56	749	0	86	1061	0	210	325	0	107	198	9
Confl. Peds. (#/hr)	50		46	46		50	27		38	38		27
Confl. Bikes (#/hr)			2			1						2
Heavy Vehicles (%)	0%	4%	4%	5%	3%	2%	1%	1%	2%	1%	1%	3%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	35.9	30.6		36.1	30.7		35.4	28.6		32.6	27.2	27.2
Effective Green, g (s)	35.9	30.6		36.1	30.7		35.4	28.6		32.6	27.2	27.2
Actuated g/C Ratio	0.40	0.34		0.40	0.34		0.39	0.32		0.36	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	176	1060		227	1068		431	494		319	562	414
v/s Ratio Prot	0.02	0.24		c0.02	c0.34		c0.04	c0.21		0.02	0.11	
v/s Ratio Perm	0.11			0.13			0.15			0.10		0.01
v/c Ratio	0.32	0.71		0.38	0.99		0.49	0.66		0.34	0.35	0.02
Uniform Delay, d1	19.5	25.8		17.9	29.5		19.5	26.5		19.9	24.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	4.0		1.1	26.0		0.9	6.7		0.6	1.7	0.1
Delay (s)	20.6	29.8		18.9	55.5		20.4	33.2		20.5	26.3	22.2
Level of Service	C	C		B	E		C	C		C	C	C
Approach Delay (s)		29.1			52.8			28.2			24.0	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			38.0			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

AM Peak period
2027 Future Background Condition

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (veh/h)	11	14	15	38	23	77	6	456	61	42	315	3			
Future Volume (Veh/h)	11	14	15	38	23	77	6	456	61	42	315	3			
Sign Control	Stop			Stop			Free			Free					
Grade	0%			0%			0%			0%					
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			
Hourly flow rate (vph)	11	14	15	38	23	77	6	456	61	42	315	3			
Pedestrians	22			23			14			15					
Lane Width (m)	3.5			3.5			3.5			3.5					
Walking Speed (m/s)	1.1			1.1			1.1			1.1					
Percent Blockage	2			2			1			1					
Right turn flare (veh)	2			2											
Median type							None			None					
Median storage veh															
Upstream signal (m)							362			256					
pX, platoon unblocked	0.87	0.87	0.94	0.87	0.87	0.84	0.94				0.84				
vC, conflicting volume	986	974	352	950	946	524	340				540				
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vCu, unblocked vol	761	748	283	720	715	341	270				359				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3				4.2				
tC, 2 stage (s)															
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4				2.3				
p0 queue free %	95	95	98	85	92	87	99				96				
cM capacity (veh/h)	208	273	695	251	285	575	1120				971				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1											
Volume Total	40	138	523	360											
Volume Left	11	38	6	42											
Volume Right	15	77	61	3											
cSH	391	597	1120	971											
Volume to Capacity	0.10	0.23	0.01	0.04											
Queue Length 95th (m)	2.6	6.7	0.1	1.0											
Control Delay (s)	17.2	16.9	0.2	1.5											
Lane LOS	C	C	A	A											
Approach Delay (s)	17.2	16.9	0.2	1.5											
Approach LOS	C	C													
Intersection Summary															
Average Delay				3.4											
Intersection Capacity Utilization				72.1%	ICU Level of Service			C							
Analysis Period (min)				15											

Timings

3: Albert Street & University Avenue West

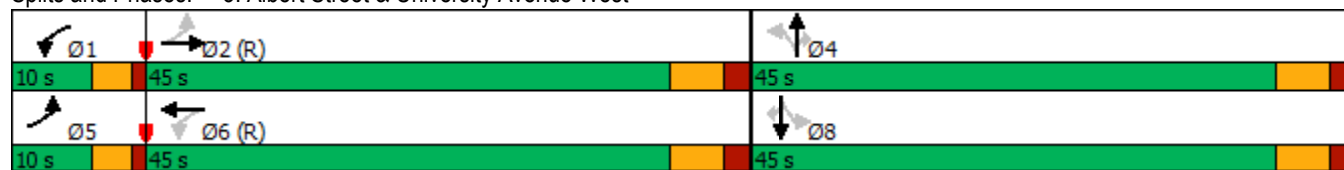
AM Peak period
2027 Future Background Condition

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	70	468	103	481	83	393	65	36	298	48
Future Volume (vph)	70	468	103	481	83	393	65	36	298	48
Lane Group Flow (vph)	70	519	103	520	83	393	65	36	298	48
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	45.0	9.0	45.0	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	45.0
Total Split (%)	10.0%	45.0%	10.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.8	41.0	47.8	41.0	39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.48	0.41	0.48	0.41	0.39	0.39	0.39	0.39	0.39	0.39
v/c Ratio	0.20	0.42	0.28	0.42	0.27	0.55	0.12	0.15	0.43	0.08
Control Delay	14.1	22.4	15.0	22.5	24.0	27.2	4.3	22.0	24.7	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	22.4	15.0	22.5	24.0	27.2	4.3	22.0	24.7	2.2
LOS	B	C	B	C	C	C	A	C	C	A
Approach Delay		21.4		21.3		24.0			21.6	
Approach LOS		C		C		C			C	
Queue Length 50th (m)	6.7	37.2	10.0	37.6	10.8	58.0	0.0	4.5	41.5	0.0
Queue Length 95th (m)	13.7	51.6	18.7	52.0	22.6	86.4	6.7	11.6	64.0	3.3
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	357	1227	370	1232	303	718	531	237	697	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.42	0.28	0.42	0.27	0.55	0.12	0.15	0.43	0.08
Intersection Summary										
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: 0.55										
Intersection Signal Delay: 22.1					Intersection LOS: C					
Intersection Capacity Utilization 94.4%					ICU Level of Service F					
Analysis Period (min) 15										

Timings 3: Albert Street & University Avenue West

AM Peak period
2027 Future Background Condition

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

AM Peak period
2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	468	51	103	481	39	83	393	65	36	298	48
Future Volume (vph)	70	468	51	103	481	39	83	393	65	36	298	48
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.89	1.00	1.00	0.93
Flpb, ped/bikes	0.96	1.00		0.97	1.00		0.96	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1560	2973		1603	2992		1514	1842	1243	1522	1789	1365
Flt Permitted	0.41	1.00		0.41	1.00		0.49	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	666	2973		685	2992		777	1842	1243	609	1789	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	468	51	103	481	39	83	393	65	36	298	48
RTOR Reduction (vph)	0	8	0	0	6	0	0	0	40	0	0	29
Lane Group Flow (vph)	70	511	0	103	514	0	83	393	25	36	298	19
Confl. Peds. (#/hr)	167		133	133		167	80		133	133		80
Confl. Bikes (#/hr)			8						1			
Heavy Vehicles (%)	3%	9%	3%	1%	9%	0%	6%	2%	5%	4%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Effective Green, g (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.45	0.40		0.45	0.40		0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	1195		352	1202		303	718	484	237	697	532
v/s Ratio Prot	0.01	0.17		c0.01	c0.17			c0.21			0.17	
v/s Ratio Perm	0.08			0.12			0.11		0.02	0.06		0.01
v/c Ratio	0.20	0.43		0.29	0.43		0.27	0.55	0.05	0.15	0.43	0.04
Uniform Delay, d1	16.0	21.6		16.3	21.6		20.8	23.7	19.0	19.8	22.3	18.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.1		0.5	1.1		2.2	3.0	0.2	1.4	1.9	0.1
Delay (s)	16.3	22.7		16.8	22.7		23.1	26.6	19.2	21.1	24.2	19.0
Level of Service	B	C		B	C		C	C	B	C	C	B
Approach Delay (s)		21.9			21.7			25.2			23.3	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		22.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		94.4%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Sunview Street & Hickory Street West

AM Peak period
2027 Future Background Condition

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↱	↱
Traffic Volume (veh/h)	17	4	14	23	1	19
Future Volume (Veh/h)	17	4	14	23	1	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	4	14	23	1	19
Pedestrians	3			16	11	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	0			1	1	
Right turn flare (veh)					2	
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			32		84	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			32		84	46
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1491		903	1005
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	21	37	20			
Volume Left	0	14	1			
Volume Right	4	0	19			
cSH	1700	1491	1058			
Volume to Capacity	0.01	0.01	0.02			
Queue Length 95th (m)	0.0	0.2	0.4			
Control Delay (s)	0.0	2.9	8.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.9	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			23.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Sunview Street & University Avenue West

AM Peak period
2027 Future Background Condition

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	9	566	3	4	597	11	1	0	6	8	0	9	
Future Volume (Veh/h)	9	566	3	4	597	11	1	0	6	8	0	9	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
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	
Hourly flow rate (vph)	9	566	3	4	597	11	1	0	6	8	0	9	
Pedestrians		4			6			102			205		
Lane Width (m)		3.5			3.5			3.5			3.5		
Walking Speed (m/s)		1.1			1.1			1.1			1.1		
Percent Blockage		0			1			9			18		
Right turn flare (veh)									2		2		
Median type	None			None									
Median storage (veh)													
Upstream signal (m)	103												
pX, platoon unblocked	0.90						0.90	0.90			0.90	0.90	0.90
vC, conflicting volume	813				671			1002	1508	392	1122	1504	513
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	557				671			769	1334	392	903	1329	222
tC, single (s)	4.1				4.1			7.5	6.5	6.9	7.5	6.5	7.3
tC, 2 stage (s)													
tF (s)	2.2				2.2			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	99				100			99	100	99	94	100	98
cM capacity (veh/h)	750				845			186	102	554	135	102	529
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1							
Volume Total	292	286	302	310	7	17							
Volume Left	9	0	4	0	1	8							
Volume Right	0	3	0	11	6	9							
cSH	750	1700	845	1700	646	287							
Volume to Capacity	0.01	0.17	0.00	0.18	0.01	0.06							
Queue Length 95th (m)	0.3	0.0	0.1	0.0	0.2	1.4							
Control Delay (s)	0.4	0.0	0.2	0.0	13.4	22.0							
Lane LOS	A			A			B	C					
Approach Delay (s)	0.2			0.1			13.4	22.0					
Approach LOS					B		C						
Intersection Summary													
Average Delay				0.5									
Intersection Capacity Utilization				40.1%		ICU Level of Service			A				
Analysis Period (min)				15									

Timings
1: Albert Street & Columbia Street West

PM Peak period
2027 Future Background Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	48	998	143	890	99	265	170	368	74
Future Volume (vph)	48	998	143	890	99	265	170	368	74
Lane Group Flow (vph)	48	1205	143	945	99	378	170	368	74
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	38.4	30.0	40.4	34.3	35.0	26.4	36.0	28.6	28.6
Actuated g/C Ratio	0.43	0.33	0.45	0.38	0.39	0.29	0.40	0.32	0.32
v/c Ratio	0.22	1.14	0.70	0.77	0.31	0.81	0.57	0.62	0.14
Control Delay	15.5	103.9	35.0	30.7	18.1	43.2	25.5	32.5	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	103.9	35.0	30.7	18.1	43.2	25.5	32.5	1.2
LOS	B	F	D	C	B	D	C	C	A
Approach Delay		100.6		31.3		38.0		26.8	
Approach LOS		F		C		D		C	
Queue Length 50th (m)	4.3	~128.0	13.6	79.5	10.0	56.8	17.9	55.7	0.0
Queue Length 95th (m)	10.1	#167.9	#36.5	#114.5	19.5	#102.2	31.2	85.4	1.7
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	222	1057	205	1232	327	466	296	596	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	0.22	1.14	0.70	0.77	0.30	0.81	0.57	0.62	0.14

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.14

Intersection Signal Delay: 56.7

Intersection LOS: E

Intersection Capacity Utilization 97.7%

ICU Level of Service F

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

PM Peak period
2027 Future Background Condition

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10.8 s	36 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10.8 s	36 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

PM Peak period
2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	998	207	143	890	55	99	265	113	170	368	74
Future Volume (vph)	48	998	207	143	890	55	99	265	113	170	368	74
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	3114		1650	3221		1650	1532		1642	1879	1365
Flt Permitted	0.16	1.00		0.13	1.00		0.38	1.00		0.31	1.00	1.00
Satd. Flow (perm)	280	3114		218	3221		652	1532		536	1879	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	998	207	143	890	55	99	265	113	170	368	74
RTOR Reduction (vph)	0	20	0	0	5	0	0	17	0	0	0	50
Lane Group Flow (vph)	48	1185	0	143	940	0	99	361	0	170	368	24
Confl. Peds. (#/hr)	52		70	70		52	60		44	44		60
Confl. Bikes (#/hr)			3			2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	0%	0%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	33.3	29.2		38.7	31.9		32.6	27.2		35.4	28.6	28.6
Effective Green, g (s)	33.3	29.2		38.7	31.9		32.6	27.2		35.4	28.6	28.6
Actuated g/C Ratio	0.37	0.32		0.43	0.35		0.36	0.30		0.39	0.32	0.32
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	165	1010		201	1141		296	463		294	597	433
v/s Ratio Prot	0.01	c0.38		c0.05	0.29		0.02	c0.24		c0.04	0.20	
v/s Ratio Perm	0.09			0.25			0.10			0.18		0.02
v/c Ratio	0.29	1.17		0.71	0.82		0.33	0.78		0.58	0.62	0.05
Uniform Delay, d1	19.5	30.4		20.7	26.5		19.9	28.7		19.5	26.0	21.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	88.8		11.3	6.8		0.7	12.3		2.7	4.7	0.2
Delay (s)	20.5	119.2		32.0	33.3		20.6	40.9		22.2	30.8	21.6
Level of Service	C	F		C	C		C	D		C	C	C
Approach Delay (s)		115.4			33.1			36.7			27.3	
Approach LOS		F			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			62.6			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			97.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

PM Peak period
2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	46	39	66	37	61	26	390	72	53	647	19
Future Volume (Veh/h)	26	46	39	66	37	61	26	390	72	53	647	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	26	46	39	66	37	61	26	390	72	53	647	19
Pedestrians		26			43			36			21	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			4			3			2	
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh												
Upstream signal (m)								362			256	
pX, platoon unblocked	0.87	0.87	0.83	0.87	0.87	0.92	0.83			0.92		
vC, conflicting volume	1336	1346	718	1362	1319	490	692			505		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1114	1124	558	1143	1094	407	526			423		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	70	91	27	77	89	97			95		
cM capacity (veh/h)	103	155	418	91	162	566	852			1019		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	111	164	488	719								
Volume Left	26	66	26	53								
Volume Right	39	61	72	19								
cSH	210	167	852	1019								
Volume to Capacity	0.53	0.98	0.03	0.05								
Queue Length 95th (m)	20.9	58.3	0.7	1.2								
Control Delay (s)	42.5	120.7	0.9	1.3								
Lane LOS	E	F	A	A								
Approach Delay (s)	42.5	120.7	0.9	1.3								
Approach LOS	E	F										
Intersection Summary												
Average Delay			17.5									
Intersection Capacity Utilization			85.1%		ICU Level of Service				E			
Analysis Period (min)			15									

Timings

3: Albert Street & University Avenue West

PM Peak period
2027 Future Background Condition

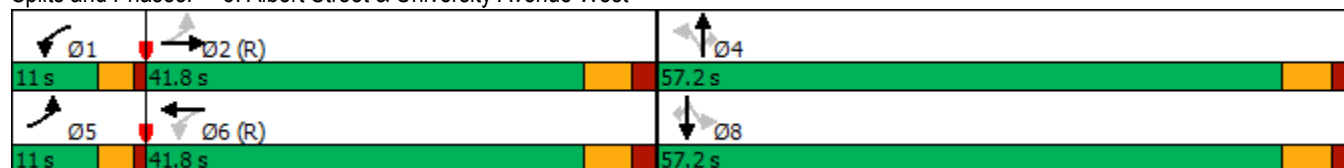
										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	118	661	86	633	136	296	128	65	576	101
Future Volume (vph)	118	661	86	633	136	296	128	65	576	101
Lane Group Flow (vph)	118	732	86	712	136	296	128	65	576	101
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	41.8	9.0	41.8	57.2	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	57.2
Total Split (%)	10.0%	38.0%	10.0%	38.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	45.6	38.0	44.6	35.8	51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.41	0.35	0.41	0.33	0.47	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.53	0.70	0.37	0.72	0.67	0.34	0.20	0.17	0.66	0.15
Control Delay	27.8	35.5	22.7	37.0	41.7	20.0	3.7	18.6	27.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	35.5	22.7	37.0	41.7	20.0	3.7	18.6	27.2	5.8
LOS	C	D	C	D	D	C	A	B	C	A
Approach Delay		34.4		35.5		21.6			23.5	
Approach LOS		C		D		C			C	
Queue Length 50th (m)	14.8	72.0	10.6	69.3	22.0	39.2	0.0	7.9	92.6	2.2
Queue Length 95th (m)	26.2	93.9	20.1	90.7	#53.1	58.8	9.9	16.7	130.7	11.3
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	224	1051	238	989	204	874	650	384	874	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.70	0.36	0.72	0.67	0.34	0.20	0.17	0.66	0.15
Intersection Summary										
Cycle Length: 110										
Actuated Cycle Length: 110										
Offset: 13 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green										
Natural Cycle: 110										
Control Type: Actuated-Coordinated										
Maximum v/c Ratio: 0.72										
Intersection Signal Delay: 29.5					Intersection LOS: C					
Intersection Capacity Utilization 105.9%					ICU Level of Service G					
Analysis Period (min) 15										

Timings 3: Albert Street & University Avenue West

PM Peak period
2027 Future Background Condition

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

PM Peak period
2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	661	71	86	633	79	136	296	128	65	576	101
Future Volume (vph)	118	661	71	86	633	79	136	296	128	65	576	101
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.91
Flpb, ped/bikes	0.97	1.00		0.98	1.00		0.97	1.00	1.00	0.91	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1621	3024		1632	3012		1621	1879	1250	1522	1879	1340
Flt Permitted	0.23	1.00		0.24	1.00		0.26	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	390	3024		419	3012		441	1879	1250	827	1879	1340
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	661	71	86	633	79	136	296	128	65	576	101
RTOR Reduction (vph)	0	7	0	0	9	0	0	0	68	0	0	44
Lane Group Flow (vph)	118	725	0	86	703	0	136	296	60	65	576	57
Confl. Peds. (#/hr)	339		230	230		339	121		216	216		121
Confl. Bikes (#/hr)			2						4			2
Heavy Vehicles (%)	0%	5%	3%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	44.2	37.2		41.4	35.8		51.2	51.2	51.2	51.2	51.2	51.2
Effective Green, g (s)	44.2	37.2		41.4	35.8		51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.40	0.34		0.38	0.33		0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	1022		219	980		205	874	581	384	874	623
v/s Ratio Prot	c0.03	c0.24		0.02	0.23			0.16			0.31	
v/s Ratio Perm	0.17			0.13			c0.31		0.05	0.08		0.04
v/c Ratio	0.50	0.71		0.39	0.72		0.66	0.34	0.10	0.17	0.66	0.09
Uniform Delay, d1	22.5	31.7		23.4	32.7		22.7	18.7	16.5	17.1	22.7	16.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	4.2		1.2	4.5		15.7	1.1	0.4	1.0	3.9	0.3
Delay (s)	24.1	35.9		24.6	37.2		38.4	19.7	16.9	18.0	26.6	16.7
Level of Service	C	D		C	D		D	B	B	B	C	B
Approach Delay (s)		34.2			35.8			23.6			24.5	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			105.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Sunview Street & Hickory Street West

PM Peak period
2027 Future Background Condition

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↱	↱
Traffic Volume (veh/h)	72	17	24	60	11	38
Future Volume (Veh/h)	72	17	24	60	11	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	72	17	24	60	11	38
Pedestrians	9			13	31	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	1			1	3	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			120		228	124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			120		228	124
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	96
cM capacity (veh/h)			1440		725	896
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	89	84	49			
Volume Left	0	24	11			
Volume Right	17	0	38			
cSH	1700	1440	1155			
Volume to Capacity	0.05	0.02	0.04			
Queue Length 95th (m)	0.0	0.4	1.0			
Control Delay (s)	0.0	2.2	9.4			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.2	9.4			
Approach LOS			A			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			25.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Sunview Street & University Avenue West

PM Peak period
2027 Future Background Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	823	6	7	841	32	7	0	11	19	0	22
Future Volume (Veh/h)	17	823	6	7	841	32	7	0	11	19	0	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	17	823	6	7	841	32	7	0	11	19	0	22
Pedestrians		6			10			249			435	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			22			38	
Right turn flare (veh)									2			2
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					103							
pX, platoon unblocked	0.81						0.81	0.81		0.81	0.81	0.81
vC, conflicting volume	1308			1078			1560	2431	674	1762	2418	878
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	917			1078			1228	2299	674	1475	2283	387
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			84	100	96	22	100	93
cM capacity (veh/h)	376			510			45	14	311	24	15	300
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	428	418	428	452	18	41						
Volume Left	17	0	7	0	7	19						
Volume Right	0	6	0	32	11	22						
cSH	376	1700	510	1700	116	51						
Volume to Capacity	0.05	0.25	0.01	0.27	0.16	0.81						
Queue Length 95th (m)	1.1	0.0	0.3	0.0	4.0	25.5						
Control Delay (s)	1.5	0.0	0.4	0.0	48.8	198.3						
Lane LOS	A		A		E	F						
Approach Delay (s)	0.7		0.2		48.8	198.3						
Approach LOS					E	F						
Intersection Summary												
Average Delay		5.5										
Intersection Capacity Utilization		55.9%			ICU Level of Service				B			
Analysis Period (min)		15										

Appendix D: ITE Trip Generation Manual Source Data

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

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: Dense Multi-Use Urban

Number of Studies: 12

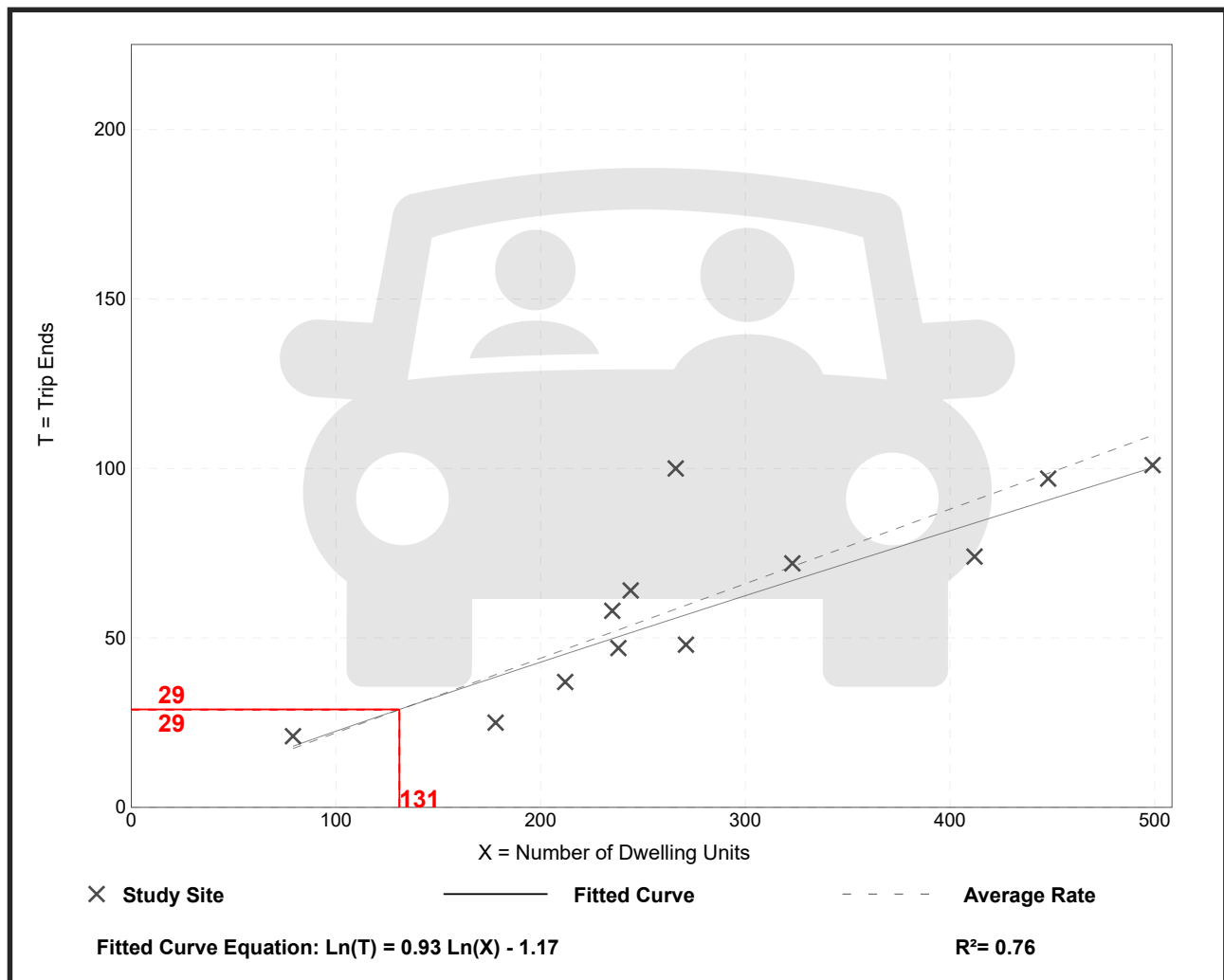
Avg. Num. of Dwelling Units: 284

Directional Distribution: 11% entering, 89% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



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

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: Dense Multi-Use Urban

Number of Studies: 10

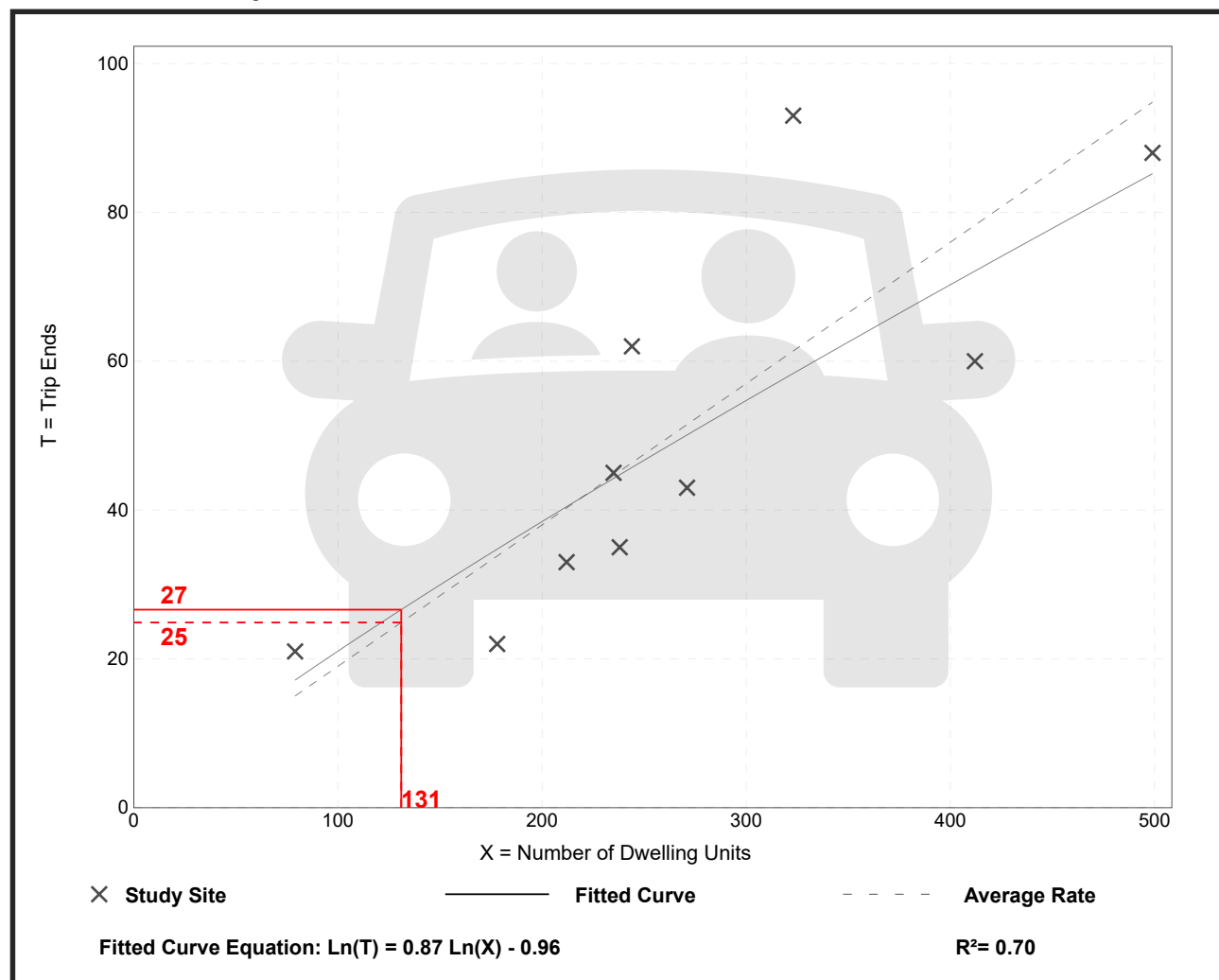
Avg. Num. of Dwelling Units: 269

Directional Distribution: 69% entering, 31% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Off-Campus Student Apartment (High-Rise) Adjacent to Campus (227)

Vehicle Trip Ends vs: Bedrooms

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: Dense Multi-Use Urban

Number of Studies: 3

Avg. Num. of Bedrooms: 497

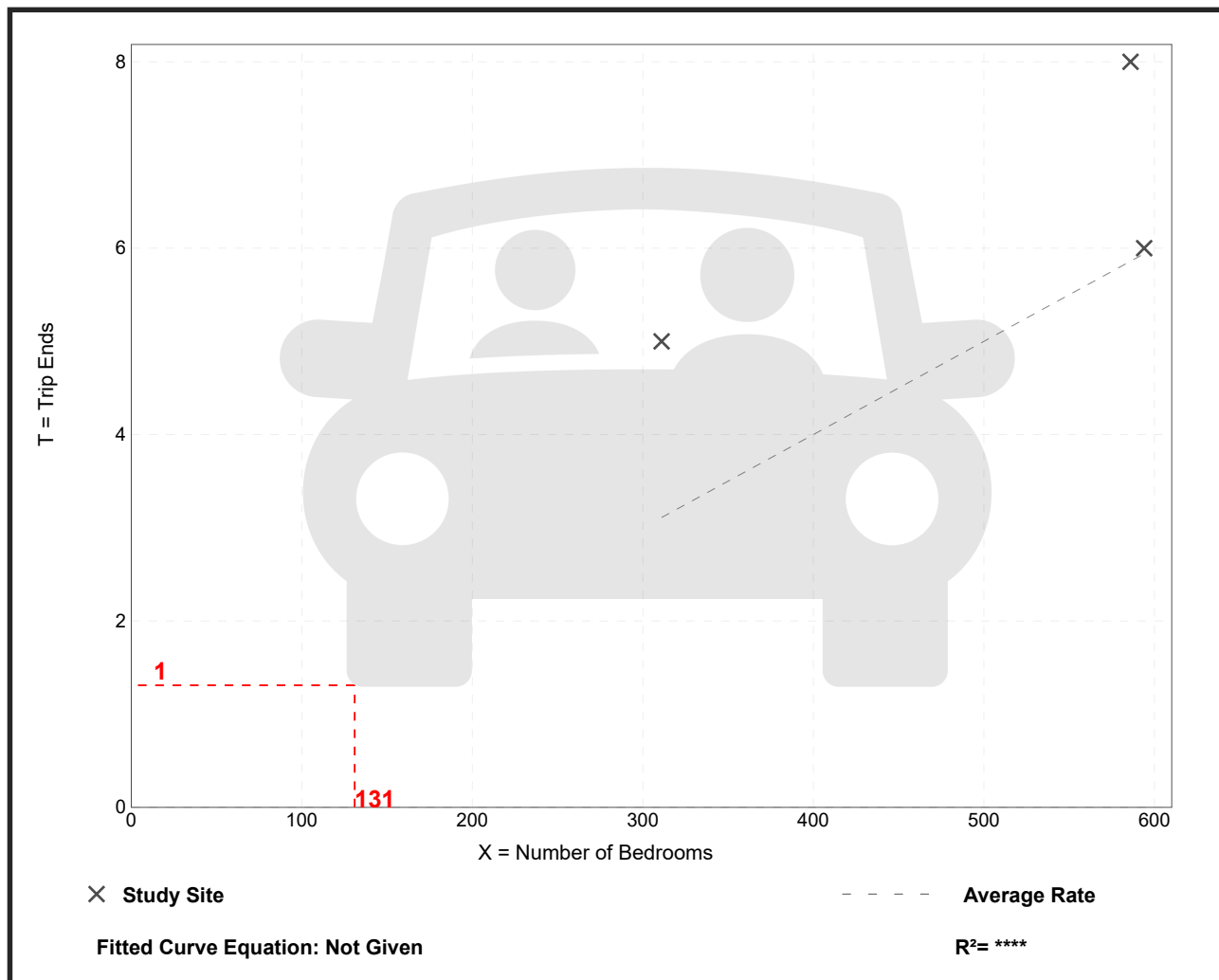
Directional Distribution: Not Available

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.01	0.01 - 0.02	*

Data Plot and Equation

Caution – Small Sample Size



Off-Campus Student Apartment (High-Rise) Adjacent to Campus (227)

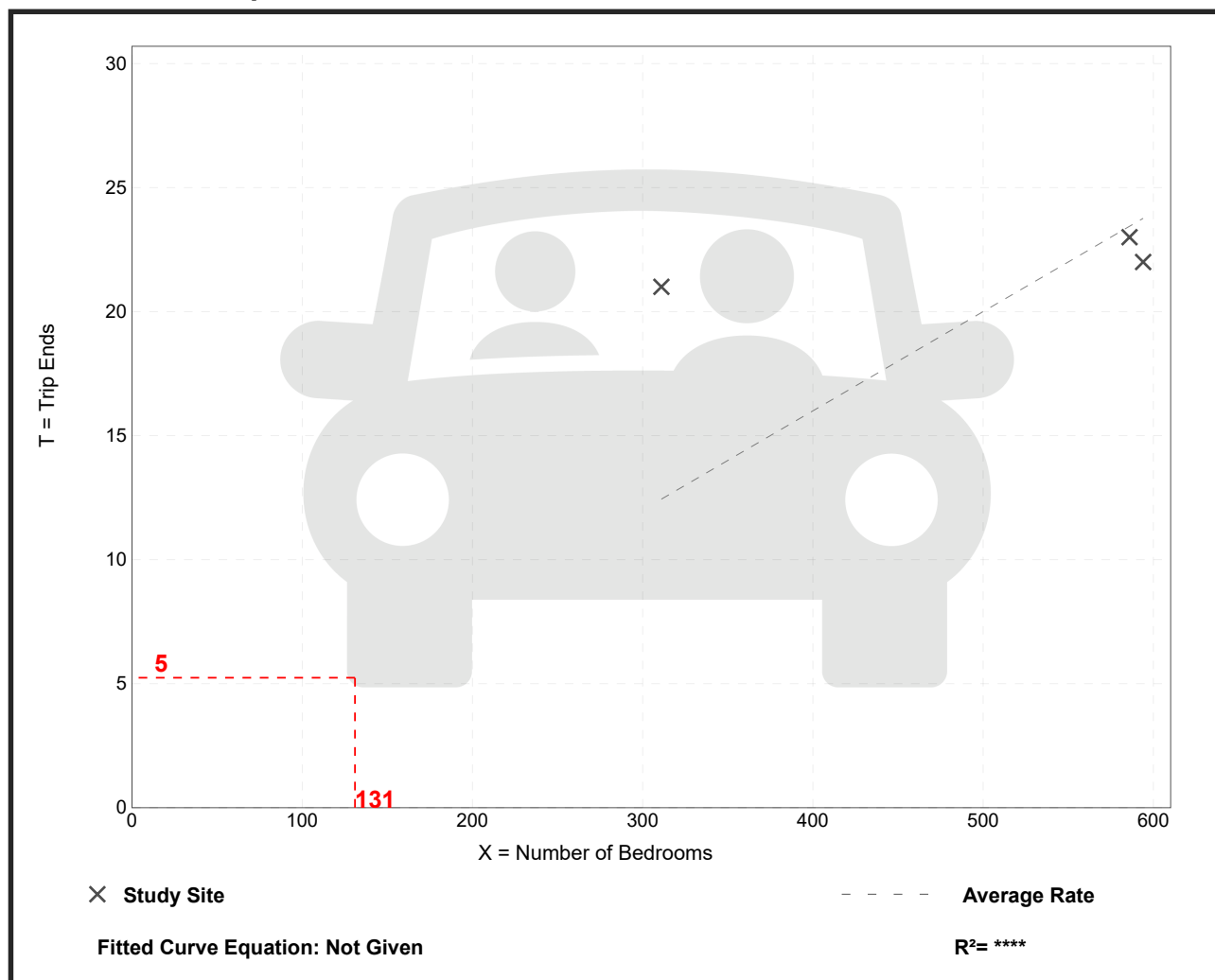
Vehicle Trip Ends vs: Bedrooms
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
Setting/Location: Dense Multi-Use Urban
 Number of Studies: 3
 Avg. Num. of Bedrooms: 497
 Directional Distribution: Not Available

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.04	0.04 - 0.07	0.01

Data Plot and Equation

Caution – Small Sample Size



Appendix E

2027 Future Total Conditions Synchro Reports

Timings
1: Albert Street & Columbia Street West

AM Peak period
2027 Future Total Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	56	683	87	919	218	278	107	198	30
Future Volume (vph)	56	683	87	919	218	278	107	198	30
Lane Group Flow (vph)	56	759	87	1076	218	341	107	198	30
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	39.5	32.2	39.7	32.3	36.0	28.6	35.1	26.4	26.4
Actuated g/C Ratio	0.44	0.36	0.44	0.36	0.40	0.32	0.39	0.29	0.29
v/c Ratio	0.28	0.68	0.34	0.95	0.50	0.68	0.31	0.36	0.06
Control Delay	16.5	28.5	17.1	46.2	22.3	35.1	18.1	27.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	28.5	17.1	46.2	22.3	35.1	18.1	27.5	0.2
LOS	B	C	B	D	C	D	B	C	A
Approach Delay		27.6		44.0		30.1		22.1	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	5.0	59.0	8.0	~98.5	23.8	50.9	10.8	27.0	0.0
Queue Length 95th (m)	11.3	79.5	16.1	#141.9	39.8	#88.4	20.8	45.3	0.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	209	1123	259	1137	435	501	347	545	495
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	0.27	0.68	0.34	0.95	0.50	0.68	0.31	0.36	0.06

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 34.1

Intersection LOS: C

Intersection Capacity Utilization 88.9%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

AM Peak period
2027 Future Total Condition

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10.8 s	36 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10.8 s	36 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

AM Peak period

2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	683	76	87	919	157	218	278	63	107	198	30
Future Volume (vph)	56	683	76	87	919	157	218	278	63	107	198	30
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1667	3118		1582	3133		1633	1553		1638	1860	1370
Flt Permitted	0.13	1.00		0.23	1.00		0.56	1.00		0.41	1.00	1.00
Satd. Flow (perm)	229	3118		388	3133		969	1553		713	1860	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	683	76	87	919	157	218	278	63	107	198	30
RTOR Reduction (vph)	0	9	0	0	15	0	0	9	0	0	0	21
Lane Group Flow (vph)	56	750	0	87	1061	0	218	332	0	107	198	9
Confl. Peds. (#/hr)	50		46	46		50	27		38	38		27
Confl. Bikes (#/hr)			2			1						2
Heavy Vehicles (%)	0%	4%	4%	5%	3%	2%	1%	1%	2%	1%	1%	3%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	35.9	30.6		36.1	30.7		35.4	28.6		32.6	27.2	27.2
Effective Green, g (s)	35.9	30.6		36.1	30.7		35.4	28.6		32.6	27.2	27.2
Actuated g/C Ratio	0.40	0.34		0.40	0.34		0.39	0.32		0.36	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	176	1060		227	1068		431	493		313	562	414
v/s Ratio Prot	0.02	0.24		c0.02	c0.34		c0.04	c0.21		0.02	0.11	
v/s Ratio Perm	0.11			0.13			0.16			0.10		0.01
v/c Ratio	0.32	0.71		0.38	0.99		0.51	0.67		0.34	0.35	0.02
Uniform Delay, d1	19.5	25.8		17.9	29.5		19.7	26.6		19.9	24.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	4.0		1.1	26.0		0.9	7.2		0.7	1.7	0.1
Delay (s)	20.6	29.8		19.0	55.5		20.6	33.8		20.5	26.3	22.2
Level of Service	C	C		B	E		C	C		C	C	C
Approach Delay (s)		29.2			52.8			28.7			24.1	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			38.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

AM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	14	15	38	23	77	6	456	61	42	315	5
Future Volume (Veh/h)	27	14	15	38	23	77	6	456	61	42	315	5
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
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
Hourly flow rate (vph)	27	14	15	38	23	77	6	456	61	42	315	5
Pedestrians	22			23			14			15		
Lane Width (m)	3.5			3.5			3.5			3.5		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	2			2			1			1		
Right turn flare (veh)	2			2								
Median type							None			None		
Median storage (veh)												
Upstream signal (m)							362			256		
pX, platoon unblocked	0.87	0.87	0.94	0.87	0.87	0.84	0.94				0.84	
vC, conflicting volume	987	976	354	952	948	524	342				540	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	762	749	284	721	717	341	272				359	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.3				4.2	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.4				2.3	
p0 queue free %	87	95	98	85	92	87	99				96	
cM capacity (veh/h)	207	273	694	250	285	575	1118				971	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	56	138	523	362								
Volume Left	27	38	6	42								
Volume Right	15	77	61	5								
cSH	313	596	1118	971								
Volume to Capacity	0.18	0.23	0.01	0.04								
Queue Length 95th (m)	4.9	6.8	0.1	1.0								
Control Delay (s)	20.4	16.9	0.2	1.4								
Lane LOS	C	C	A	A								
Approach Delay (s)	20.4	16.9	0.2	1.4								
Approach LOS	C	C										
Intersection Summary												
Average Delay				3.8								
Intersection Capacity Utilization				72.3%	ICU Level of Service			C				
Analysis Period (min)				15								

Timings

3: Albert Street & University Avenue West

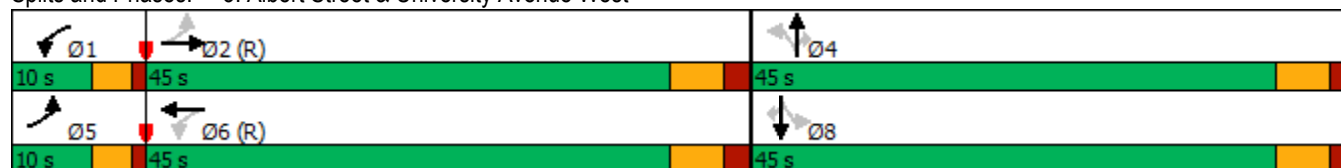
AM Peak period
2027 Future Total Condition

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	70	471	103	482	83	393	65	36	298	48
Future Volume (vph)	70	471	103	482	83	393	65	36	298	48
Lane Group Flow (vph)	70	525	103	521	83	393	65	36	298	48
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	45.0	9.0	45.0	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	45.0
Total Split (%)	10.0%	45.0%	10.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.8	41.0	47.8	41.0	39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.48	0.41	0.48	0.41	0.39	0.39	0.39	0.39	0.39	0.39
v/c Ratio	0.20	0.43	0.28	0.42	0.27	0.55	0.12	0.15	0.43	0.08
Control Delay	14.1	22.5	15.0	22.6	24.0	27.2	4.3	22.0	24.7	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	22.5	15.0	22.6	24.0	27.2	4.3	22.0	24.7	2.2
LOS	B	C	B	C	C	C	A	C	C	A
Approach Delay		21.5		21.3		24.0			21.6	
Approach LOS		C		C		C			C	
Queue Length 50th (m)	6.7	37.8	10.0	37.7	10.8	58.0	0.0	4.5	41.5	0.0
Queue Length 95th (m)	13.7	52.2	18.7	52.0	22.6	86.4	6.7	11.6	64.0	3.3
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	357	1226	368	1232	303	718	531	237	697	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.43	0.28	0.42	0.27	0.55	0.12	0.15	0.43	0.08
Intersection Summary										
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: 0.55										
Intersection Signal Delay: 22.1					Intersection LOS: C					
Intersection Capacity Utilization 94.4%					ICU Level of Service F					
Analysis Period (min) 15										

Timings 3: Albert Street & University Avenue West

AM Peak period
2027 Future Total Condition

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

AM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	471	54	103	482	39	83	393	65	36	298	48
Future Volume (vph)	70	471	54	103	482	39	83	393	65	36	298	48
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.89	1.00	1.00	0.93
Flpb, ped/bikes	0.96	1.00		0.97	1.00		0.96	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1560	2969		1604	2992		1514	1842	1243	1522	1789	1365
Flt Permitted	0.40	1.00		0.40	1.00		0.49	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	665	2969		679	2992		777	1842	1243	609	1789	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	471	54	103	482	39	83	393	65	36	298	48
RTOR Reduction (vph)	0	8	0	0	6	0	0	0	40	0	0	29
Lane Group Flow (vph)	70	517	0	103	515	0	83	393	25	36	298	19
Confl. Peds. (#/hr)	167		133	133		167	80		133	133		80
Confl. Bikes (#/hr)			8						1			
Heavy Vehicles (%)	3%	9%	3%	1%	9%	0%	6%	2%	5%	4%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Effective Green, g (s)	45.0	40.2		45.0	40.2		39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.45	0.40		0.45	0.40		0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	1193		349	1202		303	718	484	237	697	532
v/s Ratio Prot	0.01	c0.17		c0.01	0.17			c0.21			0.17	
v/s Ratio Perm	0.08			0.12			0.11		0.02	0.06		0.01
v/c Ratio	0.20	0.43		0.30	0.43		0.27	0.55	0.05	0.15	0.43	0.04
Uniform Delay, d1	16.0	21.6		16.3	21.6		20.8	23.7	19.0	19.8	22.3	18.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.1		0.5	1.1		2.2	3.0	0.2	1.4	1.9	0.1
Delay (s)	16.3	22.8		16.8	22.7		23.1	26.6	19.2	21.1	24.2	19.0
Level of Service	B	C		B	C		C	C	B	C	C	B
Approach Delay (s)		22.0			21.7			25.2			23.3	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			23.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			94.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Sunview Street & Hickory Street West

AM Peak period
2027 Future Total Condition

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	17	4	16	23	1	35
Future Volume (Veh/h)	17	4	16	23	1	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	4	16	23	1	35
Pedestrians	3			16	11	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	0			1	1	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			32		88	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			32		88	46
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	97
cM capacity (veh/h)			1491		897	1005
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	21	39	36			
Volume Left	0	16	1			
Volume Right	4	0	35			
cSH	1700	1491	1034			
Volume to Capacity	0.01	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.8			
Control Delay (s)	0.0	3.1	8.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.1	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			23.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Sunview Street & University Avenue West

AM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	566	3	4	597	12	1	0	6	14	0	13
Future Volume (Veh/h)	9	566	3	4	597	12	1	0	6	14	0	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	9	566	3	4	597	12	1	0	6	14	0	13
Pedestrians		4			6			102			205	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			9			18	
Right turn flare (veh)									2			2
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					103							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	814			671			1004	1510	392	1123	1505	514
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	557			671			770	1334	392	902	1329	221
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	99			100			99	100	99	90	100	98
cM capacity (veh/h)	750			845			184	102	554	135	102	529
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	292	286	302	310	7	27						
Volume Left	9	0	4	0	1	14						
Volume Right	0	3	0	12	6	13						
cSH	750	1700	845	1700	646	260						
Volume to Capacity	0.01	0.17	0.00	0.18	0.01	0.10						
Queue Length 95th (m)	0.3	0.0	0.1	0.0	0.2	2.6						
Control Delay (s)	0.4	0.0	0.2	0.0	13.4	23.8						
Lane LOS	A		A		B	C						
Approach Delay (s)	0.2		0.1		13.4	23.8						
Approach LOS					B	C						
Intersection Summary												
Average Delay		0.7										
Intersection Capacity Utilization		40.3%			ICU Level of Service				A			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis 6: Sunview Street & Proposed Site Access

AM Peak period
2027 Future Total Condition

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	10	1	20	18	2
Future Volume (Veh/h)	16	10	1	20	18	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	16	10	1	20	18	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	41	19	20			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	41	19	20			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	100			
cM capacity (veh/h)	975	1065	1609			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	26	21	20			
Volume Left	16	1	0			
Volume Right	10	0	2			
cSH	1008	1609	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	8.7	0.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	0.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.5				
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

Timings
1: Albert Street & Columbia Street West

PM Peak period
2027 Future Total Condition



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	48	998	147	890	100	266	170	370	74
Future Volume (vph)	48	998	147	890	100	266	170	370	74
Lane Group Flow (vph)	48	1210	147	945	100	381	170	370	74
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	36.0	10.8	36.0	10.8	32.4	10.8	32.4	32.4
Total Split (%)	12.0%	40.0%	12.0%	40.0%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	38.4	30.0	40.4	34.3	35.0	26.4	36.0	28.6	28.6
Actuated g/C Ratio	0.43	0.33	0.45	0.38	0.39	0.29	0.40	0.32	0.32
v/c Ratio	0.22	1.14	0.72	0.77	0.31	0.82	0.58	0.62	0.14
Control Delay	15.5	105.8	36.8	30.7	18.1	43.8	25.7	32.6	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	105.8	36.8	30.7	18.1	43.8	25.7	32.6	1.2
LOS	B	F	D	C	B	D	C	C	A
Approach Delay		102.3		31.5		38.4		26.9	
Approach LOS		F		C		D		C	
Queue Length 50th (m)	4.3	~128.9	14.0	79.5	10.1	57.4	17.9	56.0	0.0
Queue Length 95th (m)	10.1	#169.0	#38.7	#114.5	19.6	#103.7	31.2	85.8	1.7
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	222	1057	205	1232	326	466	294	596	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	0.22	1.14	0.72	0.77	0.31	0.82	0.58	0.62	0.14

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.14

Intersection Signal Delay: 57.5

Intersection LOS: E

Intersection Capacity Utilization 98.4%

ICU Level of Service F

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

PM Peak period
2027 Future Total Condition

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10.8 s	36 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10.8 s	36 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

PM Peak period

2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	998	212	147	890	55	100	266	115	170	370	74
Future Volume (vph)	48	998	212	147	890	55	100	266	115	170	370	74
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	3112		1650	3221		1650	1531		1642	1879	1365
Flt Permitted	0.16	1.00		0.13	1.00		0.37	1.00		0.31	1.00	1.00
Satd. Flow (perm)	280	3112		218	3221		647	1531		529	1879	1365
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	998	212	147	890	55	100	266	115	170	370	74
RTOR Reduction (vph)	0	20	0	0	5	0	0	17	0	0	0	50
Lane Group Flow (vph)	48	1190	0	147	940	0	100	364	0	170	370	24
Confl. Peds. (#/hr)	52		70	70		52	60		44	44		60
Confl. Bikes (#/hr)			3			2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	0%	0%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	33.3	29.2		38.7	31.9		32.6	27.2		35.4	28.6	28.6
Effective Green, g (s)	33.3	29.2		38.7	31.9		32.6	27.2		35.4	28.6	28.6
Actuated g/C Ratio	0.37	0.32		0.43	0.35		0.36	0.30		0.39	0.32	0.32
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	165	1009		201	1141		294	462		292	597	433
v/s Ratio Prot	0.01	c0.38		c0.06	0.29		0.02	c0.24		c0.04	0.20	
v/s Ratio Perm	0.09			0.26			0.10			0.18		0.02
v/c Ratio	0.29	1.18		0.73	0.82		0.34	0.79		0.58	0.62	0.05
Uniform Delay, d1	19.5	30.4		20.8	26.5		19.9	28.8		19.5	26.1	21.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	91.0		12.8	6.8		0.7	12.8		2.9	4.8	0.2
Delay (s)	20.5	121.4		33.6	33.3		20.6	41.6		22.4	30.9	21.6
Level of Service	C	F		C	C		C	D		C	C	C
Approach Delay (s)		117.6			33.3			37.2			27.4	
Approach LOS		F			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			63.6			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			98.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Albert Street & Hickory Street West

PM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	46	39	66	37	61	26	390	72	53	647	30
Future Volume (Veh/h)	30	46	39	66	37	61	26	390	72	53	647	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	30	46	39	66	37	61	26	390	72	53	647	30
Pedestrians		26			43			36			21	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			4			3			2	
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh												
Upstream signal (m)								362			256	
pX, platoon unblocked	0.86	0.86	0.83	0.86	0.86	0.92	0.83			0.92		
vC, conflicting volume	1342	1351	724	1368	1330	490	703			505		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1118	1129	560	1148	1104	407	534			423		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	70	70	91	26	77	89	97			95		
cM capacity (veh/h)	101	153	415	89	159	566	842			1019		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	115	164	488	730								
Volume Left	30	66	26	53								
Volume Right	39	61	72	30								
cSH	201	164	842	1019								
Volume to Capacity	0.57	1.00	0.03	0.05								
Queue Length 95th (m)	23.7	59.6	0.7	1.2								
Control Delay (s)	46.8	126.5	0.9	1.3								
Lane LOS	E	F	A	A								
Approach Delay (s)	46.8	126.5	0.9	1.3								
Approach LOS	E	F										
Intersection Summary												
Average Delay			18.4									
Intersection Capacity Utilization			86.0%		ICU Level of Service				E			
Analysis Period (min)			15									

Timings

3: Albert Street & University Avenue West

PM Peak period
2027 Future Total Condition

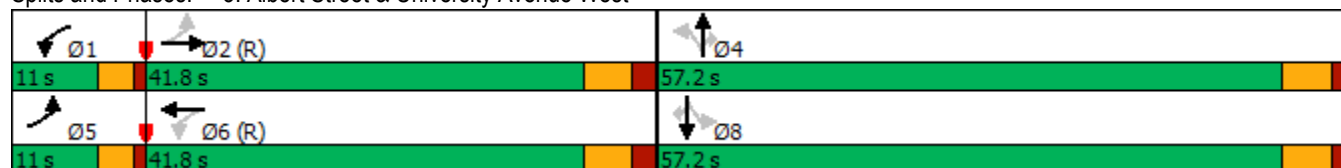
										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	118	662	86	636	138	296	128	65	576	101
Future Volume (vph)	118	662	86	636	138	296	128	65	576	101
Lane Group Flow (vph)	118	734	86	715	138	296	128	65	576	101
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2	1	6		4			8	
Permitted Phases	2		6		4		4	8		8
Detector Phase	5	2	1	6	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	41.8	9.0	41.8	57.2	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	57.2
Total Split (%)	10.0%	38.0%	10.0%	38.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	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	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	45.6	38.0	44.6	35.8	51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.41	0.35	0.41	0.33	0.47	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.53	0.70	0.37	0.72	0.68	0.34	0.20	0.17	0.66	0.15
Control Delay	27.8	35.6	22.7	37.1	42.4	20.0	3.7	18.6	27.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	35.6	22.7	37.1	42.4	20.0	3.7	18.6	27.2	5.8
LOS	C	D	C	D	D	C	A	B	C	A
Approach Delay		34.5		35.6		21.8			23.5	
Approach LOS		C		D		C			C	
Queue Length 50th (m)	14.8	72.3	10.6	69.5	22.4	39.2	0.0	7.9	92.6	2.2
Queue Length 95th (m)	26.2	94.3	20.1	91.2	#54.4	58.8	9.9	16.7	130.7	11.3
Internal Link Dist (m)		78.8		65.6		200.6			338.0	
Turn Bay Length (m)	40.5		32.6				64.3	13.5		50.2
Base Capacity (vph)	224	1050	237	989	204	874	650	384	874	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.70	0.36	0.72	0.68	0.34	0.20	0.17	0.66	0.15
Intersection Summary										
Cycle Length: 110										
Actuated Cycle Length: 110										
Offset: 13 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green										
Natural Cycle: 110										
Control Type: Actuated-Coordinated										
Maximum v/c Ratio: 0.72										
Intersection Signal Delay: 29.6					Intersection LOS: C					
Intersection Capacity Utilization 106.0%					ICU Level of Service G					
Analysis Period (min) 15										

Timings 3: Albert Street & University Avenue West

PM Peak period
2027 Future Total Condition

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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



HCM Signalized Intersection Capacity Analysis

3: Albert Street & University Avenue West

PM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	662	72	86	636	79	138	296	128	65	576	101
Future Volume (vph)	118	662	72	86	636	79	138	296	128	65	576	101
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1900	1750	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.91
Flpb, ped/bikes	0.97	1.00		0.98	1.00		0.97	1.00	1.00	0.91	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1622	3022		1632	3013		1621	1879	1250	1522	1879	1340
Flt Permitted	0.23	1.00		0.24	1.00		0.26	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	387	3022		417	3013		441	1879	1250	827	1879	1340
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	662	72	86	636	79	138	296	128	65	576	101
RTOR Reduction (vph)	0	7	0	0	9	0	0	0	68	0	0	44
Lane Group Flow (vph)	118	727	0	86	706	0	138	296	60	65	576	57
Confl. Peds. (#/hr)	339		230	230		339	121		216	216		121
Confl. Bikes (#/hr)			2						4			2
Heavy Vehicles (%)	0%	5%	3%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	44.2	37.2		41.4	35.8		51.2	51.2	51.2	51.2	51.2	51.2
Effective Green, g (s)	44.2	37.2		41.4	35.8		51.2	51.2	51.2	51.2	51.2	51.2
Actuated g/C Ratio	0.40	0.34		0.38	0.33		0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	1021		218	980		205	874	581	384	874	623
v/s Ratio Prot	c0.03	c0.24		0.02	0.23			0.16			0.31	
v/s Ratio Perm	0.17			0.13			c0.31		0.05	0.08		0.04
v/c Ratio	0.50	0.71		0.39	0.72		0.67	0.34	0.10	0.17	0.66	0.09
Uniform Delay, d1	22.5	31.7		23.4	32.7		22.9	18.7	16.5	17.1	22.7	16.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	4.2		1.2	4.6		16.3	1.1	0.4	1.0	3.9	0.3
Delay (s)	24.2	35.9		24.6	37.3		39.2	19.7	16.9	18.0	26.6	16.7
Level of Service	C	D		C	D		D	B	B	B	C	B
Approach Delay (s)		34.3			35.9			23.8			24.5	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			106.0%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 4: Sunview Street & Hickory Street West

PM Peak period
2027 Future Total Condition

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↱	↱
Traffic Volume (veh/h)	72	17	35	60	11	42
Future Volume (Veh/h)	72	17	35	60	11	42
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	72	17	35	60	11	42
Pedestrians	9			13	31	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	1			1	3	
Right turn flare (veh)						2
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			120	250		124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			120	250		124
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			98	98		95
cM capacity (veh/h)			1440	699		896
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	89	95	53			
Volume Left	0	35	11			
Volume Right	17	0	42			
cSH	1700	1440	1130			
Volume to Capacity	0.05	0.02	0.05			
Queue Length 95th (m)	0.0	0.6	1.1			
Control Delay (s)	0.0	2.9	9.4			
Lane LOS			A			
Approach Delay (s)	0.0	2.9	9.4			
Approach LOS			A			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			26.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Sunview Street & University Avenue West

PM Peak period
2027 Future Total Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	823	6	7	841	37	7	0	11	21	0	24
Future Volume (Veh/h)	20	823	6	7	841	37	7	0	11	21	0	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	20	823	6	7	841	37	7	0	11	21	0	24
Pedestrians		6			10			249			435	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			22			38	
Right turn flare (veh)									2			2
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					103							
pX, platoon unblocked	0.81						0.81	0.81		0.81	0.81	0.81
vC, conflicting volume	1313			1078			1568	2442	674	1770	2426	880
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	920			1078			1234	2312	674	1483	2293	386
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			84	100	96	12	100	92
cM capacity (veh/h)	375			510			44	14	311	24	14	300
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	432	418	428	458	18	45						
Volume Left	20	0	7	0	7	21						
Volume Right	0	6	0	37	11	24						
cSH	375	1700	510	1700	113	49						
Volume to Capacity	0.05	0.25	0.01	0.27	0.16	0.91						
Queue Length 95th (m)	1.3	0.0	0.3	0.0	4.1	29.2						
Control Delay (s)	1.7	0.0	0.4	0.0	49.9	231.2						
Lane LOS	A		A		E	F						
Approach Delay (s)	0.9		0.2		49.9	231.2						
Approach LOS					E	F						
Intersection Summary												
Average Delay			6.8									
Intersection Capacity Utilization			58.5%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Sunview Street & Proposed Site Access

PM Peak period
2027 Future Total Condition

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	4	8	48	41	11
Future Volume (Veh/h)	4	4	8	48	41	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	4	8	48	41	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110	46	52			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110	46	52			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	887	1029	1567			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	56	52			
Volume Left	4	8	0			
Volume Right	4	0	11			
cSH	952	1567	1700			
Volume to Capacity	0.01	0.01	0.03			
Queue Length 95th (m)	0.2	0.1	0.0			
Control Delay (s)	8.8	1.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.8	1.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		20.1%		ICU Level of Service		A
Analysis Period (min)		15				

Appendix F

2029 Future Background and Future Total
Conditions (Mitigated) Synchro Reports

Timings
1: Albert Street & Columbia Street West

AM Peak period
2027 Future Background Condition Mitigated



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	56	683	86	919	210	275	107	198	30
Future Volume (vph)	56	683	86	919	210	275	107	198	30
Lane Group Flow (vph)	56	758	86	1076	210	333	107	198	30
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.0	36.8	10.0	36.8	10.8	32.4	10.8	32.4	32.4
Total Split (%)	11.1%	40.9%	11.1%	40.9%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	39.6	32.8	39.6	32.8	36.0	28.6	35.1	26.4	26.4
Actuated g/C Ratio	0.44	0.36	0.44	0.36	0.40	0.32	0.39	0.29	0.29
v/c Ratio	0.29	0.66	0.34	0.93	0.48	0.66	0.31	0.36	0.06
Control Delay	17.0	27.6	17.2	43.4	21.8	34.3	18.0	27.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	27.6	17.2	43.4	21.8	34.3	18.0	27.5	0.2
LOS	B	C	B	D	C	C	B	C	A
Approach Delay		26.8		41.4		29.5		22.0	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	5.0	58.0	7.9	94.6	22.8	49.5	10.8	27.0	0.0
Queue Length 95th (m)	11.3	78.2	15.9	#139.2	38.3	#81.5	20.8	45.3	0.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	194	1145	252	1155	435	502	352	545	495
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	0.29	0.66	0.34	0.93	0.48	0.66	0.30	0.36	0.06

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 32.7

Intersection LOS: C

Intersection Capacity Utilization 88.4%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

AM Peak period
2027 Future Background Condition Mitigated

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10 s	36.8 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10 s	36.8 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

AM Peak period

2027 Future Background Condition Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	683	75	86	919	157	210	275	58	107	198	30
Future Volume (vph)	56	683	75	86	919	157	210	275	58	107	198	30
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1667	3119		1582	3133		1633	1557		1637	1860	1370
Flt Permitted	0.13	1.00		0.24	1.00		0.56	1.00		0.43	1.00	1.00
Satd. Flow (perm)	225	3119		398	3133		969	1557		733	1860	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	683	75	86	919	157	210	275	58	107	198	30
RTOR Reduction (vph)	0	9	0	0	15	0	0	8	0	0	0	21
Lane Group Flow (vph)	56	749	0	86	1061	0	210	325	0	107	198	9
Confl. Peds. (#/hr)	50		46	46		50	27		38	38		27
Confl. Bikes (#/hr)			2			1						2
Heavy Vehicles (%)	0%	4%	4%	5%	3%	2%	1%	1%	2%	1%	1%	3%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	36.0	31.2		36.0	31.2		35.4	28.6		32.6	27.2	27.2
Effective Green, g (s)	36.0	31.2		36.0	31.2		35.4	28.6		32.6	27.2	27.2
Actuated g/C Ratio	0.40	0.35		0.40	0.35		0.39	0.32		0.36	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	166	1081		222	1086		431	494		319	562	414
v/s Ratio Prot	0.02	0.24		c0.02	c0.34		c0.04	c0.21		0.02	0.11	
v/s Ratio Perm	0.12			0.13			0.15			0.10		0.01
v/c Ratio	0.34	0.69		0.39	0.98		0.49	0.66		0.34	0.35	0.02
Uniform Delay, d1	19.4	25.3		17.9	29.0		19.5	26.5		19.9	24.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	3.7		1.1	22.3		0.9	6.7		0.6	1.7	0.1
Delay (s)	20.6	28.9		19.0	51.3		20.4	33.2		20.5	26.3	22.2
Level of Service	C	C		B	D		C	C		C	C	C
Approach Delay (s)		28.4			49.0			28.2			24.0	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			36.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

1: Albert Street & Columbia Street West

PM Peak period
2027 Future Background Condition Mitigated



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	48	998	143	890	99	265	170	368	74
Future Volume (vph)	48	998	143	890	99	265	170	368	74
Lane Group Flow (vph)	48	1205	143	945	99	378	170	368	74
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	46.0	10.8	46.0	10.0	33.2	10.0	33.2	33.2
Total Split (%)	10.8%	46.0%	10.8%	46.0%	10.0%	33.2%	10.0%	33.2%	33.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	48.4	40.0	50.4	44.3	35.2	27.2	36.0	29.2	29.2
Actuated g/C Ratio	0.48	0.40	0.50	0.44	0.35	0.27	0.36	0.29	0.29
v/c Ratio	0.19	0.96	0.78	0.66	0.38	0.88	0.71	0.67	0.15
Control Delay	13.5	46.2	47.2	25.5	24.5	55.6	41.5	39.2	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	46.2	47.2	25.5	24.5	55.6	41.5	39.2	2.1
LOS	B	D	D	C	C	E	D	D	A
Approach Delay		44.9		28.4		49.2		35.4	
Approach LOS		D		C		D		D	
Queue Length 50th (m)	4.3	115.0	13.6	79.5	12.2	66.5	22.0	64.6	0.0
Queue Length 95th (m)	9.7	#161.4	#44.7	102.7	22.9	#118.0	#45.0	96.3	3.3
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	253	1260	183	1430	263	431	238	548	480
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	0.19	0.96	0.78	0.66	0.38	0.88	0.71	0.67	0.15

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 71 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 38.6

Intersection LOS: D

Intersection Capacity Utilization 97.7%

ICU Level of Service F

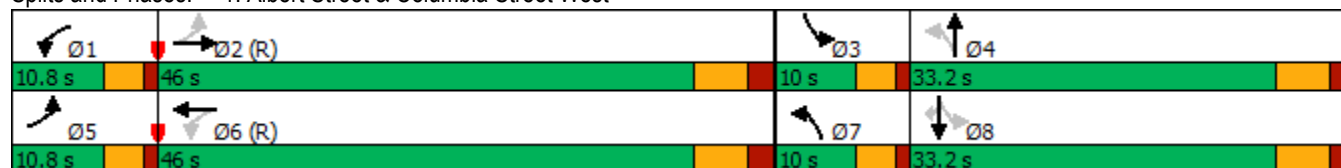
Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

PM Peak period
2027 Future Background Condition Mitigated

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



HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

PM Peak period

2027 Future Background Condition Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	998	207	143	890	55	99	265	113	170	368	74
Future Volume (vph)	48	998	207	143	890	55	99	265	113	170	368	74
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.92
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1632	3109		1650	3220		1652	1530		1643	1879	1355
Flt Permitted	0.20	1.00		0.10	1.00		0.33	1.00		0.27	1.00	1.00
Satd. Flow (perm)	341	3109		166	3220		572	1530		473	1879	1355
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	998	207	143	890	55	99	265	113	170	368	74
RTOR Reduction (vph)	0	18	0	0	4	0	0	15	0	0	0	52
Lane Group Flow (vph)	48	1187	0	143	941	0	99	363	0	170	368	22
Confl. Peds. (#/hr)	52		70	70		52	60		44	44		60
Confl. Bikes (#/hr)			3			2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	0%	0%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	43.3	39.2		48.7	41.9		32.8	28.0		35.2	29.2	29.2
Effective Green, g (s)	43.3	39.2		48.7	41.9		32.8	28.0		35.2	29.2	29.2
Actuated g/C Ratio	0.43	0.39		0.49	0.42		0.33	0.28		0.35	0.29	0.29
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	200	1218		181	1349		239	428		236	548	395
v/s Ratio Prot	0.01	c0.38		c0.05	0.29		0.02	c0.24		c0.04	0.20	
v/s Ratio Perm	0.09			0.33			0.12			0.21		0.02
v/c Ratio	0.24	0.97		0.79	0.70		0.41	0.85		0.72	0.67	0.05
Uniform Delay, d1	17.6	29.9		20.3	23.8		24.7	34.0		27.0	31.2	25.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	20.4		20.5	3.0		1.2	18.5		10.3	6.4	0.3
Delay (s)	18.2	50.3		40.8	26.9		25.9	52.4		37.3	37.6	25.7
Level of Service	B	D		D	C		C	D		D	D	C
Approach Delay (s)		49.1			28.7			46.9			36.1	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			40.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			97.7%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
1: Albert Street & Columbia Street West

AM Peak period
2027 Future Total Condition Mitigated



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	56	683	87	919	218	278	107	198	30
Future Volume (vph)	56	683	87	919	218	278	107	198	30
Lane Group Flow (vph)	56	759	87	1076	218	341	107	198	30
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.0	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.0	36.8	10.0	36.8	10.8	32.4	10.8	32.4	32.4
Total Split (%)	11.1%	40.9%	11.1%	40.9%	12.0%	36.0%	12.0%	36.0%	36.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	39.6	32.8	39.6	32.8	36.0	28.6	35.1	26.4	26.4
Actuated g/C Ratio	0.44	0.36	0.44	0.36	0.40	0.32	0.39	0.29	0.29
v/c Ratio	0.29	0.66	0.35	0.93	0.50	0.68	0.31	0.36	0.06
Control Delay	17.0	27.6	17.3	43.4	22.3	35.1	18.1	27.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	27.6	17.3	43.4	22.3	35.1	18.1	27.5	0.2
LOS	B	C	B	D	C	D	B	C	A
Approach Delay		26.9		41.4		30.1		22.1	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	5.0	58.0	8.0	94.6	23.8	50.9	10.8	27.0	0.0
Queue Length 95th (m)	11.3	78.3	16.1	#139.2	39.8	#88.4	20.8	45.3	0.0
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	194	1145	251	1155	435	501	347	545	495
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	0.29	0.66	0.35	0.93	0.50	0.68	0.31	0.36	0.06

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 71 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 32.8

Intersection LOS: C

Intersection Capacity Utilization 88.9%

ICU Level of Service E

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

AM Peak period
2027 Future Total Condition Mitigated

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

 Ø1	 Ø2 (R)	 Ø3	 Ø4
10 s	36.8 s	10.8 s	32.4 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
10 s	36.8 s	10.8 s	32.4 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

AM Peak period

2027 Future Total Condition Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	683	76	87	919	157	218	278	63	107	198	30
Future Volume (vph)	56	683	76	87	919	157	218	278	63	107	198	30
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1667	3118		1582	3133		1633	1553		1638	1860	1370
Flt Permitted	0.13	1.00		0.24	1.00		0.56	1.00		0.41	1.00	1.00
Satd. Flow (perm)	225	3118		397	3133		969	1553		713	1860	1370
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	683	76	87	919	157	218	278	63	107	198	30
RTOR Reduction (vph)	0	9	0	0	15	0	0	9	0	0	0	21
Lane Group Flow (vph)	56	750	0	87	1061	0	218	332	0	107	198	9
Confl. Peds. (#/hr)	50		46	46		50	27		38	38		27
Confl. Bikes (#/hr)			2			1						2
Heavy Vehicles (%)	0%	4%	4%	5%	3%	2%	1%	1%	2%	1%	1%	3%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	36.0	31.2		36.0	31.2		35.4	28.6		32.6	27.2	27.2
Effective Green, g (s)	36.0	31.2		36.0	31.2		35.4	28.6		32.6	27.2	27.2
Actuated g/C Ratio	0.40	0.35		0.40	0.35		0.39	0.32		0.36	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	166	1080		222	1086		431	493		313	562	414
v/s Ratio Prot	0.02	0.24		c0.02	c0.34		c0.04	c0.21		0.02	0.11	
v/s Ratio Perm	0.12			0.14			0.16			0.10		0.01
v/c Ratio	0.34	0.69		0.39	0.98		0.51	0.67		0.34	0.35	0.02
Uniform Delay, d1	19.4	25.3		17.9	29.0		19.7	26.6		19.9	24.5	22.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	3.7		1.1	22.3		0.9	7.2		0.7	1.7	0.1
Delay (s)	20.6	29.0		19.0	51.3		20.6	33.8		20.5	26.3	22.2
Level of Service	C	C		B	D		C	C		C	C	C
Approach Delay (s)		28.4			48.9			28.7			24.1	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			36.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
1: Albert Street & Columbia Street West

PM Peak period
2027 Future Total Condition Mitigated



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	48	998	147	890	100	266	170	370	74
Future Volume (vph)	48	998	147	890	100	266	170	370	74
Lane Group Flow (vph)	48	1210	147	945	100	381	170	370	74
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	36.0	9.0	36.0	9.0	32.4	9.0	32.4	32.4
Total Split (s)	10.8	46.0	10.8	46.0	10.0	33.2	10.0	33.2	33.2
Total Split (%)	10.8%	46.0%	10.8%	46.0%	10.0%	33.2%	10.0%	33.2%	33.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effect Green (s)	48.4	40.0	50.4	44.3	35.2	27.2	36.0	29.2	29.2
Actuated g/C Ratio	0.48	0.40	0.50	0.44	0.35	0.27	0.36	0.29	0.29
v/c Ratio	0.19	0.96	0.80	0.66	0.38	0.88	0.72	0.68	0.15
Control Delay	13.5	46.8	50.1	25.5	24.6	56.6	42.1	39.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	46.8	50.1	25.5	24.6	56.6	42.1	39.4	2.1
LOS	B	D	D	C	C	E	D	D	A
Approach Delay		45.6		28.8		49.9		35.6	
Approach LOS		D		C		D		D	
Queue Length 50th (m)	4.3	115.7	14.0	79.5	12.3	67.3	22.0	65.0	0.0
Queue Length 95th (m)	9.7	#162.4	#46.7	102.7	23.2	#119.7	#45.5	97.1	3.3
Internal Link Dist (m)		68.3		281.9		231.9		235.7	
Turn Bay Length (m)	52.3		50.8		34.4		44.7		
Base Capacity (vph)	253	1260	183	1430	262	431	236	548	480
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	0.19	0.96	0.80	0.66	0.38	0.88	0.72	0.68	0.15

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 71 (71%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 98.4%

ICU Level of Service F

Analysis Period (min) 15

Timings 1: Albert Street & Columbia Street West

PM Peak period
2027 Future Total Condition Mitigated

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

 Ø1 10.8 s	 Ø2 (R) 46 s	 Ø3 10 s	 Ø4 33.2 s
 Ø5 10.8 s	 Ø6 (R) 46 s	 Ø7 10 s	 Ø8 33.2 s

HCM Signalized Intersection Capacity Analysis

1: Albert Street & Columbia Street West

PM Peak period

2027 Future Total Condition Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	998	212	147	890	55	100	266	115	170	370	74
Future Volume (vph)	48	998	212	147	890	55	100	266	115	170	370	74
Ideal Flow (vphpl)	1775	1775	1900	1775	1775	1900	1775	1650	1900	1775	1900	1750
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.92
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1632	3106		1650	3220		1652	1529		1643	1879	1355
Flt Permitted	0.20	1.00		0.10	1.00		0.33	1.00		0.27	1.00	1.00
Satd. Flow (perm)	341	3106		166	3220		567	1529		465	1879	1355
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	998	212	147	890	55	100	266	115	170	370	74
RTOR Reduction (vph)	0	18	0	0	4	0	0	15	0	0	0	52
Lane Group Flow (vph)	48	1192	0	147	941	0	100	366	0	170	370	22
Confl. Peds. (#/hr)	52		70	70		52	60		44	44		60
Confl. Bikes (#/hr)			3			2						
Heavy Vehicles (%)	2%	2%	0%	1%	2%	0%	0%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	2	0	0	2	0	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	43.3	39.2		48.7	41.9		32.8	28.0		35.2	29.2	29.2
Effective Green, g (s)	43.3	39.2		48.7	41.9		32.8	28.0		35.2	29.2	29.2
Actuated g/C Ratio	0.43	0.39		0.49	0.42		0.33	0.28		0.35	0.29	0.29
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	200	1217		181	1349		238	428		234	548	395
v/s Ratio Prot	0.01	c0.38		c0.05	0.29		0.02	c0.24		c0.04	0.20	
v/s Ratio Perm	0.09			0.34			0.12			0.21		0.02
v/c Ratio	0.24	0.98		0.81	0.70		0.42	0.85		0.73	0.68	0.05
Uniform Delay, d1	17.6	30.0		20.5	23.8		24.7	34.1		27.1	31.2	25.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	21.3		23.4	3.0		1.2	19.2		10.7	6.5	0.3
Delay (s)	18.2	51.3		43.9	26.9		25.9	53.2		37.8	37.8	25.7
Level of Service	B	D		D	C		C	D		D	D	C
Approach Delay (s)		50.0			29.2			47.6			36.3	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			40.6			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			98.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												