

City of Cambridge

25 Chalmers Street South

Z0023198



TRAFFIC IMPACT STUDY



CIMA+ project number: Z0023196
27th-March-2025 – Review 01



City of Cambridge

25 Chalmers Street South

Z0023196

TRAFFIC IMPACT STUDY

Prepared by:



Venushan Nadanasiva, E.I.T.



Janice Zhang, E.I.T.

Verified by:



Kelsey Waugh, P.Eng., RSP1



400-3027 Harvester Road, Burlington, ON L7N 3G7 CANADA T 289 288-0287 F 289 288-0285

CIMA+ project number: Z0023196

Confidentiality and ownership

Unless otherwise agreed between CIMA+ and its client, all documents, whether printed or in electronic form, as well as all resulting intellectual property rights, belong exclusively to CIMA+, which reserves the copyright therein. Any use or reproduction in any form whatsoever, even partial, for purposes other than the project for which the documents have been prepared, is strictly prohibited unless authorized by CIMA+.

Table of contents

1.	Introduction.....	1
1.1	Study Area	1
1.2	Study Methodology	2
2.	Existing Traffic Operations	4
2.1	Existing Traffic Volume and Operations	4
2.2	Active Transportation	7
2.2.1	Pedestrian and Cyclist Infrastructure.....	7
2.2.2	Transit Services.....	8
3.	Future Background Operations	9
3.1	Future Traffic Growth	9
3.2	Future Background Traffic Volume and Operations	10
4.	Future Total Operations	12
4.1	Trip Generation.....	12
4.2	Trip Distribution	13
4.3	Future Total Traffic Volume and Operations.....	14
4.3.1	Proposed Mitigation.....	16
5.	Parking Review	18
6.	Conclusion	19

List of Table

Table 1: Intersection Level of Service Criteria	3
Table 2: Existing 2025 Traffic Operations	6
Table 6: Future Background 2030 Traffic Operations.....	11
Table 9: Future Total 2030 Traffic Operations	15
Table 10: Future Total 2030 Traffic Operations - Mitigation Measures	17
Table 11: Zoning By-law Parking Requirement	19

List of Figures

Figure 1: Study Area Intersections.....	2
Figure 2: Lane Configurations	4
Figure 3: Existing 2025 Volumes.....	5

Figure 4: Existing Sidewalks.....	8
Figure 5: Grand River Transit System Map.....	9
Figure 6: Future Background 2035 Volume	10
Figure 7: Site Traffic	13
Figure 8: Future Total 2035 Volumes	14

List of Appendices

- Appendix A: Existing Traffic Counts and Signal Timing Plans
- Appendix B: Existing Traffic Operations
- Appendix C: Future Background Traffic Operations
- Appendix D: Future Total Traffic Operations
- Appendix E: Future Total Traffic Operations - with Mitigations

1. Introduction

CIMA+ was retained by the City of Cambridge to conduct a Transportation Impact Study in support of a city initiated Official Plan Amendment and Zoning By-law Amendment application for 25 Chalmers Street South in Cambridge, Ontario. The proposed affordable housing development is located on a former school site and the development scale is approximately 228 units.

The study objective is to forecast the traffic volumes generated by the proposed development during the AM and PM peak hours, and to assess the impact of this traffic on existing roadway network and recommend changes to accommodate the projected traffic if needed.

1.1 Study Area

Figure 1 illustrates the subject site along with the surroundings lands, which together, represent the study area. The following intersections were analyzed as part of the road network effected by the development:

1. Main St & Chalmers St S
2. Main St & Lowell St S
3. Main St & Elgin St S
4. Elliott St & Chalmers St S
5. Elliott St & Lowell St S
6. Elliott St & Elgin St S
7. South St & Chalmers St S
8. South St & Elgin St S

The subject site is outlined in red, and the subject intersections is outlined with yellow pins.

The City has requested an operational review of these intersections to assess impacts from the residential development with 228 units.

The land use nearby the development site consists of a mixture of low and medium density residential units, including single detached homes, townhouses, and apartment buildings.

The traffic counts were conducted by Pyramid on Thursday January 30th, 2025. The existing traffic counts are provided in **Appendix A**.



Figure 1: Study Area Intersections

1.2 Study Methodology

This study evaluates existing and future traffic operations at study area intersections for the weekday AM period (7:00-9:00), and weekday PM period (15:30-18:30).

The study assessed traffic operations under existing (2025) conditions and the following future horizon years:

- Future (2030) Background Conditions (5-year horizon¹); and,
- Future (2030) Total Conditions (5-year horizon).

Intersection operations were assessed using the Synchro 11 software which utilizes the Highway Capacity Manual (HCM) 2000 methodology published by the Transportation Research Board National Research Council. Synchro 11 can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections. Intersection operations performance metrics are reported in terms of Level of Service (LOS), volume to capacity (v/c) ratios.

¹ Future horizon of 5 years from the date of the TIS.

Level of Service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. **Table 1** summarizes the LOS criteria for signalized and unsignalized intersections.

Table 1: Intersection Level of Service Criteria

Level of Service	Average Control Delay Per Vehicle (second/vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	≤10	≤10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

SimTraffic software was used to calculate the 95th percentile queue length to analyze and assess the available storage capacity and whether queue spillback or lane blockages occur due to long queues. The available storage capacity was based on the best available data collected from aerial imagery.

For this study, critical intersections are established with accordance to the Region of Waterloo "Transportation Impact Study Guidelines":

- Level of Service of E or worse;
- Volume to Capacity ratio of 1.00; and
- 95th queue exceeds the available storage length.

It should be noted that the peak hour factor (PHF) was calculated from the provided TMCs. The calculated PHF was used for all existing and future scenarios.

2. Existing Traffic Operations

The following section outlines existing conditions. Existing intersection operations were analyzed using the lane configurations illustrated in **Figure 2**.

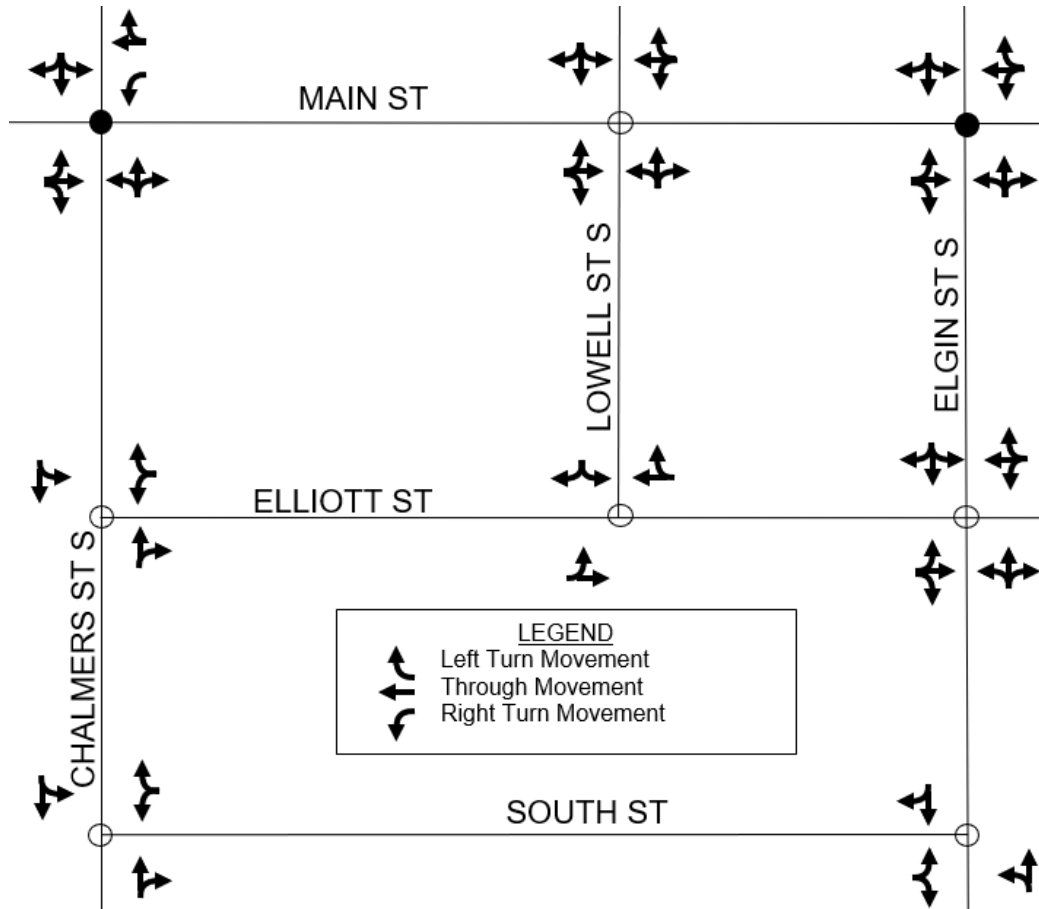


Figure 2: Lane Configurations

2.1 Existing Traffic Volume and Operations

CIMA+ received the turning movement count (TMC) for the study area network from Pyramid Traffic Inc. The counts reveal that the AM peak hours are either 07:45 to 80:45 AM or 08:00 to 09:00 AM and the PM peak hours vary between 15:30 to 16:30 PM, 16:30 to 17:30 PM, and 16:45 to 17:45 PM. The resulting existing traffic volumes are shown in **Figure 3**.

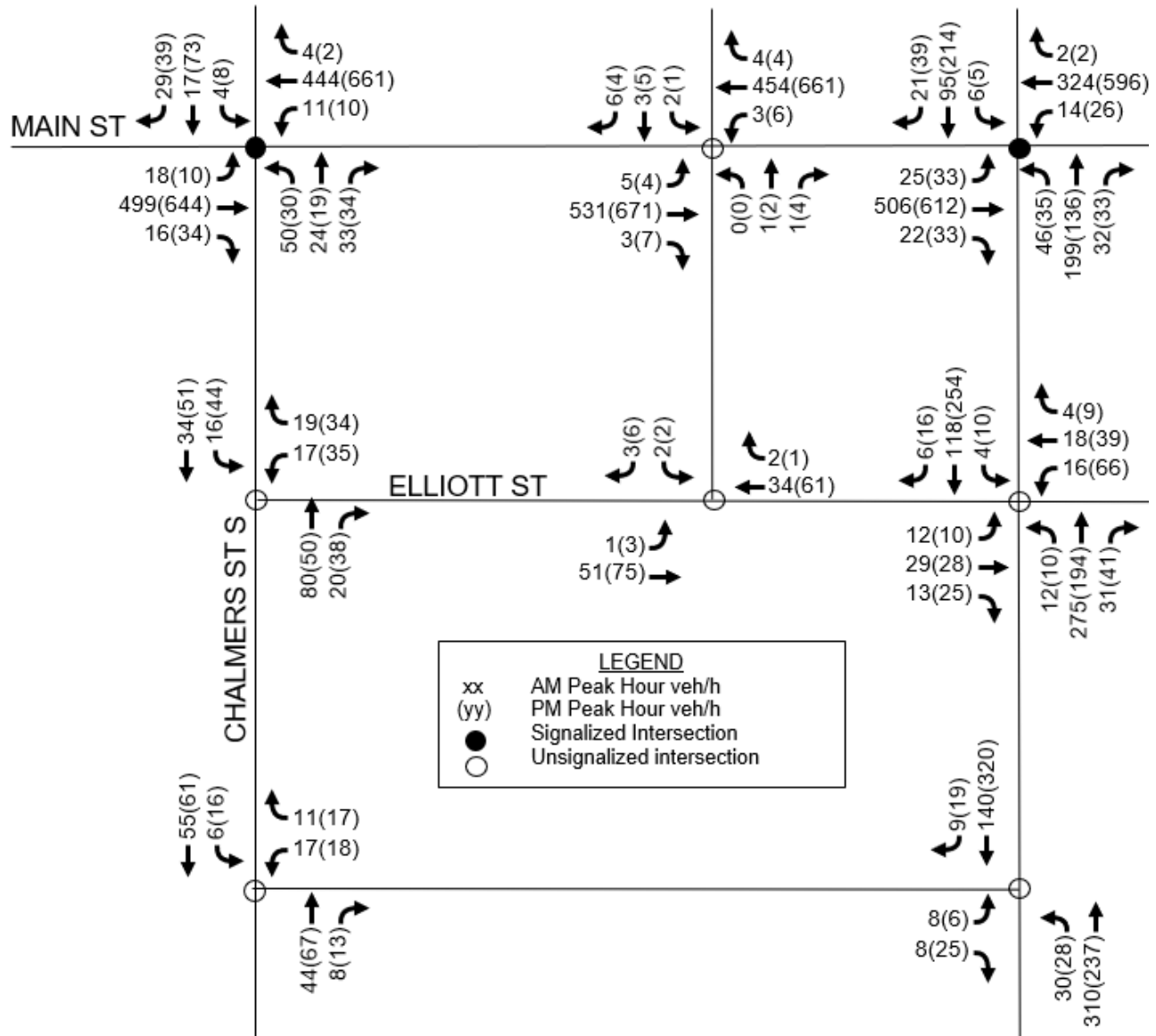


Figure 3: Existing 2025 Volumes

Traffic operations were reviewed using Synchro 11 and SimTraffic software. Volume to capacity ratio (v/c), level of service (LOS) and delay, and 95th percentile queues were reviewed. The results are summarized in **Table 2**. Synchro outputs are available in **Appendix B**.

It should be noted that the available storage capacity is based on aerial imagery to measure storage lane length or distance from the subject intersection to the nearest upstream traffic-controlled intersection.

Table 2: Existing 2025 Traffic Operations

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and Main Street					
EBLTR	>50	0.53 (0.64)	4.2 (6.4)	A (A)	39.9 (38.7)
WBLTR	>100	0.50 (0.44)	14.7 (9.4)	B (A)	33.7 (55.6)
NBLTR	>150	0.73 (0.47)	35.7 (36.6)	D (D)	29.4 (28.2)
SBLTR	>150	0.11 (0.61)	23.7 (49.6)	C (D)	17.9 (35.5)
Overall	-	0.65 (0.68)	14.4 (12.8)	B (B)	-
Lowell Street South and Main Street					
EBLTR	>50	0.01 (0.01)	0.3 (0.3)	A (A)	5.3 (31.6)
WBLTR	>50	0.01 (0.01)	0.2 (0.3)	A (A)	7.1 (26.9)
NBLTR	>150	0.02 (0.06)	15.2 (18.4)	C (C)	3.5 (8.6)
SBLTR	>150	0.07 (0.10)	15.9 (22.6)	C (C)	9.7 (8.9)
Overall	-	-	0.7 (0.8)	A (A)	-
Elgin Street South and Main Street					
EBLTR	>85	0.61 (0.73)	5.0 (7.1)	A (A)	54.1 (77.7)
WBLTR	>200	0.42 (0.60)	10.0 (11.5)	A (B)	52.3 (119.3)
NBLTR	>150	0.81 (0.77)	37.0 (43.6)	D (D)	65.4 (65.2)
SBLTR	>150	0.32 (0.74)	23.1 (40.0)	C (D)	31.9 (61.0)
Overall	-	0.67 (0.74)	15.6 (18.0)	B (B)	-
Chalmers Street South and Elliot Street					
WBLR	>80	0.08 (0.10)	7.7 (7.7)	A (A)	13.0 (12.9)
NBTR	>50	0.25 (0.13)	8.4 (7.5)	A (A)	13.8 (14.8)
SBLT	>150	0.10 (0.15)	7.8 (8.0)	A (A)	14.2 (18.1)
Overall	-	-	8.1 (7.8)	A (A)	-
Lowell Street South and Elliot Street					
EBLT	>80	0.00 (0.01)	0.4 (0.6)	A (A)	1.2 (1.8)
WBTR	>80	0.03 (0.04)	0.0 (0.0)	A (A)	-
SBLR	>150	0.01 (0.01)	8.7 (8.9)	A (A)	6.6 (7.9)
Overall	-	-	1.1 (0.9)	A (A)	-
Elgin Street South and Elliot Street					
EBLTR	>80	0.11 (0.15)	8.8 (9.6)	A (A)	12.1 (13.5)
WBLTR	>200	0.10 (0.24)	8.9 (10.5)	A (B)	13.4 (16.2)
NBLTR	>100	0.45 (0.40)	11.3 (11.3)	B (B)	28.2 (22.4)
SBLTR	>150	0.21 (0.45)	9.0 (12.0)	A (B)	19.6 (33.5)
Overall	-	-	10.2 (11.2)	B (B)	-

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and South Street					
WBLR	>180	0.05 (0.08)	9.4 (9.5)	A (A)	12.4 (12.5)
NBTR	>150	0.04 (0.05)	0.0 (0.0)	A (A)	- (2.9)
SBLT	>40	0.01 (0.01)	1.3 (1.6)	A (A)	2.2 (3.2)
Overall	-	-	2.8 (3.1)	A (A)	-
Elgin Street South and South Street					
EBLR	>180	0.04 (0.09)	12.0 (12.0)	B (B)	11.2 (12.6)
NBLT	>50	0.03 (0.04)	1.0 (1.8)	A (A)	6.6 (9.4)
SBTR	>100	0.10 (0.23)	0.0 (0.0)	A (A)	-
Overall	-	-	1.2 (1.5)	A (A)	-

All movements are operating at an acceptable level of service. All 95th percentile queues can be accommodated within existing storage capacity.

2.2 Active Transportation

2.2.1 Pedestrian and Cyclist Infrastructure

Sidewalks are provided on both sides alongside most streets in the study area, except for Elliot Street. Existing sidewalks are illustrated in **Figure 4**. There are no dedicated bike lanes within the study area road network and cyclists need to share the road with vehicular traffic.



Figure 4: Existing Sidewalks

2.2.2 Transit Services

The subject site is served by public transit provided by Grand River Transit. The bus route within the study area is Route 63 which operates on weekdays and weekends with service headway of thirty (30) minutes. There are two bus stops along Main Street and Elgin Street on both sides. Both stops are within 300m north of the subject site.

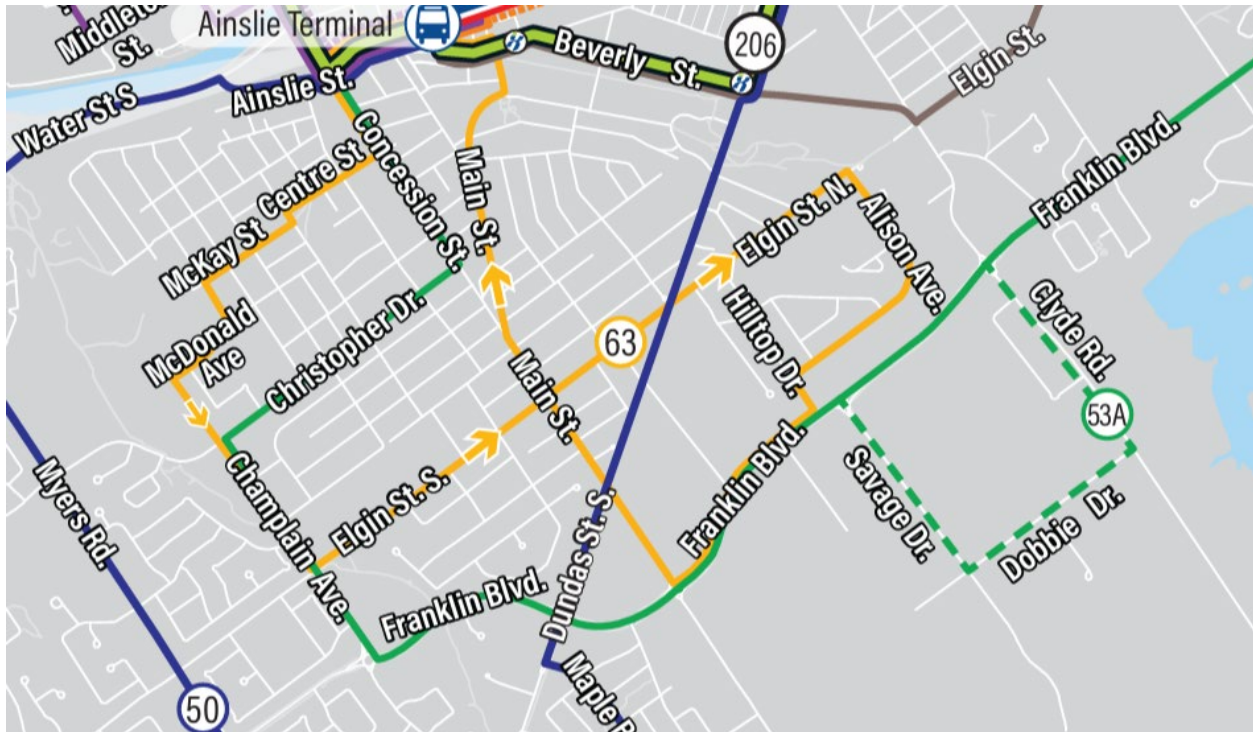


Figure 5: Grand River Transit System Map

3. Future Background Operations

3.1 Future Traffic Growth

Future conditions analysis was conducted using projected future volumes for the five-year future horizon (2030), considering two components: organic background traffic growth and additional traffic generated by other planned/approved developments in the vicinity of the study area.

A compound growth rate of 2% per annum was calculated based on historical growth observed at Elgin Street and Main Street intersection counts provided by the City. The historical growths observed are summarized in **Table 3** and **Table 4**. As indicated by the City of Cambridge, there are currently no additional planned/approved background developments within the study area.

Table 3: Elgin Street and Main Street Historical Volume Summary

Year	2011	2014	2017	2022	2025
8-hour Total TMC	10,952	11,894	12,769	10,525	11,192

Table 4: Elgin Street and Main Street Historical Growth Summary

Period	2011-2014	2014-2017	2017-2022	2022-2025
Annual Growth	2.8%	2.4%	-3.8%	2.1%

3.2 Future Background Traffic Volume and Operations

The future 2030 traffic volumes are shown in **Figure 6**.

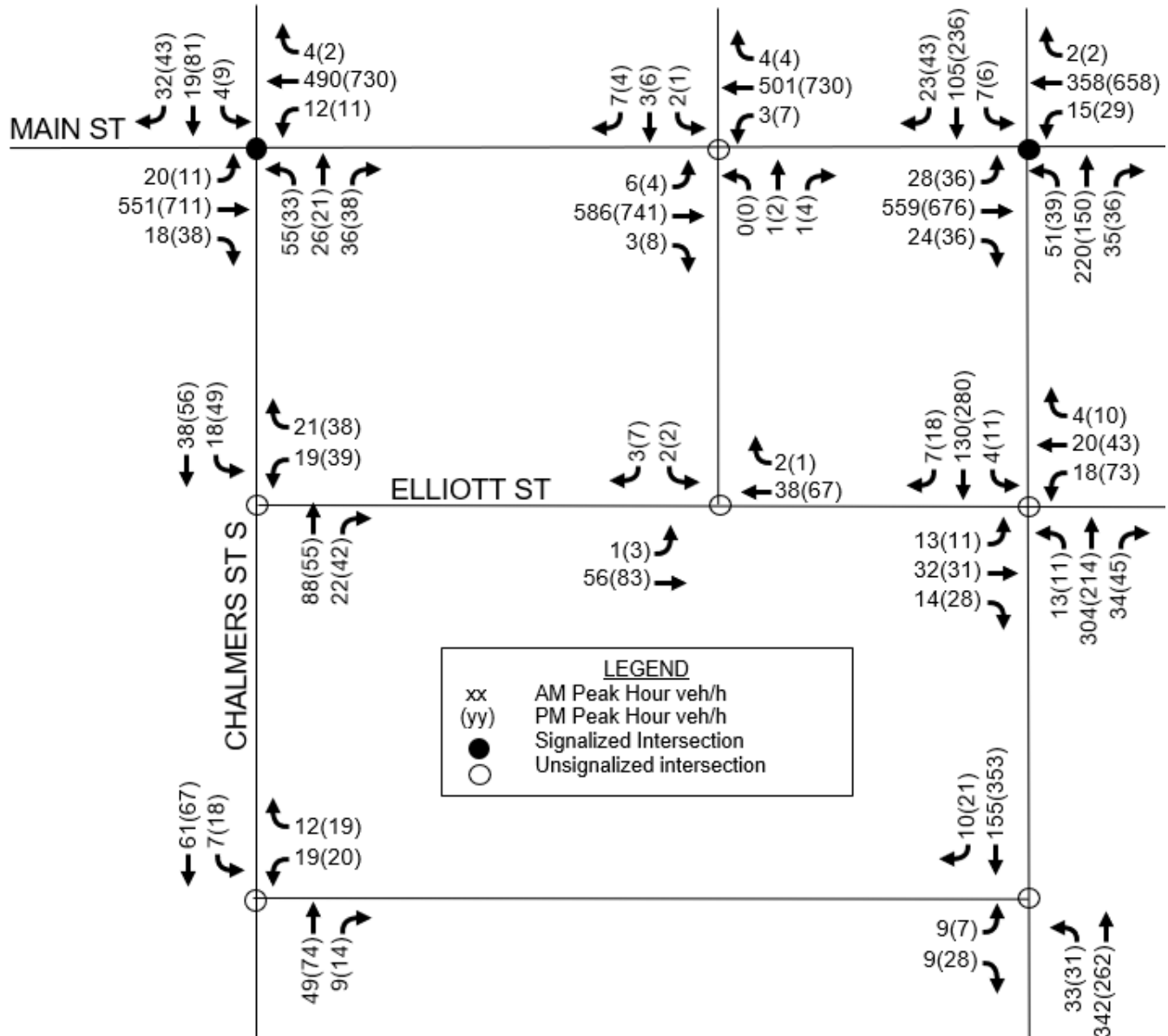


Figure 6: Future Background 2035 Volume

Traffic operations were reviewed using Synchro 11 and SimTraffic software. Volume to capacity ratio (v/c), level of service (LOS) and delay, and 95th percentile queues were reviewed. The results are summarized in **Table 5**. Synchro and SimTraffic outputs are available in **Appendix C**.

Table 5: Future Background 2030 Traffic Operations

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and Main Street					
EBLTR	>50	0.60 (0.72)	5.3 (8.1)	A (A)	39.1 (41.7)
WBLTR	>100	0.57 (0.50)	16.8 (10.6)	B (B)	46.6 (62.2)
NBLTR	>150	0.78 (0.52)	38.5 (36.6)	D (D)	30.7 (32.8)
SBLTR	>150	0.11 (0.64)	23.1 (39.9)	C (D)	17.9 (36.9)
Overall	-	0.72 (0.76)	13.6 (14.1)	B (B)	-
Lowell Street South and Main Street					
EBLTR	>50	0.01 (0.01)	0.4 (0.3)	A (A)	24.2 (45.6)
WBLTR	>50	0.01 (0.01)	0.2 (0.4)	A (A)	9.7 (27.3)
NBLTR	>150	0.02 (0.06)	16.2 (19.8)	C (C)	3.7 (7.2)
SBLTR	>150	0.08 (0.13)	16.9 (25.0)	C (C)	9.1 (10.0)
Overall	-	-	0.8 (0.9)	A (A)	-
Elgin Street South and Main Street					
EBLTR	>85	0.69 (0.83)	6.3 (10.3)	A (B)	61.6 (90.7)
WBLTR	>200	0.48 (0.69)	11.2 (14.1)	B (B)	72.9 (146.6)
NBLTR	>150	0.86 (0.82)	41.5 (48.4)	D (D)	70.8 (73.2)
SBLTR	>150	0.35 (0.78)	22.7 (41.4)	C (D)	37.9 (67.7)
Overall	-	0.74 (0.82)	17.4 (20.9)	B (C)	-
Chalmers Street South and Elliot Street					
WBLR	>80	0.09 (0.12)	7.8 (7.8)	A (A)	13.0 (13.2)
NBTR	>50	0.28 (0.14)	8.6 (7.7)	A (A)	13.9 (15.0)
SBLT	>150	0.11 (0.16)	7.9 (8.2)	A (A)	14.5 (18.0)
Overall	-	-	8.3 (7.9)	A (A)	-
Lowell Street South and Elliot Street					
EBLT	>80	0.00 (0.01)	0.4 (0.6)	A (A)	-(1.3)
WBTR	>80	0.03 (0.05)	0.0 (0.0)	A (A)	-
SBLR	>150	0.01 (0.01)	8.8 (9.0)	A (A)	5.4 (8.2)
Overall	-	-	1.0 (0.9)	A (A)	-
Elgin Street South and Elliot Street					
EBLTR	>80	0.13 (0.17)	9.1 (10.1)	A (B)	12.9 (13.5)
WBLTR	>200	0.11 (0.28)	9.1 (11.2)	A (B)	13.0 (17.2)
NBLTR	>100	0.51 (0.45)	12.3 (12.4)	B (B)	25.1 (25.7)
SBLTR	>150	0.24 (0.51)	9.3 (13.5)	A (B)	22.3 (37.0)
Overall	-	-	10.9 (12.3)	B (B)	-

Direction / Movement	Storage (m)	v/c	Delay	LOS	95 th ile Queue (m)
Chalmers Street South and South Street					
WBLR	>180	0.06 (0.09)	9.5 (9.7)	A (A)	12.7 (13.1)
NBTR	>150	0.04 (0.06)	0.0 (0.0)	A (A)	- (1.2)
SBLT	>40	0.01 (0.01)	1.3 (1.6)	A (A)	2.5 (3.6)
Overall	-	-	2.8 (3.1)	A (A)	-
Elgin Street South and South Street					
EBLR	>180	0.05 (0.11)	12.6 (12.7)	B (B)	11.9 (13.3)
NBLT	>50	0.03 (0.05)	1.1 (1.9)	A (A)	9.6 (10.4)
SBTR	>100	0.11 (0.25)	0.0 (0.0)	A (A)	- (0.9)
Overall	-	-	1.3 (1.6)	A (A)	-

All movements are operating at an acceptable level of service. All 95th percentile queues can be accommodated within existing storage capacity, except for the eastbound approach at Elgin Street South and Main Street intersection, which exhibits a queue length that slightly spills back to upstream unsignalized intersection in the PM period.

4. Future Total Operations

4.1 Trip Generation

The number of vehicle trips to be generated by the proposed development located at 25 Chalmers Street South for the weekday AM and weekday PM peak hours have been determined based on type of land use, number of residential units, and trip generation rates as per the ITE Trip Generation Manual 11th edition.

All Trip rates are based on the respective peak hour generators fitted curve equations. As a conservative estimate, it was assumed that all trips generated by the proposed site will consist of auto trips. The projected trip generation for the proposed development during the weekday AM and weekday PM peak hours are summarized in **Table 6**.

Table 6: Trip Generation Summary

ITE Land Use	Units	Parameter	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Affordable Housing (ITE LUC 223)	228	Equation	T=0.21(X)+17.97			Ln(T) = 0.75 Ln(X) + 0.53		
		Gross Trips	17	49	66	58	42	100
		Non-Auto (0%)	-	-	-	-	-	-
Total Trips			17	49	66	58	42	100

4.2 Trip Distribution

The trip distribution for the proposed development is based on the existing travel patterns. The resulting trip distribution is summarized in **Table 7**.

Table 7: Trip Distribution Summary

From/To	Via	Inbound	Outbound
East	Main Street	34%	44%
	Elliott Street	4%	5%
West	Main Street	50%	43%
North	Chalmers Street	5%	4%
South	Chalmers Street	7%	4%
Total Trips		100%	100%

The resulting site generated trips are illustrated in **Figure 7**.

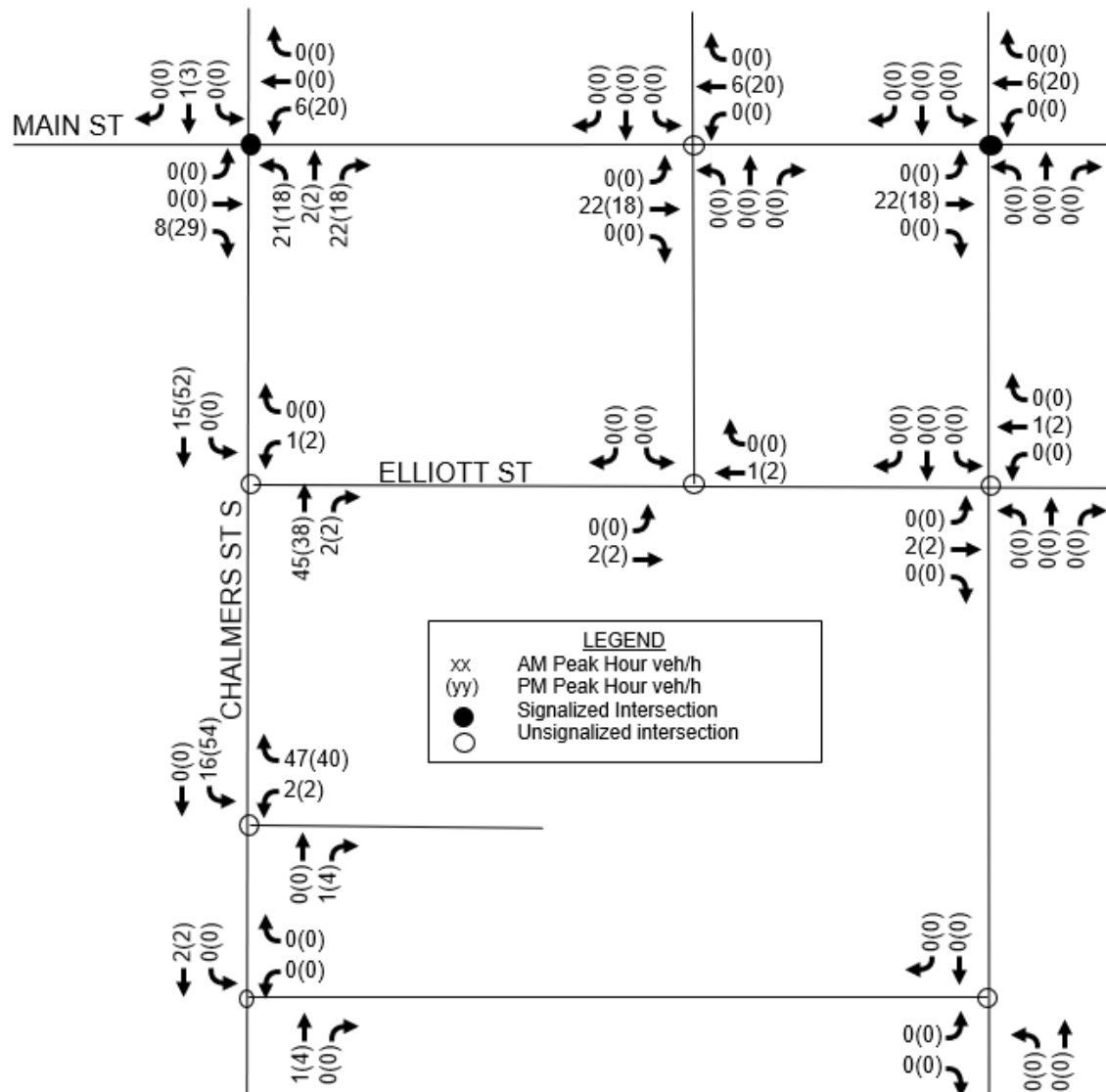


Figure 7: Site Traffic

4.3 Future Total Traffic Volume and Operations

Traffic operations under future 2030 total conditions were analyzed for the weekday AM and weekday PM peak hours. The traffic analysis and results for the future total conditions are discussed in this section.

Future (2030) total intersection operations were assessed using the existing lane configurations. The future (2030) total traffic volumes were estimated by adding the site traffic (**Figure 7**) to future (2030) background volumes (**Figure 6**) and the resulting future (2030) total traffic volumes are illustrated in **Figure 8**. The analysis results are provided in **Table 8**, and detailed calculations are provided in **Appendix D**.

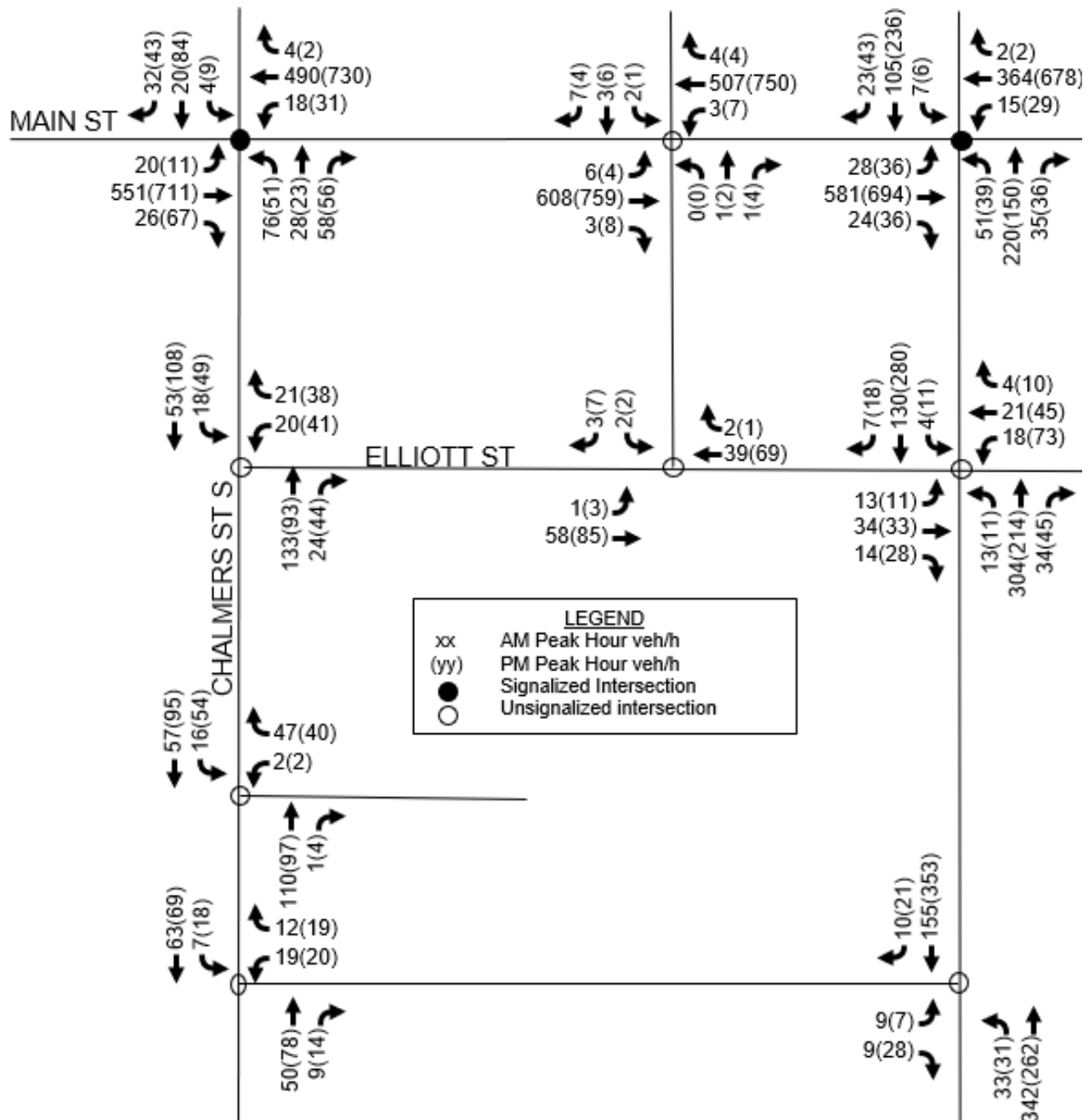


Figure 8: Future Total 2035 Volumes

Table 8: Future Total 2030 Traffic Operations

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and Main Street					
EBLTR	>50	0.63 (0.77)	6.1 (9.5)	A (A)	41.4 (43.0)
WBTR	>100	0.64 (0.59)	19.2 (12.3)	B (B)	45.1 (73.9)
NBLTR	>150	0.98 (0.75)	71.1 (49.3)	E (D)	39.0 (39.2)
SBLTR	>150	0.11 (0.60)	21.7 (37.0)	C (D)	18.7 (36.9)
Overall	-	0.81 (0.82)	25.1 (16.5)	C (B)	-
Lowell Street South and Main Street					
EBLTR	>50	0.02 (0.01)	0.4 (0.3)	A (A)	15.4 (57.8)
WBLTR	>50	0.01 (0.01)	0.2 (0.4)	A (A)	7.5 (41.1)
NBLTR	>150	0.03 (0.06)	16.7 (20.3)	C (C)	3.7 (6.9)
SBLTR	>150	0.08 (0.13)	17.3 (25.6)	C (D)	10.2 (9.8)
Overall	-	-	0.8 (0.9)	A (A)	-
Elgin Street South and Main Street					
EBLTR	>85	0.72 (0.85)	7.2 (11.8)	A (B)	60.0 (94.1)
WBLTR	>200	0.49 (0.71)	11.4 (14.7)	B (B)	58.1 (152.6)
NBLTR	>150	0.86 (0.82)	41.5 (48.4)	D (D)	65.2 (73.5)
SBLTR	>150	0.35 (0.78)	22.7 (41.4)	C (D)	35.9 (66.4)
Overall	-	0.76 (0.84)	17.7 (21.6)	B (C)	-
Chalmers Street South and Elliot Street					
WBLR	>80	0.10 (0.13)	8.2 (8.2)	A (A)	13.4 (12.2)
NBTR	>50	0.41 (0.20)	10.0 (8.2)	A (A)	15.5 (15.5)
SBLT	>150	0.14 (0.26)	8.2 (8.9)	A (A)	13.6 (18.0)
Overall	-	-	9.4 (8.5)	A (A)	-
Lowell Street South and Elliot Street					
EBLT	>80	0.00 (0.01)	0.4 (0.6)	A (A)	-
WBTR	>80	0.03 (0.05)	0.0 (0.0)	A (A)	-
SBLR	>150	0.01 (0.01)	8.8 (9.0)	A (A)	6.3 (8.0)
Overall	-	-	1.0 (0.9)	A (A)	-
Elgin Street South and Elliot Street					
EBLTR	>80	0.13 (0.18)	9.1 (10.1)	A (B)	12.8 (13.5)
WBLTR	>200	0.12 (0.28)	9.2 (11.3)	A (B)	12.6 (18.1)
NBLTR	>100	0.51 (0.45)	12.4 (12.5)	B (B)	29.4 (24.3)
SBLTR	>150	0.24 (0.51)	9.4 (13.6)	A (B)	23.1 (38.8)
Overall	-	-	10.9 (12.4)	B (B)	-

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and South Street					
WBLR	>180	0.06 (0.09)	9.5 (9.7)	A (A)	12.8 (13.1)
NBTR	>150	0.04 (0.06)	0.0 (0.0)	A (A)	- (1.2)
SBLT	>40	0.01 (0.01)	1.3 (1.5)	A (A)	1.3 (5.0)
Overall	-	-	2.8 (3.1)	A (A)	-
Elgin Street South and South Street					
EBLR	>180	0.05 (0.11)	12.6 (12.7)	B (B)	10.7 (12.9)
NBLT	>50	0.03 (0.05)	1.1 (1.9)	A (A)	9.8 (12.2)
SBTR	>100	0.11 (0.25)	0.0 (0.0)	A (A)	1.2 (1.3)
Overall	-	-	1.3 (1.6)	A (A)	-
Chalmers Street South and Site Access					
WBLR	>50	0.06 (0.05)	9.1 (9.1)	A (A)	14.1 (13.9)
NBTR	>40	0.07 (0.06)	0.0 (0.0)	A (A)	-
SBLT	>50	0.01 (0.04)	1.7 (2.9)	A (A)	1.8 (6.2)
Overall	-	-	2.4 (2.8)	A (A)	-

All movements are operating at an acceptable level of service, except for the northbound movements at Chalmers Street South and Main Street during AM peak. The northbound movement has an acceptable v/c ratio, but the high delay causes critical level of service. It is important to note the intersection is coded as a cluster to replicate signal group control of the two closely spaced signalized intersections based on the signal timing plan provided by the City. The delay may be overestimated in comparison to actual operations due to Synchro's limitations in modelling intersections under group control. Similar to Future Background conditions, the eastbound approach queue at Elgin Street South and Main Street intersection slightly spills back to upstream unsignalized intersection in the PM period.

4.3.1 Proposed Mitigation

The proposed mitigation measures tested include the following:

- In AM period, optimized the cycle length and splits for Chalmer Street south and Main Street to reduce the delay of northbound movement and bring the level of service grade below a LOS of E. Elgin Street South and Main Street cycle length was also increased to maintain coordination.
- In PM period, optimized splits for Elgin Street South and Main Street to reduce eastbound queue lengths.

The analysis results are provided in **Table 9**, and detailed calculations are provided in **Appendix E**.

Table 9: Future Total 2030 Traffic Operations - Mitigation Measures

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
Chalmers Street South and Main Street					
EBLTR	>50	0.65 (0.77)	8.9 (9.5)	A (A)	40.3 (44.2)
WBTR	>100	0.59 (0.59)	24.6 (11.5)	C (B)	50.4 (65.8)
NBLTR	>150	0.85 (0.75)	46.1 (49.3)	D (D)	45.2 (42.1)
SBLTR	>150	0.10 (0.60)	23.6 (37.0)	C (D)	19.8 (39.4)
Overall	-	0.77 (0.82)	23.1 (16.2)	C (B)	-
Lowell Street South and Main Street					
EBLTR	>50	0.02 (0.01)	0.4 (0.3)	A (A)	11.9 (48.5)
WBLTR	>50	0.01 (0.01)	0.2 (0.4)	A (A)	17.4 (35.9)
NBLTR	>150	0.03 (0.06)	16.7 (20.3)	C (C)	3.9 (6.0)
SBLTR	>150	0.08 (0.13)	17.3 (25.6)	C (D)	9.9 (9.7)
Overall	-	-	0.8 (0.9)	A (A)	-
Elgin Street South and Main Street					
EBLTR	>85	0.70 (0.84)	7.0 (11.8)	A (B)	59.2 (89.1)
WBLTR	>200	0.47 (0.70)	12.1 (14.3)	B (B)	64.2 (124.8)
NBLTR	>150	0.84 (0.85)	44.4 (53.0)	D (D)	73.0 (85.6)
SBLTR	>150	0.34 (0.79)	26.6 (43.0)	C (D)	36.6 (67.3)
Overall	-	0.74 (0.84)	18.8 (22.2)	B (C)	-
Chalmers Street South and Elliot Street					
WBLR	>80	0.10 (0.13)	8.2 (8.2)	A (A)	13.0 (12.7)
NBTR	>50	0.41 (0.20)	10.0 (8.2)	A (A)	15.0 (14.7)
SBLT	>150	0.14 (0.26)	8.2 (8.9)	A (A)	13.9 (19.4)
Overall	-	-	9.4 (8.5)	A (A)	-
Lowell Street South and Elliot Street					
EBLT	>80	0.00 (0.01)	0.4 (0.6)	A (A)	-
WBTR	>80	0.03 (0.05)	0.0 (0.0)	A (A)	-
SBLR	>150	0.01 (0.01)	8.8 (9.0)	A (A)	6.0 (7.6)
Overall	-	-	1.0 (0.9)	A (A)	-
Elgin Street South and Elliot Street					
EBLTR	>80	0.13 (0.18)	9.1 (10.1)	A (B)	13.1 (12.6)
WBLTR	>200	0.12 (0.28)	9.2 (11.3)	A (B)	13.3 (17.2)
NBLTR	>100	0.51 (0.45)	12.4 (12.5)	B (B)	28.3 (25.0)

Direction / Movement	Storage (m)	v/c	Delay	LOS	95%ile Queue (m)
SBLTR	>150	0.24 (0.51)	9.4 (13.6)	A (B)	22.8 (39.3)
Overall	-	-	10.9 (12.4)	B (B)	-
Chalmers Street South and South Street					
WBLR	>180	0.06 (0.09)	9.5 (9.7)	A (A)	13.2 (13.2)
NBTR	>150	0.04 (0.06)	0.0 (0.0)	A (A)	- (1.2)
SBLT	>40	0.01 (0.01)	1.3 (1.5)	A (A)	2.3 (4.8)
Overall	-	-	2.8 (3.1)	A (A)	-
Elgin Street South and South Street					
EBLR	>180	0.05 (0.11)	12.6 (12.7)	B (B)	10.3 (13.2)
NBLT	>50	0.03 (0.05)	1.1 (1.9)	A (A)	6.6 (13.6)
SBTR	>100	0.11 (0.25)	0.0 (0.0)	A (A)	0.9 (-)
Overall	-	-	1.3 (1.6)	A (A)	-
Chalmers Street South and Site Access					
WBLR	>50	0.06 (0.05)	9.1 (9.1)	A (A)	14.8 (14.1)
NBTR	>40	0.07 (0.06)	0.0 (0.0)	A (A)	1.2 (-)
SBLT	>50	0.01 (0.04)	1.7 (2.9)	A (A)	2.3 (7.1)
Overall	-	-	2.4 (2.8)	A (A)	-

With mitigation measures, the northbound movements at Chalmers Street and Main Street intersection during the AM peak have improved to a non-critical LOS grade of D. The eastbound queue length at Elgin Street South and Main Street reduced by 5 meters, remaining slightly critical. Considering the conservative assumptions of 2% annual background growth and 100% auto trip and Synchro's limitations in capturing realistic operations under group control, the actual operations of the northbound approach are anticipated to be better than those shown in the results in the future horizon year.

5. Parking Review

The proposed development will consist of 228 affordable housing units.

The by-law requirement for the Multiple Dwelling Unit land use category as outlined in the City of Cambridge Zoning By-law dated March 21, 2018 (**Section 5.8**) is:

- Multiple Dwelling Unit: 1 space per unit plus 0.25 spaces per unit for visitors, with such visitor spaces clearly marked for visitors.

In addition, parking supply ratio was reviewed as per the ITE Parking Generation Manual 5th edition. The average parking supply ratio for Land Use 223 - Affordable Housing in a general urban/suburban setting is 1.3 spaces per dwelling unit.

Based on the preceding by-law requirement and ITE Parking Generation average parking supply rate, the parking supply requirements for the proposed development are summarized in **Table 10**. It is also important to note that the bylaw requirement for apartment dwelling units is the same.

Table 10: Zoning By-law Parking Requirement

Land Use	Units	Requirements	Calculated Parking Supply per By-Law
Multiple Dwelling Unit	228	By-law: 1 space per unit plus 0.25 spaces per unit for visitors.	285
Affordable Housing (ITE LUC 223)		ITE Parking Generation Manual: 1.3 spaces per dwelling unit.	297

6. Conclusion

Based on the analysis results, the following conclusions can be made:

- The analysis results indicate that all movements at study intersections are operating with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under existing conditions.
- The site is expected to generate 66 new auto trips during the weekday AM peak hour and 100 new auto trips during the weekday PM peak hour.
- The analysis results indicate that all movements at study intersections are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future conditions except for the northbound approach at Chalmers Street South and Main Street South and eastbound queue at Elgin Street South and Main Street in the Future Total conditions.
- Mitigation measures of optimizing cycle lengths and signal timing splits for Main Street and Chalmers Street South and Elgin Street South and Main Street are recommended under 2030 future total scenarios.
- The parking supply recommended by the City of Cambridge's by-law is 285 parking spaces. The parking supply recommended by the ITE Parking Generation Manual is 297 parking spaces.

A

Appendix A

Existing Traffic Counts and Signal Timing Plans



CURRENT TRAFFIC SIGNAL TIMING

INT #	757	MAIN STREET @ Elgin Street	T08-50/ 30C
-------	-----	----------------------------	-------------

Date Prepared: January 29, 2025

Mode of Control Pre-timed running SEMI-ACTUATED

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

<u>Pattern 1</u>	7:00-15:00 & 19:00-21:00 M-F, 8:30-21:00 Sat, 9:00-20:00 Sun		OFFSET	93%
MAIN STREET				
Green	41.3 seconds			
Amber	4.0 seconds	Walk	33.3 seconds	
All Red	2.0 seconds	FDW	8.0 seconds	

<u>Elgin Street</u>								
Green	Min	10.0	seconds	<u>Pedestrian Call</u>				
	Ext	3.0	seconds	Green/Walk	8.0	seconds		
	Max	21.8	seconds	Green/FDW	7.0	seconds		
				Green/SDW	6.8	seconds		
Amber		4.0	seconds	Amber	4.0	seconds		
All Red		2.0	seconds	All Red	2.0	seconds		
TOTAL		75.0	seconds					

<u>Pattern 2</u>	15:00-19:00 Monday to Friday		OFFSET	90%
MAIN STREET				
Green	52.5	seconds		
Amber	4.0	seconds	Walk	44.5 seconds
All Red	2.0	seconds	FDW	8.0 seconds

<u>Elgin Street</u>								
Green	Min	10.0	seconds	<u>Pedestrian Call</u>				
	Ext	3.0	seconds	Green/Walk	8.0	seconds		
	Max	25.5	seconds	Green/FDW	7.0	seconds		
				Green/SDW	10.5	seconds		
Amber		4.0	seconds	Amber	4.0	seconds		
All Red		2.0	seconds	All Red	2.0	seconds		
TOTAL		90.0	seconds					

<u>Max 1</u>	All Other Times			
MAIN STREET				
Green	30.0	seconds		
Amber	4.0	seconds	Walk	22.0 seconds
All Red	2.0	seconds	FDW	8.0 seconds

<u>Elgin Street</u>								
Green	Min	10.0	seconds	<u>Pedestrian Call</u>				
	Ext	3.0	seconds	Green/Walk	8.0	seconds		
	Max	20.0	seconds	Green/FDW	7.0	seconds		
				Green/SDW	5.0	seconds		
Amber		4.0	seconds	Amber	4.0	seconds		
All Red		2.0	seconds	All Red	2.0	seconds		
TOTAL		62.0	seconds					

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

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



CURRENT TRAFFIC SIGNAL TIMING

INT # **934**

MAIN STREET/CONCESSION @ Chalmers Street

T08-50/

Date Prepared: **January 29, 2025**

Mode of Control **Semi-Actuated**

Left Info **Actuated** **SE LT - MAIN STREET** via **phase omits**
Actuated **EB LT - MAIN STREET/CONCESSION** via **phase omits**
Note: There is a 3 second lag between the start of the SELT and EBLT flashing arrows

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

Pattern 1 OFFSET 0% 07:00 - 15:00 & 19:00 - 21:00 Monday - Friday; 08:30 - 21:00 Sat; 09:00 - 20:00 Sun

MAIN STREET

SEL Green Arrow	Min	7.0	seconds
	Ext	3.0	seconds
	Max	12.3	seconds
SEL Amber Arrow		3.3	seconds
All Red		2.4	seconds

MAIN STREET/CONCESSION STREET

EB/WB Thru Green		26.2	seconds
Amber		3.3	seconds
All Red		3.5	seconds

MAIN STREET/CONCESSION STREET

EB LT/Thru Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	12.3	seconds
EBL Amber Arrow		3.3	seconds
All Red		2.4	seconds

Chalmers Street

Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	18.8	seconds
Amber		3.3	seconds
All Red		1.9	seconds
TOTAL		75.0	seconds

Pedestrian Call

Green/Walk	10.0	seconds
Green/FDW	8.0	seconds
Green/SDW	0.8	seconds
Amber	3.3	seconds
All Red	1.9	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 OFFSET 0%

15:00 - 19:00 Monday - Friday

MAIN STREET

SEL Green Arrow	Min	7.0	seconds
	Ext	3.0	seconds
	Max	16.8	seconds
SEL Amber Arrow		3.3	seconds
All Red		2.4	seconds

MAIN STREET/CONCESSION STREET

EB/WB Thru Green		36.4	seconds
Amber		3.3	seconds
All Red		3.5	seconds

Chalmers Street

Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	19.1	seconds
Amber		3.3	seconds
All Red		1.9	seconds
TOTAL		90.0	seconds

Max 2

All Other Times

MAIN STREET

SEL Green Arrow	Min	7.0	seconds
	Ext	3.0	seconds
	Max	20.0	seconds
SEL Amber Arrow		3.3	seconds
All Red		2.4	seconds

MAIN STREET/CONCESSION STREET

EB/WB Thru Green		20.0	seconds
Amber		3.3	seconds
All Red		3.5	seconds

Chalmers Street

Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	15.0	seconds
Amber		3.3	seconds
All Red		1.9	seconds
TOTAL		72.7	seconds

MAIN STREET/CONCESSION STREET

EB LT/Thru Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	12.3	seconds
EBL Amber Arrow		3.3	seconds
All Red		2.4	seconds

Walk	29.4	seconds
FDW	7.0	seconds

Pedestrian Call

Green/Walk	10.0	seconds
Green/FDW	8.0	seconds
Green/SDW	1.1	seconds
Amber	3.3	seconds
All Red	1.9	seconds

MAIN STREET/CONCESSION STREET

EB LT/Thru Green	Min	7.0	seconds
	Ext	3.0	seconds
	Max	20.0	seconds
EBL Amber Arrow		3.3	seconds
All Red		2.4	seconds

Walk	13.0	seconds
FDW	7.0	seconds

Pedestrian Call

Green/Walk	10.0	seconds
Green/FDW	8.0	seconds
Green/SDW	0.0	seconds
Amber	3.3	seconds
All Red	1.9	seconds

Elliott St @ Chalmers St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge

Site #: 0000000004

Intersection: Chalmers St S & Elliott St

TFR File #: 4

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Chalmers St S runs N/S

North Leg Total: 127

North Entering: 75

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	1	0	1
Trucks	0	0	0
Cars	57	17	74
Totals	58	17	



Heavys	0
Trucks	1
Cars	51
Totals	52

East Leg Total: 89

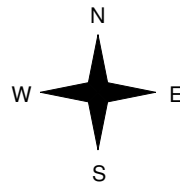
East Entering: 38

East Peds: 4

Peds Cross: $\nlessgtr$



Chalmers St S



Cars	Trucks	Heavys	Totals
19	0	0	19



Cars	Trucks	Heavys	Totals
19	0	0	19
38	0	0	

Elliott St



Chalmers St S



Cars	76
Trucks	0
Heavys	1
Totals	77



Cars	32	33	65
Trucks	1	0	1
Heavys	0	1	1
Totals	33	34	

Cars	Trucks	Heavys	Totals
50	0	1	51

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 67

South Leg Total: 144

Comments

Elliott St @ Chalmers St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

Municipality: Cambridge

Site #: 0000000004

Intersection: Chalmers St S & Elliott St

TFR File #: 4

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Chalmers St S runs N/S

North Leg Total: 149

North Entering: 50

North Peds: 0

Peds Cross: ∇

Heavys	0	0	0
Trucks	0	0	0
Cars	34	16	50
Totals	34	16	

Heavys	0
Trucks	0
Cars	99
Totals	99

East Leg Total: 72

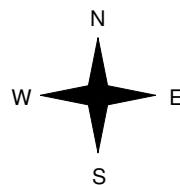
East Entering: 36

East Peds: 3

Peds Cross: ∇



Chalmers St S



Cars	Trucks	Heavys	Totals
19	0	0	19
17	0	0	17
36	0	0	

Elliott St



Chalmers St S

Cars	51
Trucks	0
Heavys	0
Totals	51



Cars	80	20	100
Trucks	0	0	0
Heavys	0	0	0
Totals	80	20	

Cars	Trucks	Heavys	Totals
36	0	0	36

Peds Cross: ∇

South Peds: 0

South Entering: 100

South Leg Total: 151

Comments

Elliott St @ Chalmers St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:30:00

To: 16:30:00

Municipality: Cambridge

Site #: 0000000004

Intersection: Chalmers St S & Elliott St

TFR File #: 4

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Chalmers St S runs N/S

North Leg Total: 179

North Entering: 95

North Peds: 1

Peds Cross: 

Heavys	0	0	0
Trucks	0	0	0
Cars	51	44	95
Totals	51	44	



Heavys	1
Trucks	0
Cars	83
Totals	84

East Leg Total: 151

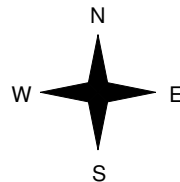
East Entering: 69

East Peds: 9

Peds Cross: 



Chalmers St S



Cars	Trucks	Heavys	Totals
34	0	0	34
35	0	0	35
69	0	0	



Elliott St



Cars	Trucks	Heavys	Totals
81	0	1	82

Chalmers St S



Cars	86	Cars	49	37	86
Trucks	0	Trucks	0	0	0
Heavys	0	Heavys	1	1	2
Totals	86	Totals	50	38	



Peds Cross: 

South Peds: 1

South Entering: 88

South Leg Total: 174

Comments

Elliott St @ Chalmers St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000004
Intersection: Chalmers St S & Elliott St
TFR File #: 4
Count date: 30-Jan-2025

Weather conditions:
Cloudy/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

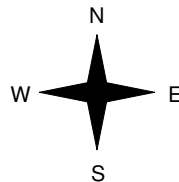
Major Road: Chalmers St S runs N/S

North Leg Total: 1075
North Entering: 552
North Peds: 1
Peds Cross: $\bowtie$

Heavys	1	1	2
Trucks	0	0	0
Cars	368	182	550
Totals	369	183	

Heavys	2
Trucks	6
Cars	515
Totals	523

East Leg Total: 714
East Entering: 349
East Peds: 39
Peds Cross: $\bowtie$



	Cars	Trucks	Heavys	Totals
Northbound	166	1	1	168
Southbound	180	1	0	181
Totals	346	2	1	

Elliott St



Chalmers St S

Cars	548	Cars	349	179	528
Trucks	1	Trucks	5	0	5
Heavys	1	Heavys	1	3	4
Totals	550	Totals	355	182	

Peds Cross: $\bowtie$
South Peds: 4
South Entering: 537
South Leg Total: 1087

Comments

Elliott St @ Elgin St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge

Site #: 0000000006

Intersection: Elgin St S & Elliott St

TFR File #: 6

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Elgin St S runs N/S

North Leg Total: 419

North Entering: 128

North Peds: 4

Peds Cross: $\bowtie$

Heavys	0	2	1	3
Trucks	0	1	0	1
Cars	6	115	3	124
Totals	6	118	4	

Heavys	4
Trucks	2
Cars	285
Totals	291

East Leg Total: 102

East Entering: 38

East Peds: 1

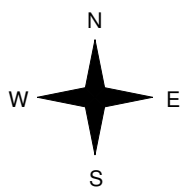
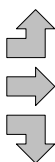
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
0	0	36	36



Elliott St

Heavys	Trucks	Cars	Totals
0	0	12	12
0	0	29	29
1	0	12	13
1	0	53	



Elgin St S

Cars	Trucks	Heavys	Totals
4	0	0	4
18	0	0	18
16	0	0	16
38	0	0	

Elliott St



Cars	Trucks	Heavys	Totals
63	0	1	64

Peds Cross: $\bowtie$

West Peds: 3

West Entering: 54

West Leg Total: 90

Cars	143
Trucks	1
Heavys	3
Totals	147



Cars	12	269	31	312
Trucks	0	2	0	2
Heavys	0	4	0	4
Totals	12	275	31	

Peds Cross: $\bowtie$

South Peds: 1

South Entering: 318

South Leg Total: 465

Comments

Elliott St @ Elgin St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

Municipality: Cambridge

Site #: 0000000006

Intersection: Elgin St S & Elliott St

TFR File #: 6

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elgin St S runs N/S

North Leg Total: 299

North Entering: 130

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	0	0	0
Trucks	0	1	0	1
Cars	4	121	4	129
Totals	4	122	4	



Heavys 2

Trucks 0

Cars 167

Totals 169

East Leg Total: 105

East Entering: 52

East Peds: 2

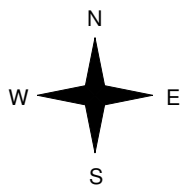
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	0	34	34



Elliott St

Heavys	Trucks	Cars	Totals
0	0	6	6
0	0	19	19
0	0	12	12
0	0	37	



Elgin St S

Cars	Trucks	Heavys	Totals
6	0	0	6
22	0	0	22
24	0	0	24
52	0	0	



Elliott St



Cars	Trucks	Heavys	Totals
52	1	0	53

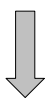
Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 37

West Leg Total: 71

Cars	157	Cars	8	155	29	192
Trucks	1	Trucks	0	0	1	1
Heavys	0	Heavys	0	2	0	2
Totals	158	Totals	8	157	30	



Peds Cross: $\nlessgtr$

South Peds: 3

South Entering: 195

South Leg Total: 353

Comments

Elliott St @ Elgin St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Cambridge

Site #: 0000000006

Intersection: Elgin St S & Elliott St

TFR File #: 6

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elgin St S runs N/S

North Leg Total: 493

North Entering: 280

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	1	0	1
Trucks	0	0	0	0
Cars	16	253	10	279
Totals	16	254	10	



Heavys 2

Trucks 1

Cars 210

Totals 213

East Leg Total: 193

East Entering: 114

East Peds: 2

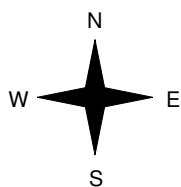
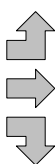
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	0	65	65



Elliott St

Heavys	Trucks	Cars	Totals
0	0	10	10
0	0	28	28
0	1	24	25
0	1	62	



Elgin St S

Cars	Trucks	Heavys	Totals
9	0	0	9
39	0	0	39
65	0	1	66
113	0	1	



Elliott St



Cars	Trucks	Heavys	Totals
79	0	0	79

Peds Cross: $\nlessgtr$

West Peds: 2

West Entering: 63

West Leg Total: 128

Cars	342	Cars	10	191	41	242
Trucks	1	Trucks	0	1	0	1
Heavys	2	Heavys	0	2	0	2
Totals	345	Totals	10	194	41	



Peds Cross: $\nlessgtr$

South Peds: 2

South Entering: 245

South Leg Total: 590

Comments

Elliott St @ Elgin St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000006
Intersection: Elgin St S & Elliott St
TFR File #: 6
Count date: 30-Jan-2025

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elgin St S runs N/S

North Leg Total: 3035
 North Entering: 1383
 North Peds: 8
 Peds Cross: $\bowtie$

	Heavys	Trucks	Cars	Totals
0	8	2	10	
0	8	0	8	
65	1249	51	1365	
Totals	65	1265	53	



	Heavys	Trucks	Cars	Totals
26	11	1615	1652	

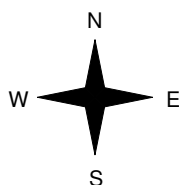
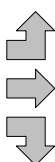
East Leg Total: 933
 East Entering: 487
 East Peds: 21
 Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
2	1	325	328



Elliott St

Heavys	Trucks	Cars	Totals
1	0	72	73
1	0	185	186
3	1	115	119
5	1	372	



Elgin St S



Cars	Trucks	Heavys	Totals
65	0	0	65
186	1	0	187
233	1	1	235
484	2	1	



Elliott St



Cars	Trucks	Heavys	Totals
441	1	4	446

Peds Cross: $\bowtie$
 West Peds: 18
 West Entering: 378
 West Leg Total: 706

Cars	Trucks	Heavys	Totals
1597	10	12	1619



Cars	Trucks	Heavys	Totals
74	0	2	76
1478	11	25	1514
205	1	1	207
1757	12	28	

Peds Cross: $\bowtie$
 South Peds: 18
 South Entering: 1797
 South Leg Total: 3416

Comments

Elliott St @ Lowell St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge
Site #: 0000000005
Intersection: Elliott St & Lowell St S
TFR File #: 5
Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Elliott St runs W/E

North Leg Total: 8

North Entering: 5

North Peds: 0

Peds Cross: $\nless$

Heavys	0	0	0
Trucks	0	0	0
Cars	3	2	5
Totals	3	2	



Heavys 0

Trucks 0

Cars 3

Totals 3

East Leg Total: 89

East Entering: 36

East Peds: 1

Peds Cross: $\nless$

Heavys	Trucks	Cars	Totals
0	0	37	37

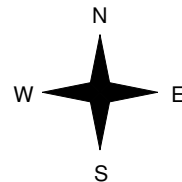


Elliott St

Heavys	Trucks	Cars	Totals
0	0	1	1
1	0	50	51
1	0	51	



Lowell St S



Cars	Trucks	Heavys	Totals
2	0	0	2
34	0	0	34
36	0	0	

Elliott St



Cars	Trucks	Heavys	Totals
52	0	1	53

Peds Cross: $\nless$

West Peds: 0

West Entering: 52

West Leg Total: 89

Comments

Elliott St @ Lowell St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

Municipality: Cambridge

Site #: 0000000005

Intersection: Elliott St & Lowell St S

TFR File #: 5

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elliott St runs W/E

North Leg Total: 7

North Entering: 6

North Peds: 0

Peds Cross: $\times$

Heavys	0	0	0
Trucks	0	0	0
Cars	4	2	6
Totals	4	2	



Heavys 0

Trucks 0

Cars 1

Totals 1

East Leg Total: 73

East Entering: 34

East Peds: 0

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
0	0	37	37



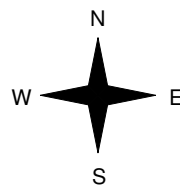
Lowell St S



Cars	Trucks	Heavys	Totals
1	0	0	1
33	0	0	33
34	0	0	



Elliott St



Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	37	37
0	0	37	



Elliott St



Cars	Trucks	Heavys	Totals
39	0	0	39

Peds Cross: $\times$

West Peds: 0

West Entering: 37

West Leg Total: 74

Comments

Elliott St @ Lowell St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:30:00

To: 16:30:00

Municipality: Cambridge

Site #: 0000000005

Intersection: Elliott St & Lowell St S

TFR File #: 5

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elliott St runs W/E

North Leg Total: 12

North Entering: 8

North Peds: 0

Peds Cross: $\times$

Heavys	0	0	0
Trucks	0	0	0
Cars	6	2	8
Totals	6	2	



Heavys	0
Trucks	0
Cars	4
Totals	4

East Leg Total: 139

East Entering: 62

East Peds: 0

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
0	0	67	67



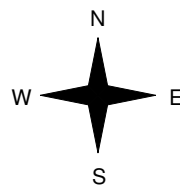
Lowell St S



Cars	Trucks	Heavys	Totals
1	0	0	1
61	0	0	61
62	0	0	



Elliott St



Heavys	Trucks	Cars	Totals
0	0	3	3
1	0	74	75
1	0	77	



Elliott St



Cars	Trucks	Heavys	Totals
76	0	1	77

Peds Cross: $\times$

West Peds: 0

West Entering: 78

West Leg Total: 145

Comments

Elliott St @ Lowell St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000005
Intersection: Elliott St & Lowell St S
TFR File #: 5
Count date: 30-Jan-2025

Weather conditions:
Cloudy/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elliott St runs W/E

North Leg Total: 92
North Entering: 64
North Peds: 0
Peds Cross: $\nless$

Heavys	0	0	0
Trucks	1	0	1
Cars	41	22	63
Totals	42	22	



Heavys	0
Trucks	0
Cars	28
Totals	28

East Leg Total: 693
East Entering: 319
East Peds: 1
Peds Cross: $\nless$

Heavys	Trucks	Cars	Totals
1	2	344	347



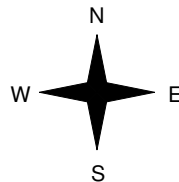
Lowell St S



Cars	Trucks	Heavys	Totals
14	0	0	14
303	1	1	305
317	1	1	



Elliott St



Heavys	Trucks	Cars	Totals
0	0	14	14
4	1	347	352
4	1	361	



Elliott St



Cars	Trucks	Heavys	Totals
369	1	4	374

Peds Cross: $\nless$
West Peds: 4
West Entering: 366
West Leg Total: 713

Comments

Main St @ Chalmers St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge

Site #: 0000000001

Intersection: Main St & Chalmers St

TFR File #: 1

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 107

North Entering: 57

North Peds: 7

Peds Cross: $\bowtie$

Heavys	0	1	0	1
Trucks	1	0	0	1
Cars	18	31	6	55
Totals	19	32	6	



Heavys	0
Trucks	0
Cars	50
Totals	50

East Leg Total: 947

East Entering: 414

East Peds: 4

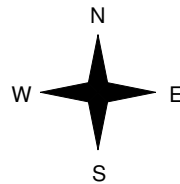
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
8	5	420	433



Main St

Heavys	Trucks	Cars	Totals
0	0	16	16
4	4	492	500
0	0	19	19
4	4	527	



Chalmers St N



Cars	Trucks	Heavys	Totals
5	0	0	5
385	4	8	397
12	0	0	12
402	4	8	

Main St



Cars	Trucks	Heavys	Totals
525	4	4	533

Peds Cross: $\bowtie$

West Peds: 6

West Entering: 535

West Leg Total: 968

Cars	62	Cars	17	29	27	73
Trucks	0	Trucks	0	0	0	0
Heavys	1	Heavys	0	0	0	0
Totals	63	Totals	17	29	27	



Chalmers St S

Peds Cross: $\bowtie$

South Peds: 3

South Entering: 73

South Leg Total: 136

Comments

Main St @ Chalmers St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:15:00

To: 13:15:00

Municipality: Cambridge

Site #: 0000000001

Intersection: Main St & Chalmers St

TFR File #: 1

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 101

North Entering: 60

North Peds: 8

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	1	1	1	3
Cars	37	17	3	57
Totals	38	18	4	



Heavys	0
Trucks	2
Cars	39
Totals	41

East Leg Total: 1006

East Entering: 484

East Peds: 2

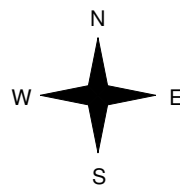
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
2	4	550	556



Main St

Heavys	Trucks	Cars	Totals
0	1	20	21
2	14	474	490
0	0	16	16
2	15	510	



Chalmers St N

Cars	Trucks	Heavys	Totals
3	1	0	4
460	3	2	465
15	0	0	15
478	4	2	



Main St



Cars	Trucks	Heavys	Totals
505	15	2	522

Peds Cross: $\times$

West Peds: 2

West Entering: 527

West Leg Total: 1083

Cars	48	Cars	53	16	28	97
Trucks	1	Trucks	0	0	0	0
Heavys	0	Heavys	0	0	0	0
Totals	49	Totals	53	16	28	



Chalmers St S

Peds Cross: $\times$

South Peds: 1

South Entering: 97

South Leg Total: 146

Comments

Main St @ Chalmers St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

Municipality: Cambridge

Site #: 0000000001

Intersection: Main St & Chalmers St

TFR File #: 1

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 151

North Entering: 120

North Peds: 9

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
0	0	0	0	0
0	0	0	0	0
39	73	8	120	
Totals	39	73	8	



	Heavys	Trucks	Cars	Totals
0	0	0	0	0
0	0	0	0	0
31	31	0	31	
Totals	31	0	31	

East Leg Total: 1359

East Entering: 673

East Peds: 1

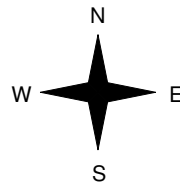
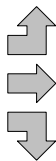
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	1	726	730



Main St

Heavys	Trucks	Cars	Totals
0	0	10	10
2	3	639	644
0	0	34	34
Totals	2	3	683



Chalmers St N

Cars	Trucks	Heavys	Totals
2	0	0	2
657	1	3	661
10	0	0	10
Totals	669	1	3



Main St



Cars	Trucks	Heavys	Totals
681	3	2	686

Peds Cross: $\times$

West Peds: 2

West Entering: 688

West Leg Total: 1418

Cars	Trucks	Heavys	Totals
117	0	0	117
30	0	0	30
19	0	0	19
34	0	0	34
Totals	83	0	0



Chalmers St S

Peds Cross: $\times$

South Peds: 6

South Entering: 83

South Leg Total: 200

Comments

Main St @ Chalmers St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000001
Intersection: Main St & Chalmers St
TFR File #: 1
Count date: 30-Jan-2025

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Main St runs W/E

North Leg Total: 894
 North Entering: 594
 North Peds: 57
 Peds Cross: $\bowtie$

	Heavys	Trucks	Cars	Totals
0	1	0	1	2
3	3	1	7	7
227	311	48	586	586
230	315	49		

	Heavys	Trucks	Cars	Totals
1	2	297	300	300

East Leg Total: 8575
 East Entering: 3983
 East Peds: 14
 Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
53	34	4202	4289

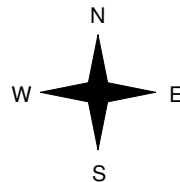


Main St

Heavys	Trucks	Cars	Totals
1	1	106	108
35	42	4208	4285
0	0	155	155
36	43	4469	



Chalmers St S



Cars	Trucks	Heavys	Totals
24	1	0	25
3779	31	53	3863
95	0	0	95
3898	32	53	

Main St



Cars	Trucks	Heavys	Totals
4509	45	38	4592

Peds Cross: $\bowtie$
 West Peds: 11
 West Entering: 4548
 West Leg Total: 8837

	Cars	Trucks	Heavys	Totals
561	3	1	565	565
196	0	0	196	196
167	0	0	167	167
253	2	3	258	258
616				

Peds Cross: $\bowtie$
 South Peds: 31
 South Entering: 621
 South Leg Total: 1186

Comments

Main St @ Elgin St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Cambridge
Site #: 0000000003
Intersection: Main St & Elgin St
TFR File #: 3
Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 348
 North Entering: 122
 North Peds: 1
 Peds Cross: $\bowtie$

	Heavys	Trucks	Cars	Totals
0	3	0	3	3
0	1	0	1	1
21	91	6	118	
Totals	21	95	6	



	Heavys	Trucks	Cars	Totals
3	2	221	226	

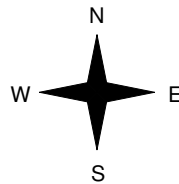
East Leg Total: 884
 East Entering: 340
 East Peds: 2
 Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
7	8	376	391



Main St

Heavys	Trucks	Cars	Totals
1	0	24	25
4	6	496	506
1	0	21	22
6	6	541	



Elgin St S



Cars	Trucks	Heavys	Totals
2	0	0	2
312	5	7	324
13	0	1	14
327	5	8	

Main St



Cars	Trucks	Heavys	Totals
533	6	5	544

Peds Cross: $\bowtie$
 West Peds: 1
 West Entering: 553
 West Leg Total: 944

	Cars	Trucks	Heavys	Totals
125	1	5	131	



	Cars	Trucks	Heavys	Totals
43	3	0	46	
195	2	2	199	
31	0	1	32	
269	5	3		

Peds Cross: $\bowtie$
 South Peds: 3
 South Entering: 277
 South Leg Total: 408

Comments

Main St @ Elgin St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 13:00:00

To: 14:00:00

Municipality: Cambridge
Site #: 0000000003
Intersection: Main St & Elgin St
TFR File #: 3
Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 266

North Entering: 130

North Peds: 11

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
1	0	0	1	1
2	0	2	1	3
3	25	98	3	126
Totals	26	100	4	



	Heavys	Trucks	Cars	Totals
2	4	130		136

East Leg Total: 985

East Entering: 440

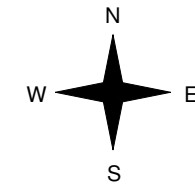
East Peds: 2

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
8	8	453	469



Main St



Cars	Trucks	Heavys	Totals
4	0	0	4
403	8	6	417
19	0	0	19
426	8	6	

Main St



Heavys	Trucks	Cars	Totals
0	1	21	22
7	10	481	498
0	2	23	25
7	13	525	



Elgin St S



Cars	Trucks	Heavys	Totals
527	11	7	545

Peds Cross: $\times$
 West Peds: 2
 West Entering: 545
 West Leg Total: 1014

Cars	Trucks	Heavys	Totals
140	4	0	144
25	0	1	26
105	3	2	110
43	0	0	43
173	3	3	



Peds Cross: $\times$
 South Peds: 2
 South Entering: 179
 South Leg Total: 323

Comments

Main St @ Elgin St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

Municipality: Cambridge

Site #: 0000000003

Intersection: Main St & Elgin St

TFR File #: 3

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 429

North Entering: 258

North Peds: 5

Peds Cross: $\times$

Heavys	1	0	0	1
Trucks	0	0	0	0
Cars	38	214	5	257
Totals	39	214	5	



Heavys 2

Trucks 1

Cars 168

Totals 171

East Leg Total: 1274

East Entering: 624

East Peds: 3

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	1	666	670

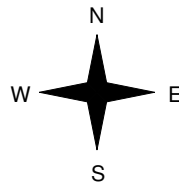


Main St

Heavys	Trucks	Cars	Totals
0	0	33	33
2	3	607	612
0	0	33	33
2	3	673	



Elgin St N



Cars	Trucks	Heavys	Totals
2	0	0	2
593	1	2	596
26	0	0	26
621	1	2	



Main St



Cars	Trucks	Heavys	Totals
645	3	2	650

Peds Cross: $\times$

West Peds: 0

West Entering: 678

West Leg Total: 1348

Cars	273
Trucks	0
Heavys	0
Totals	273



Cars	35	133	33	201
Trucks	0	1	0	1
Heavys	0	2	0	2
Totals	35	136	33	

Peds Cross: $\times$

South Peds: 5

South Entering: 204

South Leg Total: 477

Comments

Main St @ Elgin St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000003
Intersection: Main St & Elgin St
TFR File #: 3
Count date: 30-Jan-2025

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Signalized Intersection ****

Major Road: Main St runs W/E

North Leg Total: 2530
 North Entering: 1241
 North Peds: 39
 Peds Cross: $\nlessgtr$

	Heavys	Trucks	Cars	Totals
Elgin St N	6	9	0	15
Trucks	2	7	2	11
Cars	209	974	32	1215
Totals	217	990	34	

	Heavys	Trucks	Cars	Totals
Elgin St S	24	15	1250	1289
Trucks	15			
Cars				
Totals				

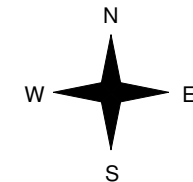
East Leg Total: 8217
 East Entering: 3731
 East Peds: 13
 Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
53	47	3913	4013



Main St

Heavys	Trucks	Cars	Totals
4	2	176	182
38	43	4059	4140
1	5	241	247
43	50	4476	



Elgin St S

Cars	Trucks	Heavys	Totals
23	0	0	23
3458	41	42	3541
166	0	1	167
3647	41	43	

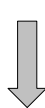
Main St



Cars	Trucks	Heavys	Totals
4402	45	39	4486

Peds Cross: $\nlessgtr$
 West Peds: 16
 West Entering: 4569
 West Leg Total: 8582

	Cars	Trucks	Heavys	Totals
Elgin St N	1381	12	11	1404
Trucks				
Heavys				
Totals				



	Cars	Trucks	Heavys	Totals
Elgin St S	246	4	5	255
Trucks				
Heavys				
Totals				

Peds Cross: $\nlessgtr$
 South Peds: 37
 South Entering: 1651
 South Leg Total: 3055

Comments

Main St @ Lowell St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Cambridge

Site #: 0000000002

Intersection: Main St & Lowell St

TFR File #: 2

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Main St runs W/E

North Leg Total: 13

North Entering: 4

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	2	0	2	4
Totals	2	0	2	



Heavys 0

Trucks 0

Cars 9

Totals 9

East Leg Total: 942

East Entering: 390

East Peds: 2

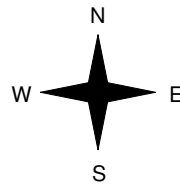
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
7	4	382	393



Main St

Heavys	Trucks	Cars	Totals
0	0	8	8
5	3	541	549
0	0	0	0
5	3	549	



Lowell St N

Cars	Trucks	Heavys	Totals
0	0	0	0
379	4	7	390
0	0	0	0
379	4	7	



Main St



Cars	Trucks	Heavys	Totals
544	3	5	552

Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 557

West Leg Total: 950

Cars	0
Trucks	0
Heavys	0
Totals	0



Cars	1	1	1	3
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	1	1	1	

Peds Cross: $\nlessgtr$

South Peds: 4

South Entering: 3

South Leg Total: 3

Comments

Main St @ Lowell St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 13:00:00

To: 14:00:00

Municipality: Cambridge

Site #: 0000000002

Intersection: Main St & Lowell St

TFR File #: 2

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 10

North Entering: 3

North Peds: 7

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	2	0	1	3
Totals	2	0	1	



Heavys 0

Trucks 1

Cars 6

Totals 7

East Leg Total: 1014

East Entering: 471

East Peds: 1

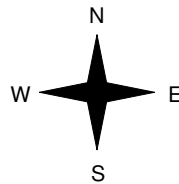
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
7	6	457	470



Main St

Heavys	Trucks	Cars	Totals
0	0	5	5
7	11	523	541
0	0	3	3
7	11	531	



Lowell St N

Lowell St S

Cars	Trucks	Heavys	Totals
1	1	0	2
454	6	7	467
2	0	0	2
457	7	7	

Main St



Cars	Trucks	Heavys	Totals
525	11	7	543

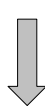
Peds Cross: $\times$

West Peds: 0

West Entering: 549

West Leg Total: 1019

Cars	5
Trucks	0
Heavys	0
Totals	5



Cars	1	0	1	2
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	1	0	1	

Peds Cross: $\times$

South Peds: 2

South Entering: 2

South Leg Total: 7

Comments

Main St @ Lowell St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

Municipality: Cambridge
Site #: 0000000002
Intersection: Main St & Lowell St
TFR File #: 2
Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Main St runs W/E

North Leg Total: 20

North Entering: 10

North Peds: 8

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
North	0	0	0	0
East	0	0	0	0
South	4	5	1	10
Totals	4	5	1	



Heavys 0

Trucks 0

Cars 10

Totals 10

East Leg Total: 1347

East Entering: 671

East Peds: 1

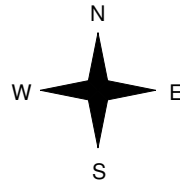
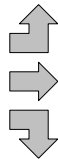
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	1	661	665



Main St

Heavys	Trucks	Cars	Totals
0	0	4	4
2	3	666	671
0	0	7	7
2	3	677	



Lowell St N

Cars	Trucks	Heavys	Totals
4	0	0	4
657	1	3	661
6	0	0	6
667	1	3	



Main St



Cars	Trucks	Heavys	Totals
671	3	2	676

Peds Cross: $\times$

West Peds: 0

West Entering: 682

West Leg Total: 1347

Cars	Trucks	Heavys	Totals
18	0	0	18



Cars	Trucks	Heavys	Totals
0	0	0	0
2	0	0	2
4	0	0	4
6	0	0	

Peds Cross: $\times$

South Peds: 4

South Entering: 6

South Leg Total: 24

Comments

Main St @ Lowell St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000002
Intersection: Main St & Lowell St
TFR File #: 2
Count date: 30-Jan-2025

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Main St runs W/E

North Leg Total: 131
 North Entering: 66
 North Peds: 39
 Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
0	1	33	34
0	0	13	13
0	0	19	19
0	1	65	66

Heavys	Trucks	Cars	Totals
0	3	62	65

East Leg Total: 8579
 East Entering: 4005
 East Peds: 5
 Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
52	35	3900	3987

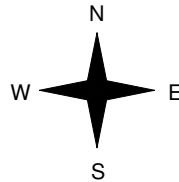


Main St

Heavys	Trucks	Cars	Totals
0	1	33	34
42	41	4457	4540
0	2	16	18
42	44	4506	4592



Lowell St S



Lowell St N

Cars	Trucks	Heavys	Totals
22	1	0	23
3861	34	52	3947
35	0	0	35
3918	35	52	4005



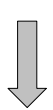
Main St



Cars	Trucks	Heavys	Totals
4491	41	42	4574

Peds Cross: $\times$
 West Peds: 1
 West Entering: 4592
 West Leg Total: 8579

Cars	Trucks	Heavys	Totals
64	2	0	66



Cars	Trucks	Heavys	Totals
6	0	0	6
7	1	0	8
15	0	0	15
28	1	0	29

Peds Cross: $\times$
 South Peds: 38
 South Entering: 29
 South Leg Total: 95

Comments

South St @ Chalmers St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge

Site #: 0000000007

Intersection: Chalmers St S & South St

TFR File #: 7

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Chalmers St S runs N/S

North Leg Total: 116

North Entering: 61

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	1	0	1
Trucks	0	0	0
Cars	54	6	60
Totals	55	6	



Heavys	1
Trucks	1
Cars	53
Totals	55

East Leg Total: 42

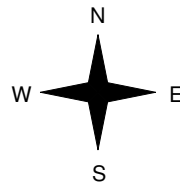
East Entering: 28

East Peds: 4

Peds Cross: $\nlessgtr$



Chalmers St S



Cars	Trucks	Heavys	Totals
9	1	1	11
17	0	0	17
26	1	1	



South St



Cars	Trucks	Heavys	Totals
13	0	1	14

Chalmers St S



Cars	71
Trucks	0
Heavys	1
Totals	72



Cars	44	7	51
Trucks	0	0	0
Heavys	0	1	1
Totals	44	8	

Peds Cross: $\nlessgtr$

South Peds: 3

South Entering: 52

South Leg Total: 124

Comments

South St @ Chalmers St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 11:30:00

To: 12:30:00

Municipality: Cambridge

Site #: 0000000007

Intersection: Chalmers St S & South St

TFR File #: 7

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Chalmers St S runs N/S

North Leg Total: 107

North Entering: 46

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	0	0
Trucks	0	0	0
Cars	38	8	46
Totals	38	8	

Heavys	0
Trucks	0
Cars	61
Totals	61

East Leg Total: 48

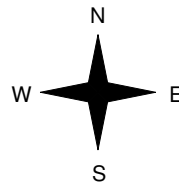
East Entering: 34

East Peds: 1

Peds Cross: $\nlessgtr$



Chalmers St S



Cars	Trucks	Heavys	Totals
18	0	0	18
16	0	0	16
34	0	0	

South St



Chalmers St S

Cars	54	Cars	43	5	48
Trucks	0	Trucks	0	1	1
Heavys	0	Heavys	0	0	0
Totals	54	Totals	43	6	

Cars	Trucks	Heavys	Totals
13	1	0	14

Peds Cross: $\nlessgtr$

South Peds: 2

South Entering: 49

South Leg Total: 103

Comments

South St @ Chalmers St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:30:00

To: 16:30:00

Municipality: Cambridge

Site #: 0000000007

Intersection: Chalmers St S & South St

TFR File #: 7

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Chalmers St S runs N/S

North Leg Total: 161

North Entering: 77

North Peds: 0

Peds Cross: $\times$

Heavys	0	0	0
Trucks	0	0	0
Cars	61	16	77
Totals	61	16	



Heavys 2

Trucks 0

Cars 82

Totals 84

East Leg Total: 64

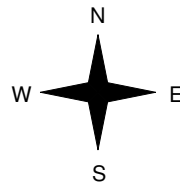
East Entering: 35

East Peds: 8

Peds Cross: $\times$



Chalmers St S



Cars	Trucks	Heavys	Totals
17	0	0	17



Cars	Trucks	Heavys	Totals
18	0	0	18
35	0	0	

South St



Cars	Trucks	Heavys	Totals
29	0	0	29

Chalmers St S



Cars	79
Trucks	0
Heavys	0
Totals	79



Cars	65	13	78
Trucks	0	0	0
Heavys	2	0	2
Totals	67	13	

Peds Cross: $\times$

South Peds: 10

South Entering: 80

South Leg Total: 159

Comments

South St @ Chalmers St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000007
Intersection: Chalmers St S & South St
TFR File #: 7
Count date: 30-Jan-2025

Weather conditions:
 Cloudy/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Chalmers St S runs N/S

North Leg Total: 840
 North Entering: 422
 North Peds: 0
 Peds Cross: $\nlessgtr$

Heavys	2	0	2
Trucks	1	0	1
Cars	357	62	419
Totals	360	62	

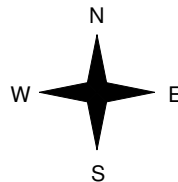


Heavys	4
Trucks	5
Cars	409
Totals	418

East Leg Total: 318
 East Entering: 172
 East Peds: 32
 Peds Cross: $\nlessgtr$



Chalmers St S



Cars	Trucks	Heavys	Totals
80	1	2	83
89	0	0	89
169	1	2	



South St



Cars	Trucks	Heavys	Totals
144	1	1	146

Chalmers St S



Cars	446
Trucks	1
Heavys	2
Totals	449



Cars	329	82	411
Trucks	4	1	5
Heavys	2	1	3
Totals	335	84	

Peds Cross: $\nlessgtr$
 South Peds: 22
 South Entering: 419
 South Leg Total: 868

Comments

South St @ Elgin St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Cambridge

Site #: 0000000008

Intersection: Elgin St S & South St

TFR File #: 8

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Elgin St S runs N/S

North Leg Total: 467

North Entering: 149

North Peds: 3

Peds Cross: 

Heavys	1	2	3
Trucks	0	1	1
Cars	8	137	145
Totals	9	140	



Heavys	4
Trucks	2
Cars	312
Totals	318

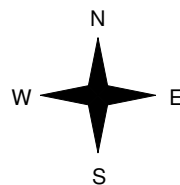
Heavys	Trucks	Cars	Totals
1	1	37	39



Elgin St S



South St



Heavys	Trucks	Cars	Totals
0	0	8	8
1	0	7	8
1	0	15	



Elgin St S

Peds Cross: 

West Peds: 8

West Entering: 16

West Leg Total: 55

Cars	144	Cars	29	304	333
Trucks	1	Trucks	1	2	3
Heavys	3	Heavys	0	4	4
Totals	148	Totals	30	310	



Peds Cross: 

South Peds: 0

South Entering: 340

South Leg Total: 488

Comments

South St @ Elgin St

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:00:00

To: 13:00:00

Municipality: Cambridge

Site #: 0000000008

Intersection: Elgin St S & South St

TFR File #: 8

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Elgin St S runs N/S

North Leg Total: 347

North Entering: 158

North Peds: 0

Peds Cross: 

Heavys	0	0	0
Trucks	0	1	1
Cars	4	153	157
Totals	4	154	



Heavys	2
Trucks	1
Cars	186
Totals	189

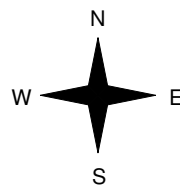
Heavys	Trucks	Cars	Totals
0	0	14	14



Elgin St S



South St



Heavys	Trucks	Cars	Totals
0	1	28	29
0	0	15	15
0	1	43	



Elgin St S



Peds Cross: 

West Peds: 1

West Entering: 44

West Leg Total: 58

Cars	168	Cars	10	158	168
Trucks	1	Trucks	0	0	0
Heavys	0	Heavys	0	2	2
Totals	169	Totals	10	160	



Peds Cross: 

South Peds: 2

South Entering: 170

South Leg Total: 339

Comments

South St @ Elgin St

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Cambridge

Site #: 0000000008

Intersection: Elgin St S & South St

TFR File #: 8

Count date: 30-Jan-2025

Weather conditions:

Cloudy/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: Elgin St S runs N/S

North Leg Total: 582

North Entering: 339

North Peds: 0

Peds Cross: 

Heavys	0	2	2
Trucks	0	1	1
Cars	19	317	336
Totals	19	320	



Heavys	2
Trucks	1
Cars	240
Totals	243

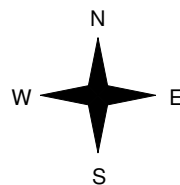
Heavys	Trucks	Cars	Totals
0	0	47	47



Elgin St S



South St



Heavys	Trucks	Cars	Totals
0	0	6	6
0	0	25	25
0	0	31	



Elgin St S



Peds Cross: 

West Peds: 4

West Entering: 31

West Leg Total: 78

Cars	342	Cars	28	234	262
Trucks	1	Trucks	0	1	1
Heavys	2	Heavys	0	2	2
Totals	345	Totals	28	237	



Peds Cross: 

South Peds: 2

South Entering: 265

South Leg Total: 610

Comments

South St @ Elgin St

Total Count Diagram

Municipality: Cambridge
Site #: 0000000008
Intersection: Elgin St S & South St
TFR File #: 8
Count date: 30-Jan-2025

Weather conditions:
Cloudy/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Elgin St S runs N/S

North Leg Total: 3388
North Entering: 1609
North Peds: 19
Peds Cross: $\bowtie$

Heavys	1	11
Trucks	0	10
Cars	109	1478
Totals	110	1499

12
10
1587



Heavys	28
Trucks	12
Cars	1739
Totals	1779

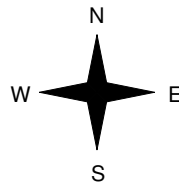
Heavys	Trucks	Cars	Totals
2	1	272	275



Elgin St S



South St



Heavys	Trucks	Cars	Totals
0	1	101	102
1	0	133	134
1	1	234	



Elgin St S

Peds Cross: $\bowtie$
West Peds: 33
West Entering: 236
West Leg Total: 511

Cars	1611
Trucks	10
Heavys	12
Totals	1633



Cars	163	1638
Trucks	1	11
Heavys	1	28
Totals	165	1677

Peds Cross: $\bowtie$
South Peds: 6
South Entering: 1842
South Leg Total: 3475

Comments

B

Appendix B Existing Traffic Operations

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	18	499	16	11	444	4	50	24	33	4	17	29
Future Volume (vph)	18	499	16	11	444	4	50	24	33	4	17	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1741			3373			1778			1738	
Flt Permitted		0.97			0.92			0.76			0.96	
Satd. Flow (perm)		1685			3098			1395			1670	
Peak-hour factor, PHF	0.64	0.97	0.80	0.46	0.78	1.00	0.32	0.75	0.75	0.50	0.71	0.91
Adj. Flow (vph)	28	514	20	24	569	4	156	32	44	8	24	32
RTOR Reduction (vph)	0	2	0	0	1	0	0	12	0	0	25	0
Lane Group Flow (vph)	0	560	0	0	596	0	0	220	0	0	39	0
Confl. Peds. (#/hr)	1		1	1		1	1		2	2		1
Heavy Vehicles (%)	1%	9%	0%	0%	7%	0%	0%	0%	1%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		46.7			28.7			16.3			16.3	
Effective Green, g (s)		46.7			28.7			16.3			16.3	
Actuated g/C Ratio		0.62			0.38			0.22			0.22	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1058			1185			303			362	
v/s Ratio Prot		c0.09										
v/s Ratio Perm		c0.24			0.19			c0.16			0.02	
v/c Ratio		0.53			0.50			0.73			0.11	
Uniform Delay, d1		8.0			17.7			27.3			23.5	
Progression Factor		0.48			0.75			1.00			1.00	
Incremental Delay, d2		0.4			1.5			8.4			0.1	
Delay (s)		4.2			14.7			35.7			23.7	
Level of Service		A			B			D			C	
Approach Delay (s)		4.2			14.7			35.7			23.7	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			14.4			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			75.0			Sum of lost time (s)			17.7			
Intersection Capacity Utilization			64.8%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	531	3	3	454	4	0	1	1	2	3	6
Future Volume (Veh/h)	5	531	3	3	454	4	0	1	1	2	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.42	0.96	0.75	0.38	0.83	0.50	0.25	0.25	0.25	0.50	0.38	0.50
Hourly flow rate (vph)	12	553	4	8	547	8	0	4	4	4	8	12
Pedestrians								5			5	
Lane Width (m)								3.6			3.6	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.89			0.83			0.88	0.88	0.83	0.88	0.88	0.89
vC, conflicting volume	560			562			1167	1160	560	1157	1158	556
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			366			836	828	363	825	826	436
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	98	99	98	97	98
cM capacity (veh/h)	994			991			238	265	565	249	266	550
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	569	563	8	24								
Volume Left	12	8	0	4								
Volume Right	4	8	4	12								
cSH	994	991	361	353								
Volume to Capacity	0.01	0.01	0.02	0.07								
Queue Length 95th (m)	0.3	0.2	0.5	1.7								
Control Delay (s)	0.3	0.2	15.2	15.9								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.3	0.2	15.2	15.9								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization			41.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	506	22	14	324	2	46	199	32	6	95	21
Future Volume (vph)	25	506	22	14	324	2	46	199	32	6	95	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1721			1701			1775			1787	
Flt Permitted		0.97			0.94			0.92			0.98	
Satd. Flow (perm)		1667			1609			1646			1753	
Peak-hour factor, PHF	0.78	0.96	0.55	0.50	0.88	0.50	0.77	0.86	0.57	0.75	0.79	0.75
Adj. Flow (vph)	32	527	40	28	368	4	60	231	56	8	120	28
RTOR Reduction (vph)	0	3	0	0	0	0	0	10	0	0	11	0
Lane Group Flow (vph)	0	596	0	0	400	0	0	337	0	0	145	0
Confl. Peds. (#/hr)	1		3	3		1	1		2	2		1
Heavy Vehicles (%)	1%	10%	1%	1%	12%	0%	3%	4%	1%	0%	4%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		43.9			43.9			19.1			19.1	
Effective Green, g (s)		43.9			43.9			19.1			19.1	
Actuated g/C Ratio		0.59			0.59			0.25			0.25	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		975			941			419			446	
v/s Ratio Prot												
v/s Ratio Perm		c0.36			0.25			c0.20			0.08	
v/c Ratio		0.61			0.42			0.81			0.32	
Uniform Delay, d1		10.0			8.6			26.2			22.7	
Progression Factor		0.32			1.00			1.00			1.00	
Incremental Delay, d2		2.5			1.4			10.7			0.4	
Delay (s)		5.7			10.0			37.0			23.1	
Level of Service		A			A			D			C	
Approach Delay (s)		5.7			10.0			37.0			23.1	
Approach LOS		A			A			D			C	
Intersection Summary												
HCM 2000 Control Delay		15.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		75.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		69.0%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	17	19	80	20	16	34
Future Volume (vph)	17	19	80	20	16	34
Peak Hour Factor	0.53	0.59	0.42	0.63	0.80	0.57
Hourly flow rate (vph)	32	32	190	32	20	60
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	64	222	80			
Volume Left (vph)	32	0	20			
Volume Right (vph)	32	32	0			
Hadj (s)	-0.20	-0.09	0.05			
Departure Headway (s)	4.3	4.0	4.3			
Degree Utilization, x	0.08	0.25	0.10			
Capacity (veh/h)	765	868	812			
Control Delay (s)	7.7	8.4	7.8			
Approach Delay (s)	7.7	8.4	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.1			
Level of Service			A			
Intersection Capacity Utilization			19.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	51	34	2	2	3
Future Volume (Veh/h)	1	51	34	2	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.80	0.77	0.50	0.50	0.38
Hourly flow rate (vph)	4	64	44	4	4	8
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	48				119	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48				119	46
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1572				879	1029
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	68	48	12			
Volume Left	4	0	4			
Volume Right	0	4	8			
cSH	1572	1700	974			
Volume to Capacity	0.00	0.03	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.4	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	0.4	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			13.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	12	29	13	16	18	4	12	275	31	4	118	6
Future Volume (vph)	12	29	13	16	18	4	12	275	31	4	118	6
Peak Hour Factor	0.60	0.73	0.65	0.50	0.64	0.50	0.75	0.89	0.86	0.33	0.87	0.50
Hourly flow rate (vph)	20	40	20	32	28	8	16	309	36	12	136	12
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	80	68	361	160								
Volume Left (vph)	20	32	16	12								
Volume Right (vph)	20	8	36	12								
Hadj (s)	-0.10	0.02	0.04	0.01								
Departure Headway (s)	5.1	5.3	4.5	4.7								
Degree Utilization, x	0.11	0.10	0.45	0.21								
Capacity (veh/h)	626	608	770	719								
Control Delay (s)	8.8	8.9	11.3	9.0								
Approach Delay (s)	8.8	8.9	11.3	9.0								
Approach LOS	A	A	B	A								
Intersection Summary												
Delay				10.2								
Level of Service				B								
Intersection Capacity Utilization				33.2%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	11	44	8	6	55
Future Volume (Veh/h)	17	11	44	8	6	55
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.61	0.55	0.85	0.67	0.38	0.69
Hourly flow rate (vph)	28	20	52	12	16	80
Pedestrians	4		3			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	177	62			68	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177	62			68	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	98			99	
cM capacity (veh/h)	804	1000			1541	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	48	64	96			
Volume Left	28	0	16			
Volume Right	20	12	0			
cSH	875	1700	1541			
Volume to Capacity	0.05	0.04	0.01			
Queue Length 95th (m)	1.4	0.0	0.3			
Control Delay (s)	9.4	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.4	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			17.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	30	310	140	9
Future Volume (Veh/h)	8	8	30	310	140	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	1.00	0.75	0.88	0.95	0.56
Hourly flow rate (vph)	16	8	40	352	147	16
Pedestrians	8				3	
Lane Width (m)	3.6				3.6	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	598	163	171			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598	163	171			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	97			
cM capacity (veh/h)	451	878	1403			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	24	392	163			
Volume Left	16	40	0			
Volume Right	8	0	16			
cSH	538	1403	1700			
Volume to Capacity	0.04	0.03	0.10			
Queue Length 95th (m)	1.1	0.7	0.0			
Control Delay (s)	12.0	1.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	1.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			40.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	100	0	0	51
Future Volume (Veh/h)	0	0	100	0	0	51
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	109	0	0	55
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	164	109			109	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164	109			109	
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			100	
cM capacity (veh/h)	827	945			1481	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	109	55			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1481			
Volume to Capacity	0.00	0.06	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report

EX AM Peak

03-11-2025

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	41.4	45.9	37.4	35.0	20.8
Average Queue (m)	20.6	17.1	18.0	16.7	8.3
95th Queue (m)	39.9	33.7	33.3	29.4	17.9
Link Distance (m)	36.7		84.6	194.2	138.6
Upstream Blk Time (%)	1				
Queuing Penalty (veh)	5				
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		0	0		
Queuing Penalty (veh)		1	0		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.5	14.8	7.3	10.3
Average Queue (m)	0.7	0.8	0.4	2.9
95th Queue (m)	5.3	7.1	3.5	9.7
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	63.0	65.1	80.5	40.7
Average Queue (m)	27.7	28.9	39.6	17.3
95th Queue (m)	54.1	52.3	65.4	31.9
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report

EX AM Peak

03-11-2025

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.3	15.1	13.5
Average Queue (m)	6.5	9.7	7.9
95th Queue (m)	13.0	13.8	14.2
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	1.7	8.9
Average Queue (m)	0.1	1.4
95th Queue (m)	1.2	6.6
Link Distance (m)	89.2	188.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.8	14.3	37.4	26.3
Average Queue (m)	7.4	6.8	17.5	11.8
95th Queue (m)	12.1	13.4	28.2	19.6
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.2	5.4
Average Queue (m)	5.3	0.2
95th Queue (m)	12.4	2.2
Link Distance (m)	194.4	38.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Elgin St S & South St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.4	10.6
Average Queue (m)	3.9	1.3
95th Queue (m)	11.2	6.6
Link Distance (m)	194.4	257.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Chalmers St S & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	644	34	10	661	2	30	19	34	8	73	39
Future Volume (vph)	10	644	34	10	661	2	30	19	34	8	73	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.95			0.95	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		1798			3467			1761			1795	
Flt Permitted		0.99			0.93			0.67			0.97	
Satd. Flow (perm)		1775			3227			1209			1748	
Peak-hour factor, PHF	0.63	0.86	0.77	0.63	0.94	0.50	0.75	0.59	0.85	0.50	0.68	0.61
Adj. Flow (vph)	16	749	44	16	703	4	40	32	40	16	107	64
RTOR Reduction (vph)	0	2	0	0	0	0	0	24	0	0	22	0
Lane Group Flow (vph)	0	807	0	0	723	0	0	88	0	0	165	0
Confl. Peds. (#/hr)	9		6	6		9	2		1	1		2
Heavy Vehicles (%)	0%	5%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		64.1			46.1			13.9			13.9	
Effective Green, g (s)		64.1			46.1			13.9			13.9	
Actuated g/C Ratio		0.71			0.51			0.15			0.15	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1267			1652			186			269	
v/s Ratio Prot		c0.09										
v/s Ratio Perm		c0.37			0.22			0.07			c0.09	
v/c Ratio		0.64			0.44			0.47			0.61	
Uniform Delay, d1		6.8			13.8			34.7			35.5	
Progression Factor		0.86			0.63			1.00			1.00	
Incremental Delay, d2		0.6			0.7			1.9			4.1	
Delay (s)		6.4			9.4			36.6			39.6	
Level of Service		A			A			D			D	
Approach Delay (s)		6.4			9.4			36.6			39.6	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		12.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.68										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			17.7				
Intersection Capacity Utilization		65.6%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	671	7	6	661	4	0	2	4	1	5	4
Future Volume (Veh/h)	4	671	7	6	661	4	0	2	4	1	5	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.90	0.58	0.75	0.92	0.33	0.25	0.25	0.50	0.25	0.31	1.00
Hourly flow rate (vph)	8	746	12	8	718	12	0	8	8	4	16	4
Pedestrians					1			4			8	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.78			0.76			0.87	0.87	0.76	0.87	0.87	0.78
vC, conflicting volume	738			762			1524	1526	757	1529	1526	732
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	528			531			969	972	524	975	972	521
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	96	98	98	93	99
cM capacity (veh/h)	817			794			186	215	422	187	215	436
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	766	738	16	24								
Volume Left	8	8	0	4								
Volume Right	12	12	8	4								
cSH	817	794	285	229								
Volume to Capacity	0.01	0.01	0.06	0.11								
Queue Length 95th (m)	0.2	0.2	1.4	2.8								
Control Delay (s)	0.3	0.3	18.4	22.6								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.3	0.3	18.4	22.6								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			49.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	612	33	26	596	2	35	136	33	5	214	39
Future Volume (vph)	33	612	33	26	596	2	35	136	33	5	214	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1798			1841			1792			1858	
Flt Permitted		0.93			0.94			0.81			0.99	
Satd. Flow (perm)		1679			1743			1454			1842	
Peak-hour factor, PHF	0.69	0.87	0.75	0.81	0.92	0.50	0.97	0.81	0.69	0.63	0.85	0.89
Adj. Flow (vph)	48	703	44	32	648	4	36	168	48	8	252	44
RTOR Reduction (vph)	0	2	0	0	0	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	793	0	0	684	0	0	242	0	0	297	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	3%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		58.4			58.4			19.6			19.6	
Effective Green, g (s)		58.4			58.4			19.6			19.6	
Actuated g/C Ratio		0.65			0.65			0.22			0.22	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1089			1131			316			401	
v/s Ratio Prot												
v/s Ratio Perm		c0.47			0.39			c0.17			0.16	
v/c Ratio		0.73			0.60			0.77			0.74	
Uniform Delay, d1		10.5			9.1			33.0			32.8	
Progression Factor		0.32			1.00			1.00			1.00	
Incremental Delay, d2		3.5			2.4			10.5			7.2	
Delay (s)		6.9			11.5			43.6			40.0	
Level of Service		A			B			D			D	
Approach Delay (s)		6.9			11.5			43.6			40.0	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		17.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		86.4%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	35	34	50	38	44	51
Future Volume (vph)	35	34	50	38	44	51
Peak Hour Factor	0.88	0.71	0.83	0.68	0.85	0.71
Hourly flow rate (vph)	40	48	60	56	52	72
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	88	116	124			
Volume Left (vph)	40	0	52			
Volume Right (vph)	48	56	0			
Hadj (s)	-0.24	-0.27	0.08			
Departure Headway (s)	4.2	4.0	4.3			
Degree Utilization, x	0.10	0.13	0.15			
Capacity (veh/h)	815	878	816			
Control Delay (s)	7.7	7.5	8.0			
Approach Delay (s)	7.7	7.5	8.0			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.8			
Level of Service			A			
Intersection Capacity Utilization			22.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	75	61	1	2	6
Future Volume (Veh/h)	3	75	61	1	2	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.38	0.82	0.90	0.25	0.50	0.75
Hourly flow rate (vph)	8	91	68	4	4	8
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	72				177	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	72				177	70
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1541				813	998
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	99	72	12			
Volume Left	8	0	4			
Volume Right	0	4	8			
cSH	1541	1700	928			
Volume to Capacity	0.01	0.04	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.6	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	0.6	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		16.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	28	25	66	39	9	10	194	41	10	254	16
Future Volume (vph)	10	28	25	66	39	9	10	194	41	10	254	16
Peak Hour Factor	0.50	0.64	0.78	0.72	0.81	0.75	0.63	0.93	0.68	0.50	0.93	0.57
Hourly flow rate (vph)	20	44	32	92	48	12	16	209	60	20	273	28
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	96	152	285	321								
Volume Left (vph)	20	92	16	20								
Volume Right (vph)	32	12	60	28								
Hadj (s)	-0.15	0.08	-0.08	-0.03								
Departure Headway (s)	5.6	5.7	5.0	5.0								
Degree Utilization, x	0.15	0.24	0.40	0.45								
Capacity (veh/h)	561	565	680	682								
Control Delay (s)	9.6	10.5	11.3	12.0								
Approach Delay (s)	9.6	10.5	11.3	12.0								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay				11.2								
Level of Service				B								
Intersection Capacity Utilization				37.7%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	17	67	13	16	61
Future Volume (Veh/h)	18	17	67	13	16	61
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.43	0.88	0.81	0.80	0.76
Hourly flow rate (vph)	28	40	76	16	20	80
Pedestrians	8		10			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	1		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	222	92			100	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	222	92			100	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	96			99	
cM capacity (veh/h)	749	964			1495	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	68	92	100			
Volume Left	28	0	20			
Volume Right	40	16	0			
cSH	862	1700	1495			
Volume to Capacity	0.08	0.05	0.01			
Queue Length 95th (m)	2.0	0.0	0.3			
Control Delay (s)	9.5	0.0	1.6			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.6			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			20.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	25	28	237	320	19
Future Volume (Veh/h)	6	25	28	237	320	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.69	0.54	0.96	0.93	0.43
Hourly flow rate (vph)	12	36	52	247	344	44
Pedestrians	4			2		
Lane Width (m)	3.6			3.6		
Walking Speed (m/s)	1.2			1.2		
Percent Blockage	0			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	721	372	392			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	721	372	392			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	95	96			
cM capacity (veh/h)	378	675	1174			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	48	299	388			
Volume Left	12	52	0			
Volume Right	36	0	44			
cSH	564	1174	1700			
Volume to Capacity	0.09	0.04	0.23			
Queue Length 95th (m)	2.2	1.1	0.0			
Control Delay (s)	12.0	1.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	1.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.5				
Intersection Capacity Utilization		46.0%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	88	0	0	86
Future Volume (Veh/h)	0	0	88	0	0	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	96	0	0	93
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	189	96			96	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	189	96			96	
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			100	
cM capacity (veh/h)	800	960			1498	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	96	93			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1498			
Volume to Capacity	0.00	0.06	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		8.0%		ICU Level of Service		A
Analysis Period (min)		15				

Queuing and Blocking Report

EX PM Peak

03-11-2025

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	40.2	52.3	85.4	33.9	42.3
Average Queue (m)	19.4	25.8	26.9	14.6	19.6
95th Queue (m)	38.7	47.4	55.6	28.2	35.5
Link Distance (m)	36.7		84.6	194.2	138.6
Upstream Blk Time (%)	1		0		
Queuing Penalty (veh)	9		2		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		2	2		
Queuing Penalty (veh)		5	5		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	51.9	57.3	10.4	9.0
Average Queue (m)	5.7	4.5	2.2	2.5
95th Queue (m)	31.6	26.9	8.6	8.9
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)	0	0		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	90.1	143.7	73.5	67.6
Average Queue (m)	34.7	58.4	35.9	38.2
95th Queue (m)	77.7	119.3	65.2	61.0
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	1			
Queuing Penalty (veh)	10			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report

EX PM Peak

03-11-2025

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	10.6	16.6	20.5
Average Queue (m)	8.3	9.9	10.7
95th Queue (m)	12.9	14.8	18.1
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	1.8	9.0
Average Queue (m)	0.1	1.9
95th Queue (m)	1.8	7.9
Link Distance (m)	89.2	188.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	12.7	18.5	28.1	37.6
Average Queue (m)	7.6	10.5	14.1	21.4
95th Queue (m)	13.5	16.2	22.4	33.5
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report

EX PM Peak

03-11-2025

Intersection: 7: Chalmers St S & South St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.2	3.1	6.7
Average Queue (m)	5.4	0.2	0.3
95th Queue (m)	12.5	2.9	3.2
Link Distance (m)	194.4	173.6	38.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Elgin St S & South St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	11.6	13.0
Average Queue (m)	5.5	2.4
95th Queue (m)	12.6	9.4
Link Distance (m)	194.4	257.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Chalmers St S & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

C

Appendix C Future Background Traffic Operations

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	551	18	12	490	4	55	26	36	4	19	32
Future Volume (vph)	20	551	18	12	490	4	55	26	36	4	19	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1740			3374			1778			1739	
Flt Permitted		0.96			0.91			0.75			0.96	
Satd. Flow (perm)		1675			3080			1387			1678	
Peak-hour factor, PHF	0.64	0.97	0.80	0.46	0.78	1.00	0.32	0.75	0.75	0.50	0.71	0.91
Adj. Flow (vph)	31	568	22	26	628	4	172	35	48	8	27	35
RTOR Reduction (vph)	0	2	0	0	1	0	0	12	0	0	27	0
Lane Group Flow (vph)	0	620	0	0	657	0	0	243	0	0	43	0
Confl. Peds. (#/hr)	1		1	1		1	1		2	2		1
Heavy Vehicles (%)	1%	9%	0%	0%	7%	0%	0%	0%	1%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		46.0			28.0			17.0			17.0	
Effective Green, g (s)		46.0			28.0			17.0			17.0	
Actuated g/C Ratio		0.61			0.37			0.23			0.23	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1037			1149			314			380	
v/s Ratio Prot		c0.10										
v/s Ratio Perm		c0.27			0.21			c0.18			0.03	
v/c Ratio		0.60			0.57			0.78			0.11	
Uniform Delay, d1		8.9			18.7			27.2			23.0	
Progression Factor		0.52			0.79			1.00			1.00	
Incremental Delay, d2		0.7			2.0			11.3			0.1	
Delay (s)		5.3			16.8			38.5			23.1	
Level of Service		A			B			D			C	
Approach Delay (s)		5.3			16.8			38.5			23.1	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			16.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			75.0			Sum of lost time (s)			17.7			
Intersection Capacity Utilization			69.8%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	586	3	3	501	4	0	1	1	2	3	7
Future Volume (Veh/h)	6	586	3	3	501	4	0	1	1	2	3	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.42	0.96	0.75	0.38	0.83	0.50	0.25	0.25	0.25	0.50	0.38	0.50
Hourly flow rate (vph)	14	610	4	8	604	8	0	4	4	4	8	14
Pedestrians								5			5	
Lane Width (m)								3.6			3.6	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.86			0.79			0.86	0.86	0.79	0.86	0.86	0.86
vC, conflicting volume	617			619			1287	1278	617	1275	1276	613
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	477			384			893	883	382	880	881	473
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	98	99	98	97	97
cM capacity (veh/h)	937			932			209	238	527	221	239	510
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	628	620	8	26								
Volume Left	14	8	0	4								
Volume Right	4	8	4	14								
cSH	937	932	328	329								
Volume to Capacity	0.01	0.01	0.02	0.08								
Queue Length 95th (m)	0.4	0.2	0.6	2.0								
Control Delay (s)	0.4	0.2	16.2	16.9								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.4	0.2	16.2	16.9								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			45.1%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	559	24	15	358	2	51	220	35	7	105	23
Future Volume (vph)	28	559	24	15	358	2	51	220	35	7	105	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1722			1701			1776			1787	
Flt Permitted		0.96			0.94			0.91			0.98	
Satd. Flow (perm)		1659			1599			1634			1749	
Peak-hour factor, PHF	0.78	0.96	0.55	0.50	0.88	0.50	0.77	0.86	0.57	0.75	0.79	0.75
Adj. Flow (vph)	36	582	44	30	407	4	66	256	61	9	133	31
RTOR Reduction (vph)	0	3	0	0	0	0	0	10	0	0	11	0
Lane Group Flow (vph)	0	659	0	0	441	0	0	373	0	0	162	0
Confl. Peds. (#/hr)	1		3	3		1	1		2	2		1
Heavy Vehicles (%)	1%	10%	1%	1%	12%	0%	3%	4%	1%	0%	4%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		43.0			43.0			20.0			20.0	
Effective Green, g (s)		43.0			43.0			20.0			20.0	
Actuated g/C Ratio		0.57			0.57			0.27			0.27	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		951			916			435			466	
v/s Ratio Prot												
v/s Ratio Perm		c0.40			0.28			c0.23			0.09	
v/c Ratio		0.69			0.48			0.86			0.35	
Uniform Delay, d1		11.3			9.4			26.2			22.2	
Progression Factor		0.33			1.00			1.00			1.00	
Incremental Delay, d2		3.5			1.8			15.4			0.5	
Delay (s)		7.2			11.2			41.5			22.7	
Level of Service		A			B			D			C	
Approach Delay (s)		7.2			11.2			41.5			22.7	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			17.8				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			75.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			81.6%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

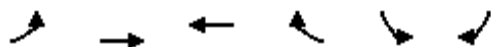
03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	19	21	88	22	18	38
Future Volume (vph)	19	21	88	22	18	38
Peak Hour Factor	0.53	0.59	0.42	0.63	0.80	0.57
Hourly flow rate (vph)	36	36	210	35	22	67
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	72	245	89			
Volume Left (vph)	36	0	22			
Volume Right (vph)	36	35	0			
Hadj (s)	-0.20	-0.09	0.05			
Departure Headway (s)	4.4	4.1	4.4			
Degree Utilization, x	0.09	0.28	0.11			
Capacity (veh/h)	750	860	792			
Control Delay (s)	7.8	8.6	7.9			
Approach Delay (s)	7.8	8.6	7.9			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.3			
Level of Service			A			
Intersection Capacity Utilization			19.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	56	38	2	2	3
Future Volume (Veh/h)	1	56	38	2	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.80	0.77	0.50	0.50	0.38
Hourly flow rate (vph)	4	70	49	4	4	8
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	53				130	51
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	53				130	51
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1566				866	1023
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	74	53	12			
Volume Left	4	0	4			
Volume Right	0	4	8			
cSH	1566	1700	965			
Volume to Capacity	0.00	0.03	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.4	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	0.4	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	13	32	14	18	20	4	13	304	34	4	130	7
Future Volume (vph)	13	32	14	18	20	4	13	304	34	4	130	7
Peak Hour Factor	0.60	0.73	0.65	0.50	0.64	0.50	0.75	0.89	0.86	0.33	0.87	0.50
Hourly flow rate (vph)	22	44	22	36	31	8	17	342	40	12	149	14
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	88	75	399	175								
Volume Left (vph)	22	36	17	12								
Volume Right (vph)	22	8	40	14								
Hadj (s)	-0.10	0.03	0.04	0.01								
Departure Headway (s)	5.3	5.4	4.6	4.8								
Degree Utilization, x	0.13	0.11	0.51	0.24								
Capacity (veh/h)	603	585	757	701								
Control Delay (s)	9.1	9.1	12.3	9.3								
Approach Delay (s)	9.1	9.1	12.3	9.3								
Approach LOS	A	A	B	A								
Intersection Summary												
Delay				10.9								
Level of Service				B								
Intersection Capacity Utilization				36.0%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	12	49	9	7	61
Future Volume (Veh/h)	19	12	49	9	7	61
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.61	0.55	0.85	0.67	0.38	0.69
Hourly flow rate (vph)	31	22	58	13	18	88
Pedestrians	4		3			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	196	68			75	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	196	68			75	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			99	
cM capacity (veh/h)	784	991			1532	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	71	106			
Volume Left	31	0	18			
Volume Right	22	13	0			
cSH	858	1700	1532			
Volume to Capacity	0.06	0.04	0.01			
Queue Length 95th (m)	1.6	0.0	0.3			
Control Delay (s)	9.5	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay		2.8				
Intersection Capacity Utilization		19.1%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	33	342	155	10
Future Volume (Veh/h)	9	9	33	342	155	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	1.00	0.75	0.88	0.95	0.56
Hourly flow rate (vph)	18	9	44	389	163	18
Pedestrians	8				3	
Lane Width (m)	3.6				3.6	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	660	180	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	180	189			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	97			
cM capacity (veh/h)	414	860	1382			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	27	433	181			
Volume Left	18	44	0			
Volume Right	9	0	18			
cSH	500	1382	1700			
Volume to Capacity	0.05	0.03	0.11			
Queue Length 95th (m)	1.4	0.8	0.0			
Control Delay (s)	12.6	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.6	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		43.0%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	110	0	0	57
Future Volume (Veh/h)	0	0	110	0	0	57
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	120	0	0	62
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	182	120			120	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182	120			120	
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			100	
cM capacity (veh/h)	807	931			1468	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	120	62			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1468			
Volume to Capacity	0.00	0.07	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			9.1%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	39.9	49.0	61.2	34.6	20.5
Average Queue (m)	19.6	24.3	24.2	17.7	8.7
95th Queue (m)	39.1	43.8	46.6	30.7	17.9
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	1		0		
Queuing Penalty (veh)	7		0		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		1	1		
Queuing Penalty (veh)		3	1		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	54.2	17.6	7.1	11.4
Average Queue (m)	3.8	0.9	0.4	2.5
95th Queue (m)	24.2	9.7	3.2	9.1
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	83.6	88.3	79.0	46.1
Average Queue (m)	26.7	34.1	43.8	20.3
95th Queue (m)	61.6	72.9	70.8	37.9
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	2			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.3	16.3	14.8
Average Queue (m)	6.1	9.6	8.2
95th Queue (m)	13.0	13.9	14.5
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	SB
Directions Served	LR
Maximum Queue (m)	8.9
Average Queue (m)	1.0
95th Queue (m)	5.4
Link Distance (m)	188.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	14.4	11.5	26.7	27.7
Average Queue (m)	7.1	6.5	17.2	13.6
95th Queue (m)	12.9	13.0	25.1	22.3
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.2	3.6
Average Queue (m)	5.8	0.2
95th Queue (m)	12.7	2.5
Link Distance (m)	194.4	38.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Elgin St S & South St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	11.8	18.2
Average Queue (m)	4.5	2.0
95th Queue (m)	11.9	9.6
Link Distance (m)	194.4	257.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Chalmers St S & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 14

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	711	38	11	730	2	33	21	38	9	81	43
Future Volume (vph)	11	711	38	11	730	2	33	21	38	9	81	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.95			0.95	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		1798			3468			1761			1796	
Flt Permitted		0.98			0.93			0.65			0.97	
Satd. Flow (perm)		1772			3216			1174			1749	
Peak-hour factor, PHF	0.63	0.86	0.77	0.63	0.94	0.50	0.75	0.59	0.85	0.50	0.68	0.61
Adj. Flow (vph)	17	827	49	17	777	4	44	36	45	18	119	70
RTOR Reduction (vph)	0	2	0	0	0	0	0	24	0	0	22	0
Lane Group Flow (vph)	0	891	0	0	798	0	0	101	0	0	185	0
Confl. Peds. (#/hr)	9		6	6		9	2		1	1		2
Heavy Vehicles (%)	0%	5%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		63.1			45.1			14.9			14.9	
Effective Green, g (s)		63.1			45.1			14.9			14.9	
Actuated g/C Ratio		0.70			0.50			0.17			0.17	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1245			1611			194			289	
v/s Ratio Prot		c0.10										
v/s Ratio Perm		c0.40			0.25			0.09			c0.11	
v/c Ratio		0.72			0.50			0.52			0.64	
Uniform Delay, d1		8.1			14.9			34.3			35.1	
Progression Factor		0.91			0.66			1.00			1.00	
Incremental Delay, d2		0.8			0.8			2.3			4.8	
Delay (s)		8.1			10.6			36.6			39.9	
Level of Service		A			B			D			D	
Approach Delay (s)		8.1			10.6			36.6			39.9	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		14.1			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.76										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			17.7				
Intersection Capacity Utilization		74.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	741	8	7	730	4	0	2	4	1	6	4
Future Volume (Veh/h)	4	741	8	7	730	4	0	2	4	1	6	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.90	0.58	0.75	0.92	0.33	0.25	0.25	0.50	0.25	0.31	1.00
Hourly flow rate (vph)	8	823	14	9	793	12	0	8	8	4	19	4
Pedestrians					1			4			8	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.73			0.70			0.83	0.83	0.70	0.83	0.83	0.73
vC, conflicting volume	813			841			1680	1681	835	1684	1682	807
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	565			554			998	999	545	1003	1000	557
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	96	98	98	90	99
cM capacity (veh/h)	742			713			166	197	376	170	196	390
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	845	814	16	27								
Volume Left	8	9	0	4								
Volume Right	14	12	8	4								
cSH	742	713	258	207								
Volume to Capacity	0.01	0.01	0.06	0.13								
Queue Length 95th (m)	0.3	0.3	1.6	3.5								
Control Delay (s)	0.3	0.4	19.9	25.0								
Lane LOS	A	A	C	D								
Approach Delay (s)	0.3	0.4	19.9	25.0								
Approach LOS			C	D								
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			53.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	676	36	29	658	2	39	150	36	6	236	43
Future Volume (vph)	36	676	36	29	658	2	39	150	36	6	236	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1798			1841			1793			1858	
Flt Permitted		0.92			0.93			0.78			0.99	
Satd. Flow (perm)		1665			1725			1409			1838	
Peak-hour factor, PHF	0.69	0.87	0.75	0.81	0.92	0.50	0.97	0.81	0.69	0.63	0.85	0.89
Adj. Flow (vph)	52	777	48	36	715	4	40	185	52	10	278	48
RTOR Reduction (vph)	0	2	0	0	0	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	875	0	0	755	0	0	267	0	0	329	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	3%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		57.3			57.3			20.7			20.7	
Effective Green, g (s)		57.3			57.3			20.7			20.7	
Actuated g/C Ratio		0.64			0.64			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1060			1098			324			422	
v/s Ratio Prot												
v/s Ratio Perm		c0.53			0.44			c0.19			0.18	
v/c Ratio		0.83			0.69			0.82			0.78	
Uniform Delay, d1		12.5			10.6			32.9			32.5	
Progression Factor		0.36			1.00			1.00			1.00	
Incremental Delay, d2		5.6			3.5			15.5			8.8	
Delay (s)		10.1			14.1			48.4			41.4	
Level of Service		B			B			D			D	
Approach Delay (s)		10.1			14.1			48.4			41.4	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		20.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.82										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		93.6%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	39	38	55	42	49	56
Future Volume (vph)	39	38	55	42	49	56
Peak Hour Factor	0.88	0.71	0.83	0.68	0.85	0.71
Hourly flow rate (vph)	44	54	66	62	58	79
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	98	128	137			
Volume Left (vph)	44	0	58			
Volume Right (vph)	54	62	0			
Hadj (s)	-0.24	-0.27	0.08			
Departure Headway (s)	4.2	4.0	4.3			
Degree Utilization, x	0.12	0.14	0.16			
Capacity (veh/h)	792	868	808			
Control Delay (s)	7.8	7.7	8.2			
Approach Delay (s)	7.8	7.7	8.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.9			
Level of Service			A			
Intersection Capacity Utilization			23.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	83	67	1	2	7
Future Volume (Veh/h)	3	83	67	1	2	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.38	0.82	0.90	0.25	0.50	0.75
Hourly flow rate (vph)	8	101	74	4	4	9
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	78				193	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78				193	76
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1533				796	991
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	109	78	13			
Volume Left	8	0	4			
Volume Right	0	4	9			
cSH	1533	1700	922			
Volume to Capacity	0.01	0.05	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.6	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	0.6	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			16.8%		ICU Level of Service	
Analysis Period (min)			15			
			A			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	31	28	73	43	10	11	214	45	11	280	18
Future Volume (vph)	11	31	28	73	43	10	11	214	45	11	280	18
Peak Hour Factor	0.50	0.64	0.78	0.72	0.81	0.75	0.63	0.93	0.68	0.50	0.93	0.57
Hourly flow rate (vph)	22	48	36	101	53	13	17	230	66	22	301	32
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	106	167	313	355								
Volume Left (vph)	22	101	17	22								
Volume Right (vph)	36	13	66	32								
Hadj (s)	-0.16	0.08	-0.08	-0.03								
Departure Headway (s)	5.8	5.9	5.2	5.2								
Degree Utilization, x	0.17	0.28	0.45	0.51								
Capacity (veh/h)	519	538	647	660								
Control Delay (s)	10.1	11.2	12.4	13.5								
Approach Delay (s)	10.1	11.2	12.4	13.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay				12.3								
Level of Service				B								
Intersection Capacity Utilization				40.2%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	19	74	14	18	67
Future Volume (Veh/h)	20	19	74	14	18	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.43	0.88	0.81	0.80	0.76
Hourly flow rate (vph)	31	44	84	17	22	88
Pedestrians	8		10			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	1		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	242	100			109	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	242	100			109	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	95			99	
cM capacity (veh/h)	728	954			1484	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	75	101	110			
Volume Left	31	0	22			
Volume Right	44	17	0			
cSH	846	1700	1484			
Volume to Capacity	0.09	0.06	0.01			
Queue Length 95th (m)	2.3	0.0	0.4			
Control Delay (s)	9.7	0.0	1.6			
Lane LOS	A		A			
Approach Delay (s)	9.7	0.0	1.6			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			21.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	28	31	262	353	21
Future Volume (Veh/h)	7	28	31	262	353	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.69	0.54	0.96	0.93	0.43
Hourly flow rate (vph)	14	41	57	273	380	49
Pedestrians	4			2		
Lane Width (m)	3.6			3.6		
Walking Speed (m/s)	1.2			1.2		
Percent Blockage	0			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	796	410	433			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	796	410	433			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	94	95			
cM capacity (veh/h)	340	642	1134			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	55	330	429			
Volume Left	14	57	0			
Volume Right	41	0	49			
cSH	524	1134	1700			
Volume to Capacity	0.11	0.05	0.25			
Queue Length 95th (m)	2.8	1.3	0.0			
Control Delay (s)	12.7	1.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	1.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.6				
Intersection Capacity Utilization		49.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	97	0	0	95
Future Volume (Veh/h)	0	0	97	0	0	95
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	105	0	0	103
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	208	105			105	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	208	105			105	
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			100	
cM capacity (veh/h)	780	949			1486	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	105	103			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1486			
Volume to Capacity	0.00	0.06	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.4%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	41.9	52.3	72.8	42.4	42.4
Average Queue (m)	22.9	30.0	30.2	16.5	20.9
95th Queue (m)	41.7	53.5	62.2	32.8	36.9
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	2		0		
Queuing Penalty (veh)	14		0		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		4	2		
Queuing Penalty (veh)		14	9		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	73.2	55.7	9.0	12.7
Average Queue (m)	10.0	4.2	1.6	2.9
95th Queue (m)	45.6	27.3	7.2	10.0
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)	0	0		
Queuing Penalty (veh)	2	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	91.6	179.6	93.7	80.9
Average Queue (m)	41.7	74.7	41.6	39.3
95th Queue (m)	90.7	146.6	73.2	67.7
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	3	1		
Queuing Penalty (veh)	23	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.1	16.4	18.2
Average Queue (m)	8.6	9.3	10.9
95th Queue (m)	13.2	15.0	18.0
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	1.8	8.9
Average Queue (m)	0.1	2.1
95th Queue (m)	1.3	8.2
Link Distance (m)	89.2	188.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.3	19.1	31.3	44.3
Average Queue (m)	8.3	10.6	15.6	22.7
95th Queue (m)	13.5	17.2	25.7	37.0
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	11.6	1.7	7.3
Average Queue (m)	6.7	0.1	0.4
95th Queue (m)	13.1	1.2	3.6
Link Distance (m)	194.4	173.6	38.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Elgin St S & South St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	14.2	14.3	1.3
Average Queue (m)	5.9	2.7	0.0
95th Queue (m)	13.3	10.4	0.9
Link Distance (m)	194.4	257.6	128.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Chalmers St S & Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 62

D

Appendix D Future Total Traffic Operations

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	551	26	18	490	4	76	28	58	4	20	32
Future Volume (vph)	20	551	26	18	490	4	76	28	58	4	20	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1738			3375			1769			1741	
Flt Permitted		0.96			0.88			0.75			0.96	
Satd. Flow (perm)		1673			2978			1378			1680	
Peak-hour factor, PHF	0.64	0.97	0.80	0.46	0.78	1.00	0.32	0.75	0.75	0.50	0.71	0.91
Adj. Flow (vph)	31	568	32	39	628	4	238	37	77	8	28	35
RTOR Reduction (vph)	0	2	0	0	1	0	0	13	0	0	26	0
Lane Group Flow (vph)	0	630	0	0	670	0	0	339	0	0	45	0
Confl. Peds. (#/hr)	1		1	1		1	1		2	2		1
Heavy Vehicles (%)	1%	9%	0%	0%	7%	0%	0%	0%	1%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		44.2			26.2			18.8			18.8	
Effective Green, g (s)		44.2			26.2			18.8			18.8	
Actuated g/C Ratio		0.59			0.35			0.25			0.25	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		996			1040			345			421	
v/s Ratio Prot		c0.10										
v/s Ratio Perm		c0.27			0.23			c0.25			0.03	
v/c Ratio		0.63			0.64			0.98			0.11	
Uniform Delay, d1		10.1			20.5			27.9			21.6	
Progression Factor		0.52			0.79			1.00			1.00	
Incremental Delay, d2		0.9			2.9			43.2			0.1	
Delay (s)		6.1			19.2			71.1			21.7	
Level of Service		A			B			E			C	
Approach Delay (s)		6.1			19.2			71.1			21.7	
Approach LOS		A			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			25.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			75.0			Sum of lost time (s)			17.7			
Intersection Capacity Utilization			72.8%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	608	3	3	507	4	0	1	1	2	3	7
Future Volume (Veh/h)	6	608	3	3	507	4	0	1	1	2	3	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.42	0.96	0.75	0.38	0.83	0.50	0.25	0.25	0.25	0.50	0.38	0.50
Hourly flow rate (vph)	14	633	4	8	611	8	0	4	4	4	8	14
Pedestrians								5			5	
Lane Width (m)								3.6			3.6	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.86			0.77			0.84	0.84	0.77	0.84	0.84	0.86
vC, conflicting volume	624			642			1317	1308	640	1305	1306	620
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	481			389			908	898	387	894	895	476
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	98			99			100	98	99	98	97	97
cM capacity (veh/h)	930			908			200	229	512	212	230	506
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	651	627	8	26								
Volume Left	14	8	0	4								
Volume Right	4	8	4	14								
cSH	930	908	317	320								
Volume to Capacity	0.02	0.01	0.03	0.08								
Queue Length 95th (m)	0.4	0.2	0.6	2.1								
Control Delay (s)	0.4	0.2	16.7	17.3								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.4	0.2	16.7	17.3								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			46.3%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	28	581	24	15	364	2	51	220	35	7	105	23
Future Volume (vph)	28	581	24	15	364	2	51	220	35	7	105	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1722			1701			1776			1787	
Flt Permitted		0.96			0.94			0.91			0.98	
Satd. Flow (perm)		1660			1597			1634			1749	
Peak-hour factor, PHF	0.78	0.96	0.55	0.50	0.88	0.50	0.77	0.86	0.57	0.75	0.79	0.75
Adj. Flow (vph)	36	605	44	30	414	4	66	256	61	9	133	31
RTOR Reduction (vph)	0	3	0	0	0	0	0	10	0	0	11	0
Lane Group Flow (vph)	0	682	0	0	448	0	0	373	0	0	162	0
Confl. Peds. (#/hr)	1		3	3		1	1		2	2		1
Heavy Vehicles (%)	1%	10%	1%	1%	12%	0%	3%	4%	1%	0%	4%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		43.0			43.0			20.0			20.0	
Effective Green, g (s)		43.0			43.0			20.0			20.0	
Actuated g/C Ratio		0.57			0.57			0.27			0.27	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		951			915			435			466	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.28			c0.23			0.09	
v/c Ratio		0.72			0.49			0.86			0.35	
Uniform Delay, d1		11.6			9.5			26.2			22.2	
Progression Factor		0.39			1.00			1.00			1.00	
Incremental Delay, d2		3.7			1.9			15.4			0.5	
Delay (s)		8.2			11.4			41.5			22.7	
Level of Service		A			B			D			C	
Approach Delay (s)		8.2			11.4			41.5			22.7	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay		18.1			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.76										
Actuated Cycle Length (s)		75.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		82.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

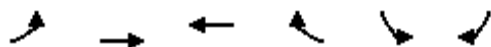
03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	20	21	133	24	18	53
Future Volume (vph)	20	21	133	24	18	53
Peak Hour Factor	0.53	0.59	0.42	0.63	0.80	0.57
Hourly flow rate (vph)	38	36	317	38	22	93
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	74	355	115			
Volume Left (vph)	38	0	22			
Volume Right (vph)	36	38	0			
Hadj (s)	-0.19	-0.06	0.04			
Departure Headway (s)	4.7	4.1	4.5			
Degree Utilization, x	0.10	0.41	0.14			
Capacity (veh/h)	689	849	769			
Control Delay (s)	8.2	10.0	8.2			
Approach Delay (s)	8.2	10.0	8.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			9.4			
Level of Service			A			
Intersection Capacity Utilization			26.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	58	39	2	2	3
Future Volume (Veh/h)	1	58	39	2	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.80	0.77	0.50	0.50	0.38
Hourly flow rate (vph)	4	72	51	4	4	8
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	55				134	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				134	53
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1563				862	1020
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	76	55	12			
Volume Left	4	0	4			
Volume Right	0	4	8			
cSH	1563	1700	961			
Volume to Capacity	0.00	0.03	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.4	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	0.4	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	13	34	14	18	21	4	13	304	34	4	130	7
Future Volume (vph)	13	34	14	18	21	4	13	304	34	4	130	7
Peak Hour Factor	0.60	0.73	0.65	0.50	0.64	0.50	0.75	0.89	0.86	0.33	0.87	0.50
Hourly flow rate (vph)	22	47	22	36	33	8	17	342	40	12	149	14
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	91	77	399	175								
Volume Left (vph)	22	36	17	12								
Volume Right (vph)	22	8	40	14								
Hadj (s)	-0.09	0.03	0.04	0.01								
Departure Headway (s)	5.3	5.5	4.6	4.9								
Degree Utilization, x	0.13	0.12	0.51	0.24								
Capacity (veh/h)	602	584	754	698								
Control Delay (s)	9.1	9.2	12.4	9.4								
Approach Delay (s)	9.1	9.2	12.4	9.4								
Approach LOS	A	A	B	A								
Intersection Summary												
Delay			10.9									
Level of Service			B									
Intersection Capacity Utilization			36.1%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	12	50	9	7	63
Future Volume (Veh/h)	19	12	50	9	7	63
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.61	0.55	0.85	0.67	0.38	0.69
Hourly flow rate (vph)	31	22	59	13	18	91
Pedestrians	4		3			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	200	70			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200	70			76	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			99	
cM capacity (veh/h)	780	990			1531	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	72	109			
Volume Left	31	0	18			
Volume Right	22	13	0			
cSH	855	1700	1531			
Volume to Capacity	0.06	0.04	0.01			
Queue Length 95th (m)	1.6	0.0	0.3			
Control Delay (s)	9.5	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	33	342	155	10
Future Volume (Veh/h)	9	9	33	342	155	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	1.00	0.75	0.88	0.95	0.56
Hourly flow rate (vph)	18	9	44	389	163	18
Pedestrians	8				3	
Lane Width (m)	3.6				3.6	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	660	180	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	180	189			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	97			
cM capacity (veh/h)	414	860	1382			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	27	433	181			
Volume Left	18	44	0			
Volume Right	9	0	18			
cSH	500	1382	1700			
Volume to Capacity	0.05	0.03	0.11			
Queue Length 95th (m)	1.4	0.8	0.0			
Control Delay (s)	12.6	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.6	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			43.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	47	110	1	16	57
Future Volume (Veh/h)	2	47	110	1	16	57
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	51	120	1	17	62
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	216	120			121	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216	120			121	
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	95			99	
cM capacity (veh/h)	763	931			1467	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	121	79			
Volume Left	2	0	17			
Volume Right	51	1	0			
cSH	923	1700	1467			
Volume to Capacity	0.06	0.07	0.01			
Queue Length 95th (m)	1.5	0.0	0.3			
Control Delay (s)	9.1	0.0	1.7			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	1.7			
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			20.6%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	41.6	51.8	65.3	42.6	22.0
Average Queue (m)	21.7	26.1	22.6	23.4	9.0
95th Queue (m)	41.4	45.1	45.0	39.0	18.7
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	2		0		
Queuing Penalty (veh)	11		0		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		1	1		
Queuing Penalty (veh)		3	2		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	32.2	15.5	7.2	10.2
Average Queue (m)	2.1	0.8	0.5	3.2
95th Queue (m)	15.4	7.5	3.7	10.2
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	71.6	79.3	75.2	42.4
Average Queue (m)	29.8	30.1	42.8	19.7
95th Queue (m)	60.0	58.1	65.2	35.9
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.1	18.2	15.1
Average Queue (m)	6.4	10.6	8.7
95th Queue (m)	13.4	15.5	13.6
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	SB
Directions Served	LR
Maximum Queue (m)	9.0
Average Queue (m)	1.3
95th Queue (m)	6.3
Link Distance (m)	188.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	12.5	8.8	37.6	27.4
Average Queue (m)	7.5	6.6	19.0	13.6
95th Queue (m)	12.8	12.6	29.4	23.1
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	10.6	1.8
Average Queue (m)	5.6	0.1
95th Queue (m)	12.8	1.3
Link Distance (m)	194.4	38.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Elgin St S & South St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	9.2	18.6	1.7
Average Queue (m)	3.6	2.0	0.1
95th Queue (m)	10.7	9.8	1.2
Link Distance (m)	194.4	257.6	128.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Chalmers St S & Site Access

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.1	3.6
Average Queue (m)	7.8	0.1
95th Queue (m)	14.1	1.8
Link Distance (m)	80.8	79.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 17

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	711	67	31	730	2	51	23	56	9	84	43
Future Volume (vph)	11	711	67	31	730	2	51	23	56	9	84	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.95			0.96	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		1790			3466			1751			1798	
Flt Permitted		0.98			0.84			0.61			0.97	
Satd. Flow (perm)		1764			2907			1086			1748	
Peak-hour factor, PHF	0.63	0.86	0.77	0.63	0.94	0.50	0.75	0.59	0.85	0.50	0.68	0.61
Adj. Flow (vph)	17	827	87	49	777	4	68	39	66	18	124	70
RTOR Reduction (vph)	0	4	0	0	1	0	0	25	0	0	20	0
Lane Group Flow (vph)	0	927	0	0	829	0	0	148	0	0	192	0
Confl. Peds. (#/hr)	9		6	6		9	2		1	1		2
Heavy Vehicles (%)	0%	5%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		61.6			43.6			16.4			16.4	
Effective Green, g (s)		61.6			43.6			16.4			16.4	
Actuated g/C Ratio		0.68			0.48			0.18			0.18	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1210			1408			197			318	
v/s Ratio Prot		c0.10										
v/s Ratio Perm		c0.42			0.29			c0.14			0.11	
v/c Ratio		0.77			0.59			0.75			0.60	
Uniform Delay, d1		9.4			16.7			34.9			33.8	
Progression Factor		0.91			0.66			1.00			1.00	
Incremental Delay, d2		1.0			1.3			14.4			3.2	
Delay (s)		9.5			12.3			49.3			37.0	
Level of Service		A			B			D			D	
Approach Delay (s)		9.5			12.3			49.3			37.0	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		16.5			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.82										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			17.7				
Intersection Capacity Utilization		80.6%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	759	8	7	750	4	0	2	4	1	6	4
Future Volume (Veh/h)	4	759	8	7	750	4	0	2	4	1	6	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.90	0.58	0.75	0.92	0.33	0.25	0.25	0.50	0.25	0.31	1.00
Hourly flow rate (vph)	8	843	14	9	815	12	0	8	8	4	19	4
Pedestrians					1			4			8	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.72			0.65			0.79	0.79	0.65	0.79	0.79	0.72
vC, conflicting volume	835			861			1722	1723	855	1726	1724	829
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	577			523			988	988	514	992	990	569
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	96	98	98	90	99
cM capacity (veh/h)	720			687			161	191	368	165	191	376
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	865	836	16	27								
Volume Left	8	9	0	4								
Volume Right	14	12	8	4								
cSH	720	687	251	201								
Volume to Capacity	0.01	0.01	0.06	0.13								
Queue Length 95th (m)	0.3	0.3	1.6	3.7								
Control Delay (s)	0.3	0.4	20.3	25.7								
Lane LOS	A	A	C	D								
Approach Delay (s)	0.3	0.4	20.3	25.7								
Approach LOS			C	D								
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			54.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	694	36	29	678	2	39	150	36	6	236	43
Future Volume (vph)	36	694	36	29	678	2	39	150	36	6	236	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1798			1842			1793			1858	
Flt Permitted		0.92			0.93			0.78			0.99	
Satd. Flow (perm)		1664			1725			1409			1838	
Peak-hour factor, PHF	0.69	0.87	0.75	0.81	0.92	0.50	0.97	0.81	0.69	0.63	0.85	0.89
Adj. Flow (vph)	52	798	48	36	737	4	40	185	52	10	278	48
RTOR Reduction (vph)	0	2	0	0	0	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	896	0	0	777	0	0	267	0	0	329	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	3%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		57.3			57.3			20.7			20.7	
Effective Green, g (s)		57.3			57.3			20.7			20.7	
Actuated g/C Ratio		0.64			0.64			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1059			1098			324			422	
v/s Ratio Prot												
v/s Ratio Perm		c0.54			0.45			c0.19			0.18	
v/c Ratio		0.85			0.71			0.82			0.78	
Uniform Delay, d1		12.9			10.8			32.9			32.5	
Progression Factor		0.43			1.00			1.00			1.00	
Incremental Delay, d2		5.9			3.9			15.5			8.8	
Delay (s)		11.5			14.7			48.4			41.4	
Level of Service		B			B			D			D	
Approach Delay (s)		11.5			14.7			48.4			41.4	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		21.4			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		94.7%			ICU Level of Service			F				
Analysis Period (min)		15										

c Critical Lane Group

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	41	38	93	44	49	108
Future Volume (vph)	41	38	93	44	49	108
Peak Hour Factor	0.88	0.71	0.83	0.68	0.85	0.71
Hourly flow rate (vph)	47	54	112	65	58	152
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	101	177	210			
Volume Left (vph)	47	0	58			
Volume Right (vph)	54	65	0			
Hadj (s)	-0.23	-0.20	0.06			
Departure Headway (s)	4.5	4.2	4.4			
Degree Utilization, x	0.13	0.20	0.26			
Capacity (veh/h)	731	831	791			
Control Delay (s)	8.2	8.2	8.9			
Approach Delay (s)	8.2	8.2	8.9			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.5			
Level of Service			A			
Intersection Capacity Utilization			32.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	85	69	1	2	7
Future Volume (Veh/h)	3	85	69	1	2	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.38	0.82	0.90	0.25	0.50	0.75
Hourly flow rate (vph)	8	104	77	4	4	9
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	81				199	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	81				199	79
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1529				790	987
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	112	81	13			
Volume Left	8	0	4			
Volume Right	0	4	9			
cSH	1529	1700	917			
Volume to Capacity	0.01	0.05	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.6	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	0.6	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			16.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	33	28	73	45	10	11	214	45	11	280	18
Future Volume (vph)	11	33	28	73	45	10	11	214	45	11	280	18
Peak Hour Factor	0.50	0.64	0.78	0.72	0.81	0.75	0.63	0.93	0.68	0.50	0.93	0.57
Hourly flow rate (vph)	22	52	36	101	56	13	17	230	66	22	301	32
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	110	170	313	355								
Volume Left (vph)	22	101	17	22								
Volume Right (vph)	36	13	66	32								
Hadj (s)	-0.15	0.08	-0.08	-0.03								
Departure Headway (s)	5.9	6.0	5.2	5.2								
Degree Utilization, x	0.18	0.28	0.45	0.51								
Capacity (veh/h)	517	537	643	656								
Control Delay (s)	10.1	11.3	12.5	13.6								
Approach Delay (s)	10.1	11.3	12.5	13.6								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay				12.4								
Level of Service				B								
Intersection Capacity Utilization				40.3%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	19	78	14	18	69
Future Volume (Veh/h)	20	19	78	14	18	69
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.43	0.88	0.81	0.80	0.76
Hourly flow rate (vph)	31	44	89	17	22	91
Pedestrians	8		10			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	1		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	250	106			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250	106			114	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	95			99	
cM capacity (veh/h)	720	948			1478	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	75	106	113			
Volume Left	31	0	22			
Volume Right	44	17	0			
cSH	839	1700	1478			
Volume to Capacity	0.09	0.06	0.01			
Queue Length 95th (m)	2.4	0.0	0.4			
Control Delay (s)	9.7	0.0	1.5			
Lane LOS	A		A			
Approach Delay (s)	9.7	0.0	1.5			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			21.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	28	31	262	353	21
Future Volume (Veh/h)	7	28	31	262	353	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.69	0.54	0.96	0.93	0.43
Hourly flow rate (vph)	14	41	57	273	380	49
Pedestrians	4			2		
Lane Width (m)	3.6			3.6		
Walking Speed (m/s)	1.2			1.2		
Percent Blockage	0			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	796	410	433			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	796	410	433			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	94	95			
cM capacity (veh/h)	340	642	1134			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	55	330	429			
Volume Left	14	57	0			
Volume Right	41	0	49			
cSH	524	1134	1700			
Volume to Capacity	0.11	0.05	0.25			
Queue Length 95th (m)	2.8	1.3	0.0			
Control Delay (s)	12.7	1.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	1.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.6				
Intersection Capacity Utilization		49.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	40	97	4	54	95
Future Volume (Veh/h)	2	40	97	4	54	95
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	43	105	4	59	103
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	328	107			109	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	107			109	
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	95			96	
cM capacity (veh/h)	640	947			1481	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	45	109	162			
Volume Left	2	0	59			
Volume Right	43	4	0			
cSH	927	1700	1481			
Volume to Capacity	0.05	0.06	0.04			
Queue Length 95th (m)	1.2	0.0	1.0			
Control Delay (s)	9.1	0.0	2.9			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	2.9			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			24.7%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	42.8	52.4	91.0	48.0	44.0
Average Queue (m)	23.2	35.4	36.0	21.8	20.7
95th Queue (m)	43.0	57.3	73.9	39.2	36.9
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	3		1		
Queuing Penalty (veh)	25		6		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		8	2		
Queuing Penalty (veh)		28	9		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	82.7	73.9	9.1	11.9
Average Queue (m)	14.4	8.8	1.5	2.7
95th Queue (m)	57.8	41.1	6.9	9.8
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	6	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	91.9	195.5	92.8	80.1
Average Queue (m)	43.9	74.8	40.5	39.8
95th Queue (m)	94.1	152.6	73.5	66.4
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	5	1		
Queuing Penalty (veh)	36	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	11.9	16.7	16.9
Average Queue (m)	8.8	10.5	11.8
95th Queue (m)	12.2	15.5	18.0
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	SB
Directions Served	LR
Maximum Queue (m)	9.1
Average Queue (m)	2.0
95th Queue (m)	8.0
Link Distance (m)	188.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	13.7	23.6	28.8	53.3
Average Queue (m)	7.9	11.1	15.8	22.3
95th Queue (m)	13.5	18.1	24.3	38.8
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	10.6	1.7	11.8
Average Queue (m)	6.6	0.1	0.6
95th Queue (m)	13.1	1.2	5.0
Link Distance (m)	194.4	173.6	38.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Elgin St S & South St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	11.8	20.2	1.9
Average Queue (m)	5.6	3.4	0.1
95th Queue (m)	12.9	12.2	1.3
Link Distance (m)	194.4	257.6	128.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Chalmers St S & Site Access

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.0	10.5
Average Queue (m)	6.7	1.1
95th Queue (m)	13.9	6.2
Link Distance (m)	80.8	79.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 110

E

Appendix E

Future Total Traffic Operations – with Mitigations

HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	551	26	18	490	4	76	28	58	4	20	32
Future Volume (vph)	20	551	26	18	490	4	76	28	58	4	20	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1738			3375			1768			1741	
Flt Permitted		0.96			0.88			0.76			0.95	
Satd. Flow (perm)		1665			2977			1398			1669	
Peak-hour factor, PHF	0.64	0.97	0.80	0.46	0.78	1.00	0.32	0.75	0.75	0.50	0.71	0.91
Adj. Flow (vph)	31	568	32	39	628	4	238	37	77	8	28	35
RTOR Reduction (vph)	0	2	0	0	1	0	0	11	0	0	25	0
Lane Group Flow (vph)	0	630	0	0	670	0	0	341	0	0	46	0
Confl. Peds. (#/hr)	1		1	1		1	1		2	2		1
Heavy Vehicles (%)	1%	9%	0%	0%	7%	0%	0%	0%	1%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		52.2			34.2			25.8			25.8	
Effective Green, g (s)		52.2			34.2			25.8			25.8	
Actuated g/C Ratio		0.58			0.38			0.29			0.29	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		975			1131			400			478	
v/s Ratio Prot		c0.09										
v/s Ratio Perm		c0.29			0.23			c0.24			0.03	
v/c Ratio		0.65			0.59			0.85			0.10	
Uniform Delay, d1		12.7			22.3			30.3			23.5	
Progression Factor		0.62			0.74			1.00			1.00	
Incremental Delay, d2		0.9			2.2			15.8			0.1	
Delay (s)		8.7			18.7			46.1			23.6	
Level of Service		A			B			D			C	
Approach Delay (s)		8.7			18.7			46.1			23.6	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay		20.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			17.7				
Intersection Capacity Utilization		72.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	608	3	3	507	4	0	1	1	2	3	7
Future Volume (Veh/h)	6	608	3	3	507	4	0	1	1	2	3	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.42	0.96	0.75	0.38	0.83	0.50	0.25	0.25	0.25	0.50	0.38	0.50
Hourly flow rate (vph)	14	633	4	8	611	8	0	4	4	4	8	14
Pedestrians								5			5	
Lane Width (m)								3.6			3.6	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.86			0.77			0.83	0.83	0.77	0.83	0.83	0.86
vC, conflicting volume	624			642			1317	1308	640	1305	1306	620
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	486			380			914	903	377	900	901	482
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	98			99			100	98	99	98	96	97
cM capacity (veh/h)	931			907			196	225	514	208	226	505
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	651	627	8	26								
Volume Left	14	8	0	4								
Volume Right	4	8	4	14								
cSH	931	907	313	316								
Volume to Capacity	0.02	0.01	0.03	0.08								
Queue Length 95th (m)	0.4	0.2	0.6	2.1								
Control Delay (s)	0.4	0.2	16.8	17.4								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.4	0.2	16.8	17.4								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			46.3%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	581	24	15	364	2	51	220	35	7	105	23
Future Volume (vph)	28	581	24	15	364	2	51	220	35	7	105	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1722			1701			1776			1787	
Flt Permitted		0.96			0.93			0.91			0.98	
Satd. Flow (perm)		1659			1595			1625			1750	
Peak-hour factor, PHF	0.78	0.96	0.55	0.50	0.88	0.50	0.77	0.86	0.57	0.75	0.79	0.75
Adj. Flow (vph)	36	605	44	30	414	4	66	256	61	9	133	31
RTOR Reduction (vph)	0	2	0	0	0	0	0	8	0	0	9	0
Lane Group Flow (vph)	0	683	0	0	448	0	0	375	0	0	164	0
Confl. Peds. (#/hr)	1		3	3		1	1		2	2		1
Heavy Vehicles (%)	1%	10%	1%	1%	12%	0%	3%	4%	1%	0%	4%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		53.3			53.3			24.7			24.7	
Effective Green, g (s)		53.3			53.3			24.7			24.7	
Actuated g/C Ratio		0.59			0.59			0.27			0.27	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		982			944			445			480	
v/s Ratio Prot												
v/s Ratio Perm		c0.41			0.28			c0.23			0.09	
v/c Ratio		0.70			0.47			0.84			0.34	
Uniform Delay, d1		12.7			10.4			30.8			26.1	
Progression Factor		0.30			1.00			1.00			1.00	
Incremental Delay, d2		3.2			1.7			13.5			0.4	
Delay (s)		7.0			12.1			44.4			26.6	
Level of Service		A			B			D			C	
Approach Delay (s)		7.0			12.1			44.4			26.6	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay		18.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		82.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

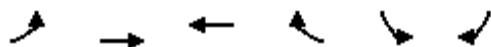
03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	20	21	133	24	18	53
Future Volume (vph)	20	21	133	24	18	53
Peak Hour Factor	0.53	0.59	0.42	0.63	0.80	0.57
Hourly flow rate (vph)	38	36	317	38	22	93
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	74	355	115			
Volume Left (vph)	38	0	22			
Volume Right (vph)	36	38	0			
Hadj (s)	-0.19	-0.06	0.04			
Departure Headway (s)	4.7	4.1	4.5			
Degree Utilization, x	0.10	0.41	0.14			
Capacity (veh/h)	689	849	769			
Control Delay (s)	8.2	10.0	8.2			
Approach Delay (s)	8.2	10.0	8.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			9.4			
Level of Service			A			
Intersection Capacity Utilization			26.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	58	39	2	2	3
Future Volume (Veh/h)	1	58	39	2	2	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.80	0.77	0.50	0.50	0.38
Hourly flow rate (vph)	4	72	51	4	4	8
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	55				134	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				134	53
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1563				862	1020
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	76	55	12			
Volume Left	4	0	4			
Volume Right	0	4	8			
cSH	1563	1700	961			
Volume to Capacity	0.00	0.03	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.4	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	0.4	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	13	34	14	18	21	4	13	304	34	4	130	7
Future Volume (vph)	13	34	14	18	21	4	13	304	34	4	130	7
Peak Hour Factor	0.60	0.73	0.65	0.50	0.64	0.50	0.75	0.89	0.86	0.33	0.87	0.50
Hourly flow rate (vph)	22	47	22	36	33	8	17	342	40	12	149	14
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	91	77	399	175								
Volume Left (vph)	22	36	17	12								
Volume Right (vph)	22	8	40	14								
Hadj (s)	-0.09	0.03	0.04	0.01								
Departure Headway (s)	5.3	5.5	4.6	4.9								
Degree Utilization, x	0.13	0.12	0.51	0.24								
Capacity (veh/h)	602	584	754	698								
Control Delay (s)	9.1	9.2	12.4	9.4								
Approach Delay (s)	9.1	9.2	12.4	9.4								
Approach LOS	A	A	B	A								
Intersection Summary												
Delay				10.9								
Level of Service				B								
Intersection Capacity Utilization				36.1%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	12	50	9	7	63
Future Volume (Veh/h)	19	12	50	9	7	63
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.61	0.55	0.85	0.67	0.38	0.69
Hourly flow rate (vph)	31	22	59	13	18	91
Pedestrians	4		3			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	200	70			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200	70			76	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			99	
cM capacity (veh/h)	780	990			1531	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	72	109			
Volume Left	31	0	18			
Volume Right	22	13	0			
cSH	855	1700	1531			
Volume to Capacity	0.06	0.04	0.01			
Queue Length 95th (m)	1.6	0.0	0.3			
Control Delay (s)	9.5	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	33	342	155	10
Future Volume (Veh/h)	9	9	33	342	155	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	1.00	0.75	0.88	0.95	0.56
Hourly flow rate (vph)	18	9	44	389	163	18
Pedestrians	8				3	
Lane Width (m)	3.6				3.6	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	660	180	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	180	189			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	97			
cM capacity (veh/h)	414	860	1382			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	27	433	181			
Volume Left	18	44	0			
Volume Right	9	0	18			
cSH	500	1382	1700			
Volume to Capacity	0.05	0.03	0.11			
Queue Length 95th (m)	1.4	0.8	0.0			
Control Delay (s)	12.6	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.6	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			43.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	47	110	1	16	57
Future Volume (Veh/h)	2	47	110	1	16	57
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	51	120	1	17	62
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	216	120			121	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216	120			121	
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	95			99	
cM capacity (veh/h)	763	931			1467	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	121	79			
Volume Left	2	0	17			
Volume Right	51	1	0			
cSH	923	1700	1467			
Volume to Capacity	0.06	0.07	0.01			
Queue Length 95th (m)	1.5	0.0	0.3			
Control Delay (s)	9.1	0.0	1.7			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	1.7			
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			20.6%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	40.9	51.6	75.7	54.3	22.9
Average Queue (m)	21.8	23.7	22.5	25.4	9.8
95th Queue (m)	40.3	43.0	50.4	45.2	19.8
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	2		0		
Queuing Penalty (veh)	9		1		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		2	1		
Queuing Penalty (veh)		4	1		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	28.3	33.2	7.0	10.2
Average Queue (m)	1.5	1.9	0.5	3.1
95th Queue (m)	11.9	17.4	3.9	9.9
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	78.6	85.0	80.7	43.1
Average Queue (m)	28.6	30.9	47.7	20.4
95th Queue (m)	59.2	64.2	73.0	36.6
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.3	16.8	14.8
Average Queue (m)	6.1	10.5	8.1
95th Queue (m)	13.0	15.0	13.9
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	SB
Directions Served	LR
Maximum Queue (m)	9.1
Average Queue (m)	1.2
95th Queue (m)	6.0
Link Distance (m)	188.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	12.5	13.0	37.1	26.2
Average Queue (m)	7.4	6.8	18.3	13.5
95th Queue (m)	13.1	13.3	28.3	22.8
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	11.8	3.7
Average Queue (m)	5.9	0.2
95th Queue (m)	13.2	2.3
Link Distance (m)	194.4	38.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Elgin St S & South St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	9.2	12.2	1.3
Average Queue (m)	3.3	1.1	0.0
95th Queue (m)	10.3	6.6	0.9
Link Distance (m)	194.4	257.6	128.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Chalmers St S & Site Access

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	16.2	1.7	5.5
Average Queue (m)	8.1	0.1	0.2
95th Queue (m)	14.8	1.2	2.3
Link Distance (m)	80.8	38.3	79.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

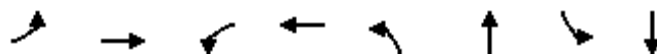
Zone Summary

Zone wide Queuing Penalty: 16

Timings

1: Chalmers St S & Main St

03-11-2025



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	20	551	18	490	76	28	4	20
Future Volume (vph)	20	551	18	490	76	28	4	20
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	12.3	26.2	26.2	26.2	7.0	7.0	7.0	7.0
Minimum Split (s)	18.0	33.0	33.0	33.0	23.2	23.2	23.2	23.2
Total Split (s)	18.0	57.0	39.0	39.0	33.0	33.0	33.0	33.0
Total Split (%)	20.0%	63.3%	43.3%	43.3%	36.7%	36.7%	36.7%	36.7%
Maximum Green (s)	12.3	50.2	32.2	32.2	27.8	27.8	27.8	27.8
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	3.5	3.5	3.5	1.9	1.9	1.9	1.9
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.8		6.8		5.2		5.2
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)		19.2	19.2	19.2	10.0	10.0	10.0	10.0
Flash Dont Walk (s)		7.0	7.0	7.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		2	1	1	1	1	1	1

Intersection Summary

Cycle Length: 90

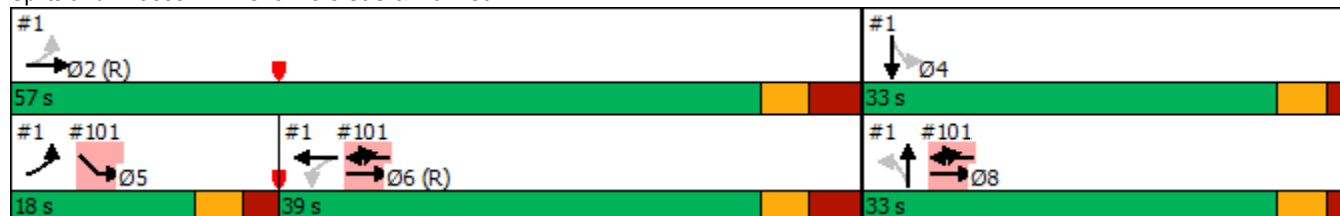
Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

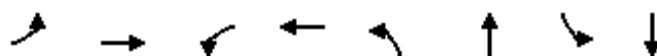
Splits and Phases: 1: Chalmers St S & Main St



Timings

3: Elgin St S & Main St

03-11-2025



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	28	581	15	364	51	220	7	105
Future Volume (vph)	28	581	15	364	51	220	7	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	41.3	41.3	41.3	41.3	10.0	10.0	10.0	10.0
Minimum Split (s)	47.3	47.3	47.3	47.3	21.0	21.0	21.0	21.0
Total Split (s)	55.0	55.0	55.0	55.0	35.0	35.0	35.0	35.0
Total Split (%)	61.1%	61.1%	61.1%	61.1%	38.9%	38.9%	38.9%	38.9%
Maximum Green (s)	49.0	49.0	49.0	49.0	29.0	29.0	29.0	29.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)	33.3	33.3	33.3	33.3	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0
Pedestrian Calls (#/hr)	2	2	1	1	1	1	3	3

Intersection Summary

Cycle Length: 90

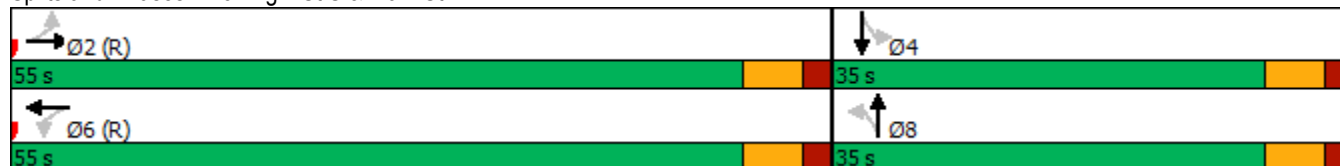
Actuated Cycle Length: 90

Offset: 80 (89%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 3: Elgin St S & Main St



HCM Signalized Intersection Capacity Analysis

1: Chalmers St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	711	67	31	730	2	51	23	56	9	84	43
Future Volume (vph)	11	711	67	31	730	2	51	23	56	9	84	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8			5.2			5.2	
Lane Util. Factor		1.00			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.95			0.96	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		1790			3466			1751			1798	
Flt Permitted		0.98			0.84			0.61			0.97	
Satd. Flow (perm)		1764			2907			1086			1748	
Peak-hour factor, PHF	0.63	0.86	0.77	0.63	0.94	0.50	0.75	0.59	0.85	0.50	0.68	0.61
Adj. Flow (vph)	17	827	87	49	777	4	68	39	66	18	124	70
RTOR Reduction (vph)	0	4	0	0	1	0	0	25	0	0	20	0
Lane Group Flow (vph)	0	927	0	0	829	0	0	148	0	0	192	0
Confl. Peds. (#/hr)	9		6	6		9	2		1	1		2
Heavy Vehicles (%)	0%	5%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		61.6			43.6			16.4			16.4	
Effective Green, g (s)		61.6			43.6			16.4			16.4	
Actuated g/C Ratio		0.68			0.48			0.18			0.18	
Clearance Time (s)		6.8			6.8			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1210			1408			197			318	
v/s Ratio Prot		c0.10										
v/s Ratio Perm		c0.42			0.29			c0.14			0.11	
v/c Ratio		0.77			0.59			0.75			0.60	
Uniform Delay, d1		9.4			16.7			34.9			33.8	
Progression Factor		0.91			0.61			1.00			1.00	
Incremental Delay, d2		1.0			1.3			14.4			3.2	
Delay (s)		9.5			11.5			49.3			37.0	
Level of Service		A			B			D			D	
Approach Delay (s)		9.5			11.5			49.3			37.0	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		16.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.82										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			17.7				
Intersection Capacity Utilization		80.6%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Lowell St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	759	8	7	750	4	0	2	4	1	6	4
Future Volume (Veh/h)	4	759	8	7	750	4	0	2	4	1	6	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.90	0.58	0.75	0.92	0.33	0.25	0.25	0.50	0.25	0.31	1.00
Hourly flow rate (vph)	8	843	14	9	815	12	0	8	8	4	19	4
Pedestrians					1			4			8	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)		103			106							
pX, platoon unblocked	0.72			0.65			0.79	0.79	0.65	0.79	0.79	0.72
vC, conflicting volume	835			861			1722	1723	855	1726	1724	829
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	581			523			996	996	514	1000	998	573
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
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 %	99			99			100	96	98	98	90	99
cM capacity (veh/h)	721			687			158	188	368	162	188	376
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	865	836	16	27								
Volume Left	8	9	0	4								
Volume Right	14	12	8	4								
cSH	721	687	249	198								
Volume to Capacity	0.01	0.01	0.06	0.14								
Queue Length 95th (m)	0.3	0.3	1.6	3.7								
Control Delay (s)	0.3	0.4	20.4	26.0								
Lane LOS	A	A	C	D								
Approach Delay (s)	0.3	0.4	20.4	26.0								
Approach LOS			C	D								
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			54.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Elgin St S & Main St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	694	36	29	678	2	39	150	36	6	236	43
Future Volume (vph)	36	694	36	29	678	2	39	150	36	6	236	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.98	
Flt Protected		1.00			1.00			0.99			1.00	
Satd. Flow (prot)		1798			1842			1793			1858	
Flt Permitted		0.92			0.93			0.77			0.99	
Satd. Flow (perm)		1664			1725			1391			1838	
Peak-hour factor, PHF	0.69	0.87	0.75	0.81	0.92	0.50	0.97	0.81	0.69	0.63	0.85	0.89
Adj. Flow (vph)	52	798	48	36	737	4	40	185	52	10	278	48
RTOR Reduction (vph)	0	2	0	0	0	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	896	0	0	777	0	0	267	0	0	329	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	3%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		57.7			57.7			20.3			20.3	
Effective Green, g (s)		57.7			57.7			20.3			20.3	
Actuated g/C Ratio		0.64			0.64			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1066			1105			313			414	
v/s Ratio Prot												
v/s Ratio Perm		c0.54			0.45			c0.19			0.18	
v/c Ratio		0.84			0.70			0.85			0.79	
Uniform Delay, d1		12.6			10.5			33.4			32.9	
Progression Factor		0.48			1.00			1.00			1.00	
Incremental Delay, d2		5.7			3.7			19.6			10.1	
Delay (s)		11.8			14.3			53.0			43.0	
Level of Service		B			B			D			D	
Approach Delay (s)		11.8			14.3			53.0			43.0	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		22.2			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		94.7%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Chalmers St S & Elliott St

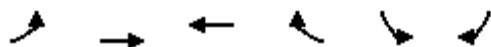
03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	41	38	93	44	49	108
Future Volume (vph)	41	38	93	44	49	108
Peak Hour Factor	0.88	0.71	0.83	0.68	0.85	0.71
Hourly flow rate (vph)	47	54	112	65	58	152
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	101	177	210			
Volume Left (vph)	47	0	58			
Volume Right (vph)	54	65	0			
Hadj (s)	-0.23	-0.20	0.06			
Departure Headway (s)	4.5	4.2	4.4			
Degree Utilization, x	0.13	0.20	0.26			
Capacity (veh/h)	731	831	791			
Control Delay (s)	8.2	8.2	8.9			
Approach Delay (s)	8.2	8.2	8.9			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.5			
Level of Service			A			
Intersection Capacity Utilization			32.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Elliott St & Lowell St S

03-11-2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	85	69	1	2	7
Future Volume (Veh/h)	3	85	69	1	2	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.38	0.82	0.90	0.25	0.50	0.75
Hourly flow rate (vph)	8	104	77	4	4	9
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	81				199	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	81				199	79
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1529				790	987
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	112	81	13			
Volume Left	8	0	4			
Volume Right	0	4	9			
cSH	1529	1700	917			
Volume to Capacity	0.01	0.05	0.01			
Queue Length 95th (m)	0.1	0.0	0.3			
Control Delay (s)	0.6	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	0.6	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			16.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Elgin St S & Elliott St

03-11-2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	33	28	73	45	10	11	214	45	11	280	18
Future Volume (vph)	11	33	28	73	45	10	11	214	45	11	280	18
Peak Hour Factor	0.50	0.64	0.78	0.72	0.81	0.75	0.63	0.93	0.68	0.50	0.93	0.57
Hourly flow rate (vph)	22	52	36	101	56	13	17	230	66	22	301	32
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	110	170	313	355								
Volume Left (vph)	22	101	17	22								
Volume Right (vph)	36	13	66	32								
Hadj (s)	-0.15	0.08	-0.08	-0.03								
Departure Headway (s)	5.9	6.0	5.2	5.2								
Degree Utilization, x	0.18	0.28	0.45	0.51								
Capacity (veh/h)	517	537	643	656								
Control Delay (s)	10.1	11.3	12.5	13.6								
Approach Delay (s)	10.1	11.3	12.5	13.6								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay				12.4								
Level of Service				B								
Intersection Capacity Utilization				40.3%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

7: Chalmers St S & South St

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	19	78	14	18	69
Future Volume (Veh/h)	20	19	78	14	18	69
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.64	0.43	0.88	0.81	0.80	0.76
Hourly flow rate (vph)	31	44	89	17	22	91
Pedestrians	8		10			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	1		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	250	106			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250	106			114	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	95			99	
cM capacity (veh/h)	720	948			1478	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	75	106	113			
Volume Left	31	0	22			
Volume Right	44	17	0			
cSH	839	1700	1478			
Volume to Capacity	0.09	0.06	0.01			
Queue Length 95th (m)	2.4	0.0	0.4			
Control Delay (s)	9.7	0.0	1.5			
Lane LOS	A		A			
Approach Delay (s)	9.7	0.0	1.5			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			21.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Elgin St S & South St

03-11-2025

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	28	31	262	353	21
Future Volume (Veh/h)	7	28	31	262	353	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.69	0.54	0.96	0.93	0.43
Hourly flow rate (vph)	14	41	57	273	380	49
Pedestrians	4			2		
Lane Width (m)	3.6			3.6		
Walking Speed (m/s)	1.2			1.2		
Percent Blockage	0			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	796	410	433			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	796	410	433			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	94	95			
cM capacity (veh/h)	340	642	1134			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	55	330	429			
Volume Left	14	57	0			
Volume Right	41	0	49			
cSH	524	1134	1700			
Volume to Capacity	0.11	0.05	0.25			
Queue Length 95th (m)	2.8	1.3	0.0			
Control Delay (s)	12.7	1.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	1.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.6				
Intersection Capacity Utilization		49.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Chalmers St S & Site Access

03-11-2025

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	40	97	4	54	95
Future Volume (Veh/h)	2	40	97	4	54	95
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	43	105	4	59	103
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	328	107			109	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	107			109	
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	95			96	
cM capacity (veh/h)	640	947			1481	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	45	109	162			
Volume Left	2	0	59			
Volume Right	43	4	0			
cSH	927	1700	1481			
Volume to Capacity	0.05	0.06	0.04			
Queue Length 95th (m)	1.2	0.0	1.0			
Control Delay (s)	9.1	0.0	2.9			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	2.9			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			24.7%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Chalmers St S & Main St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (m)	42.5	51.9	78.6	57.2	50.6
Average Queue (m)	25.4	33.3	30.3	21.9	21.4
95th Queue (m)	44.2	56.2	65.8	42.1	39.4
Link Distance (m)	36.8		84.6	194.2	138.6
Upstream Blk Time (%)	3		0		
Queuing Penalty (veh)	26		3		
Storage Bay Dist (m)		45.0			
Storage Blk Time (%)		5	1		
Queuing Penalty (veh)		19	5		

Intersection: 2: Lowell St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	80.4	66.0	9.0	11.8
Average Queue (m)	11.2	6.6	1.2	2.7
95th Queue (m)	48.5	35.9	6.0	9.7
Link Distance (m)	84.6	87.9	188.8	142.4
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	4	1		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Elgin St S & Main St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	91.3	158.6	109.0	82.5
Average Queue (m)	41.9	63.2	43.7	40.1
95th Queue (m)	89.1	124.8	85.6	67.3
Link Distance (m)	87.9	212.5	192.3	124.3
Upstream Blk Time (%)	4			
Queuing Penalty (veh)	28			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Chalmers St S & Elliott St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.3	16.8	24.6
Average Queue (m)	8.9	10.3	11.9
95th Queue (m)	12.7	14.7	19.4
Link Distance (m)	89.2	79.7	194.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Elliott St & Lowell St S

Movement	SB
Directions Served	LR
Maximum Queue (m)	9.0
Average Queue (m)	1.8
95th Queue (m)	7.6
Link Distance (m)	188.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Elgin St S & Elliott St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	13.6	21.6	31.4	53.1
Average Queue (m)	8.0	11.2	16.1	22.6
95th Queue (m)	12.6	17.2	25.0	39.3
Link Distance (m)	87.5	116.3	128.6	192.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Chalmers St S & South St

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	11.6	1.7	9.3
Average Queue (m)	6.5	0.1	0.7
95th Queue (m)	13.2	1.2	4.8
Link Distance (m)	194.4	173.6	38.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: Elgin St S & South St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	13.1	23.4
Average Queue (m)	6.0	3.3
95th Queue (m)	13.2	13.6
Link Distance (m)	194.4	257.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Chalmers St S & Site Access

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	14.0	10.4
Average Queue (m)	7.2	1.5
95th Queue (m)	14.1	7.1
Link Distance (m)	80.8	79.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

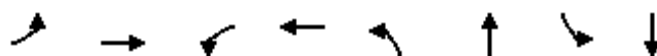
Zone Summary

Zone wide Queuing Penalty: 86

Timings

1: Chalmers St S & Main St

03-11-2025



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	11	711	31	730	51	23	9	84
Future Volume (vph)	11	711	31	730	51	23	9	84
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	12.3	36.4	36.4	36.4	7.0	7.0	7.0	7.0
Minimum Split (s)	18.0	43.2	43.2	43.2	23.2	23.2	23.2	23.2
Total Split (s)	18.0	65.7	47.7	47.7	24.3	24.3	24.3	24.3
Total Split (%)	20.0%	73.0%	53.0%	53.0%	27.0%	27.0%	27.0%	27.0%
Maximum Green (s)	12.3	58.9	40.9	40.9	19.1	19.1	19.1	19.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	3.5	3.5	3.5	1.9	1.9	1.9	1.9
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.8		6.8		5.2		5.2
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)		29.4	29.4	29.4	10.0	10.0	10.0	10.0
Flash Dont Walk (s)		7.0	7.0	7.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		6	9	9	9	9	2	2

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

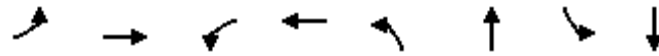
Splits and Phases: 1: Chalmers St S & Main St



Timings

3: Elgin St S & Main St

03-11-2025



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	36	694	29	678	39	150	6	236
Future Volume (vph)	36	694	29	678	39	150	6	236
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	52.5	52.5	52.5	52.5	10.0	10.0	10.0	10.0
Minimum Split (s)	58.5	58.5	58.5	58.5	21.0	21.0	21.0	21.0
Total Split (s)	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%
Maximum Green (s)	54.0	54.0	54.0	54.0	24.0	24.0	24.0	24.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Walk Time (s)	44.5	44.5	44.5	44.5	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0
Pedestrian Calls (#/hr)	3	3	0	0	5	5	5	5

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 76 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Splits and Phases: 3: Elgin St S & Main St

