281 Chippawa Road Traffic Impact Study Report

Port Colborne, Ontario

Date: 11/03/2022
Prepared for: Coordinated Traffic Solutions, 180 Lawrence Lane, Fonthill, ON, L0S 1E4

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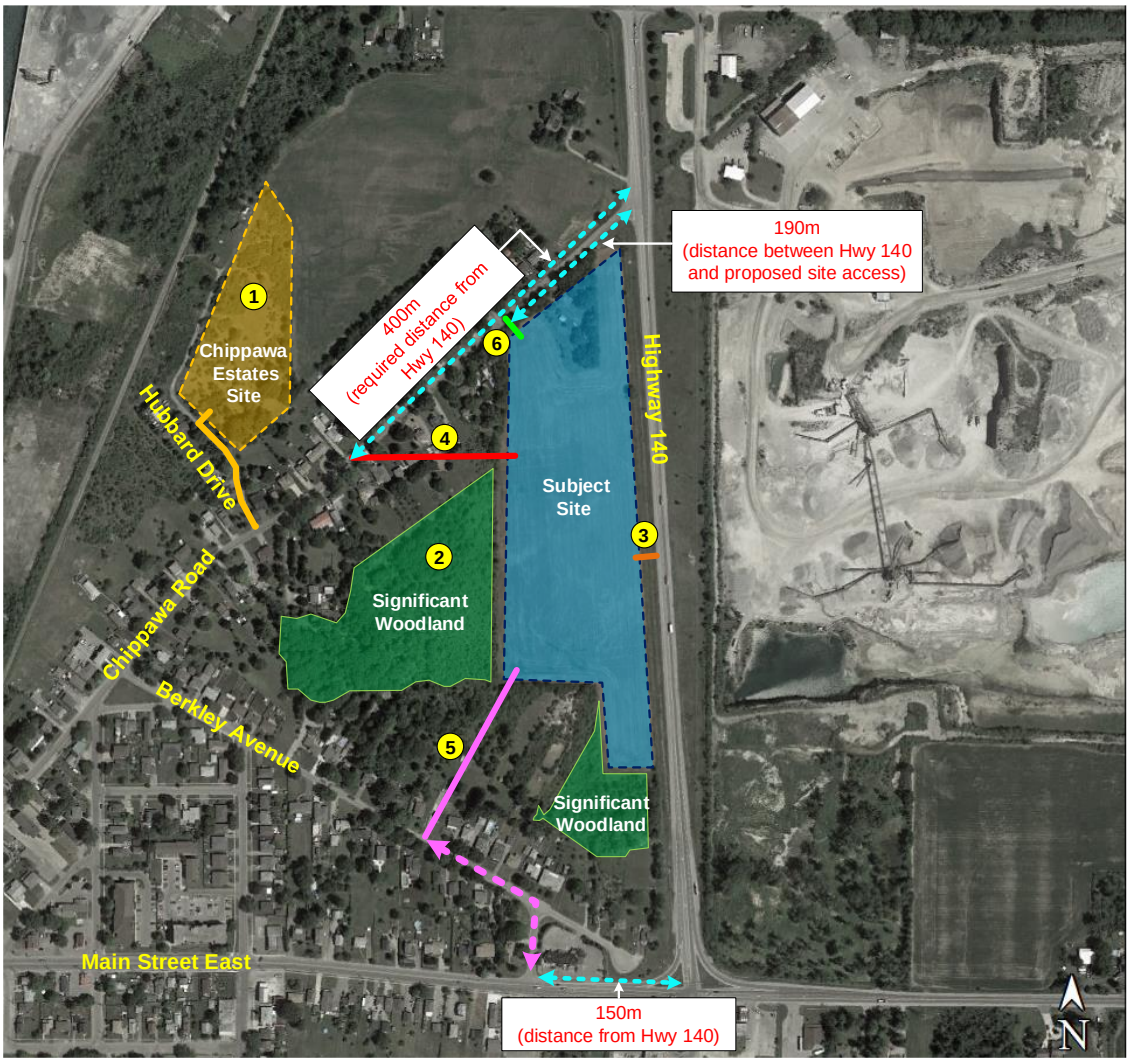
Preface

The development team for 281 Chippawa Road, Port Colborne Ontario, is submitting this request to the Ministry of Transportation Ontario ("MTO") to consider this application for acceptance of non-conforming site access pursuant to Highway Access Management spacing requirements of 400 metres (desirable).

Current design plans provide for a single access for 188 residential townhouse units via Chippawa Road located to the west of Highway 140 in the City of Port Colborne ("City"). The current access location for the proposed development is set back approximately 190 metres west of Highway 140, which is sub-standard to the recommended setback policy of 400 metres.

Therefore, a detailed review of alternative access options was conducted to identify the most feasible alternative for the proposed development in consultations with the City and Niagara Region ("Region") staff. The following figure provides an overview of the background developments, significant woodland, road network and existing properties constraints taken into consideration in the assessment of alternative access options for the proposed development.



1. **Chippawa Estates Site:** Proposed background development with 19 single family residential units with proposed site access via Hubbard Drive connecting to Chippawa Road.

2. **Significant Woodland:** The lands to the west and south of the site, as shown in the above figure, are designated as Significant Woodland. It is important to note that the current Official Plan policies prohibit development within woodland communities of this type and the City no longer requires the consideration of lands to the west due to limited development potential as per the following statements from the Region and the City, respectively:

    - *"The current Official Plan policies prohibit development and site alteration within woodland communities of this type, unless no negative impact can be confirmed through the submission of an Environmental Impact Study. Given the size of the woodland and the amount of area required for any road construction, this test would be difficult to meet. Certainly there is limited development potential to the west".*
    - *"Please accept this as confirmation that based on the Region's environmental comments, the City of Port Colborne will no longer require the consideration of lands to the west as there is limited development potential".*

    Detailed correspondence is provided in **Appendix A**.

3. **Site Access Alternative #1 (Direct access to Highway 140):** Highway 140 is classified as a 2A-Principal Arterial as per **Figure 4.5.3** of the Ministry's "*Highway Corridor Management Manual*". It is noted that direct highway access in not permitted for Principal Arterials as per **Figure 4.6.8** of the above-noted manual. Therefore, this access alternative was not considered for the proposed development.

4. **Site Access Alternative #2 (Compliant with MTO's spacing requirement):** This access alternative via Chippawa Road will meet MTO's spacing requirement of 400 metres from Highway 140. However, it will require significant property acquisition of both vacant and occupied lands. At least six (6) residential lots will need to be purchased at an estimated cost of $4,000,000-$6,000,000 (based on area home valuations). Therefore, this alternative is not feasible due to the significant property acquisition of both vacant and occupied lands.

5. **Site Access Alternative #3 (Access via Berkley Avenue):** Based on discussions with the City staff, it is noted that the City prefers all traffic to enter / exit from Chippawa Road. Chippawa Road is a Collector Road as per the City's official plan and is designed to take larger volumes of traffic rather than Berkley Avenue which is designated as a Local Road. Entering / exiting from Chippawa Road provides more efficient access to Highway 140 and away from low traffic roads.

    Moreover, this access alternative will require significant property acquisition of both vacant and occupied lands in million of dollars.

    In addition, as shown in the above figure, the site traffic to / from the east, north, and south will most likely use the intersection of Berkley Avenue / Main Street. The distance between this stop controlled full-move intersection and the signalized intersection of Highway 140 / Main Street is approximately 150 metres.

    It is also noted that the eastbound left turn lane at the intersection of Highway 140 / Main Street extends beyond this intersection. The relatively short distance between the two intersections may result in potential operational and safety issues. Therefore, this access alternative is not preferred due to the operations and safety concerns.

6 **Site Access Alternative #4 (Proposed access via Chippawa Road):** This is the feasible and preferred access alternative for the proposed development. The advantages of the proposed access location are as follows:

- Direct access to Chippawa Road (recommended by the City);
- Minimal disturbance of development traffic in front of existing residential properties along Chippawa Road;
- No new lanes (i.e., auxiliary lanes) will be required on Chippawa Road;
- Site access operations will not impact operations at the Chippawa Road / Highway 140 intersection;
- No impacts to Significant Woodland area; and,
- No property acquisition will be required.

Please refer to the accompanying Traffic Impact Study for our assessment of the expected impact of development traffic to the existing road network with the feasible and preferred site access location noted above.

We request that the MTO consider the impact of the 400 metres policy for development at 281 Chippawa Road in Port Colborne, Ontario and respectfully submit this application for approval of non-conformance and the development plans as currently provided.

Document Revision History

Rev	Description	Prepared/ Revised By	Reviewed By	Approved By	Date Issued (M/D/Y)
R0	DRAFT for Review	V. Nadanasiva	M. Ismatyar	R. Sooklall	11/19/2021
R1	DRAFT for Review	V. Nadanasiva	M. Ismatyar	R. Sooklall	06/30/2022
R2	DRAFT for Review	V. Nadanasiva	M. Ismatyar	R. Sooklall	08/19/2022
R3	FINAL for Submission	V. Nadanasiva	M. Ismatyar	R. Sooklall	11/03/2022

Approved by:

Rudy Sooklall, P.Eng.

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1.0 Introduction

TraffMobility Engineering Inc. ("TraffMobility") was retained by Coordinated Traffic Solutions to undertake a Traffic Impact Study ("TIS") as part of the development application for the proposed development at 281 Chippawa Road in Port Colborne, Ontario. The study scope was discussed and confirmed with the City of Port Colborne ("City"), Regional Municipality of Niagara ("Region"), and Ministry of Transportation Ontario ("MTO") staff.

1.1 Study Area

The subject site is bounded by Chippawa Road to the north and west, Highway 140 to the east, and Main Street to the south as shown in **Figure 1**.

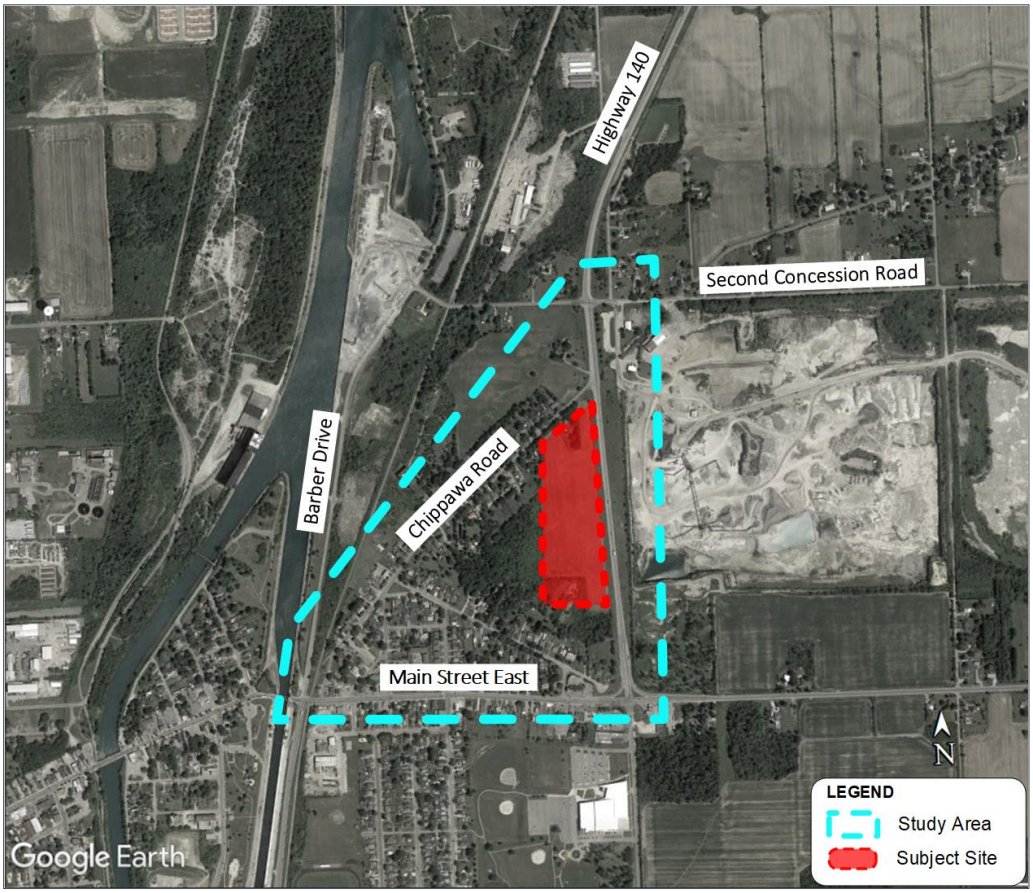

Figure 1: Study Area and Site Location

The study area for the analysis includes the following key intersections:

- Main Street at Highway 140 / Elizabeth Street;
- Main Street at Chippawa Road;
- Main Street at Barber Drive / Welland Street;
- Highway 140 at Chippawa Road; and,
- Highway 140 at Second Concession Road.

1.2 Study Methodology

The study assessed traffic operations under existing (2021) conditions and the following future horizon years:

- Future (2026) Background Conditions (5-year horizon);
- Future (2031) Background Conditions (10-year horizon);
- Future (2036) Background Conditions (15-year horizon);
- Future (2026) Total Conditions (5-year horizon);
- Future (2031) Total Conditions (10-year horizon); and,
- Future (2036) Total Conditions (15-year horizon).

Intersection operations were assessed using the Synchro 11 software which utilizes the Highway Capacity Manual (HCM) 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, and 95th percentile queues. 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

	Average Control Delay per Vehicle (second / vehicle)	
Level of Service	**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

The following Synchro parameter used in the analysis are based on "*Niagara Region Guidelines for Transportation Impact Studies*":

- Ideal Saturated Flow: 1750 vphpl; and,
- Peak Hour Factor (PHF): 0.92.

A compound growth rate of 2% per annum was used in the analysis to estimate future traffic volumes. The growth rate and above-noted Synchro parameters were confirmed with the Region and MTO staff.

For the purposes of the traffic analysis, critical movements were identified based on the following criteria as outlined in the Region's TIS guidelines:

- *"At signalized intersections, through and/or through-right and/or right-turn movements with a v/c ratio greater than 0.85 are deemed to be "critical" in terms of operations. Dedicated left-turn movements with a v/c ratio greater than 0.90 are deemed to be "critical" in terms of operations"*

- *"At unsignalized intersections, analysis must highlight where movements are expected to operate at LOS "D" or worse and/or where the estimated 95th percentile queue length for an individual movement exceeds the available queue space".*

1.3 Data Collection

The 24-hour Automatic Traffic Recorder (ATR) counts on Highway 140 were provided by the Ministry of Transportation Ontario (MTO). Moreover, existing turning movement counts and signal timing plans for the study area intersections were provided by the MTO and the Region. The existing turning movement count at the intersection of Main Street at Chippawa Road was not available; therefore, existing traffic volumes were obtained from a traffic count survey commissioned by TraffMobility during the weekday AM peak period (7:00 am to 9:00 am) and weekday PM peak period (4:00 pm to 6:00 pm). The survey summary is provided in **Table 2** and a copy of the existing turning movement counts are provided in **Appendix B**.

Table 2: Turning Movement Counts Summary

Intersection	Count Date	Source
Highway 140 at Main Street	August 1, 2017	MTO
Highway 140 at 2nd Concession	June 9, 2016	MTO
Highway 140 at Chippawa Road	November 6, 2018	MTO
Main Street at Chippawa Road	July 15, 2021	Traffic Survey Analysis Inc. (TSA)
Main Street at Barber Drive / Welland Street	May 23, 2019	Region

It is expected that the traffic volumes obtained from the new traffic counts are likely to be lower than the traffic volumes before the COVID-19 pandemic. Therefore, the link volumes on Main Street between Chippawa Road and Barber Drive were compared which indicated that the volumes obtained from the new count at there intersection of Main Street at Chippawa Road are higher in the westbound direction and lower in the eastbound direction compared to the existing volumes at the intersection of Main Street at Barber / Welland. Therefore, the volumes between the two intersections were balanced to the higher volumes in both directions (i.e., a conservative approach).

2.0 Existing Conditions

Traffic operations under existing conditions were analyzed for the peak hours during the weekday AM (7:00 am to 9:00 am) and weekday PM (4:00 pm to 6:00 pm) periods using the Synchro 11 software.

2.1 Existing Intersection Operations

Existing intersection operations were analyzed using the lane configurations illustrated in **Figure 2** and the existing (2021) traffic volumes shown in **Figure 3**. A peak hour factor of 0.92 was used in analysis for the weekday AM and weekday PM peak hours based as outlined in the Region's TIS guidelines. The analysis results are provided in **Table 3** and detailed calculations are provided in **Appendix C**.

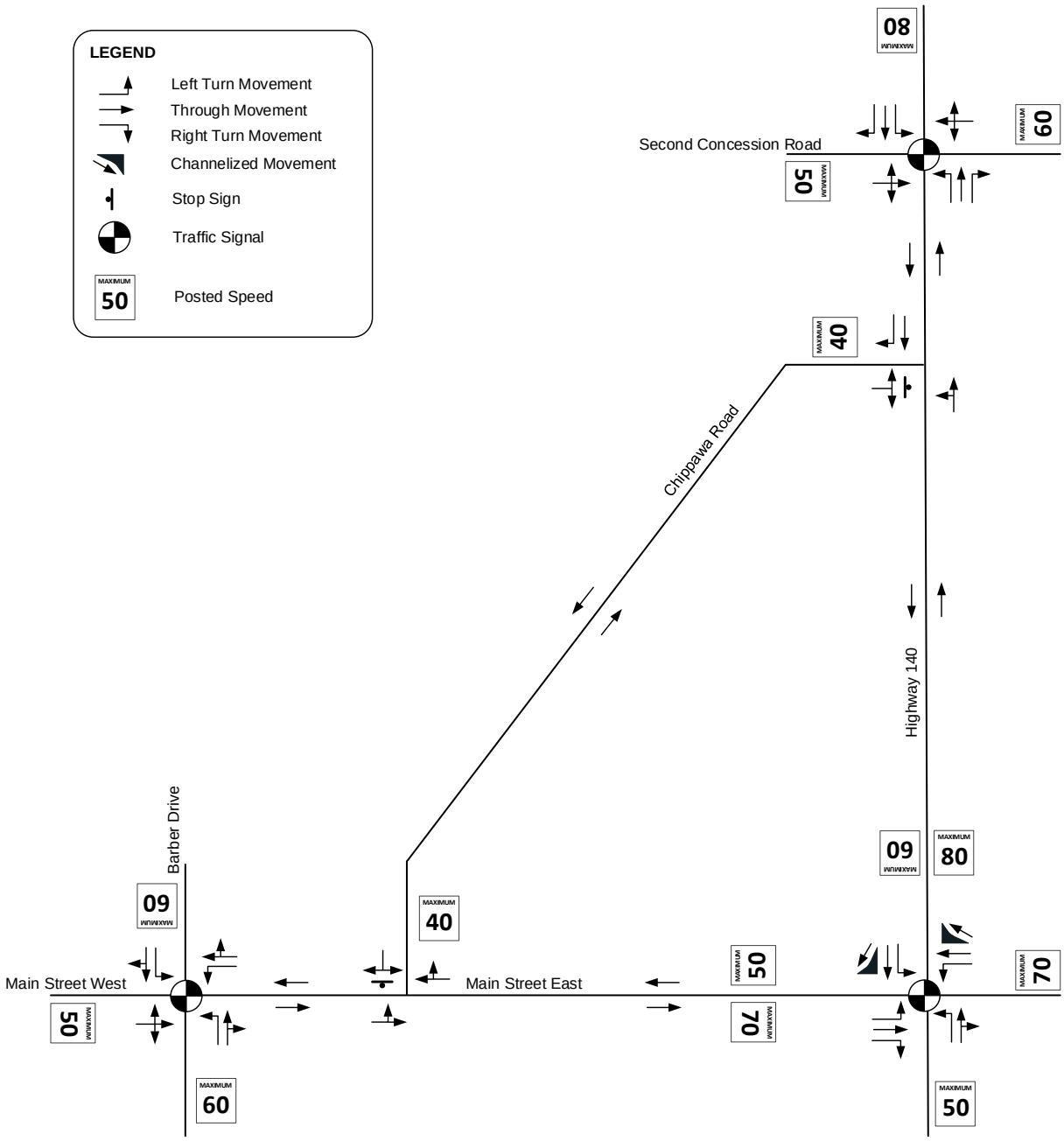

Figure 2: Existing Intersection Lane Configuration

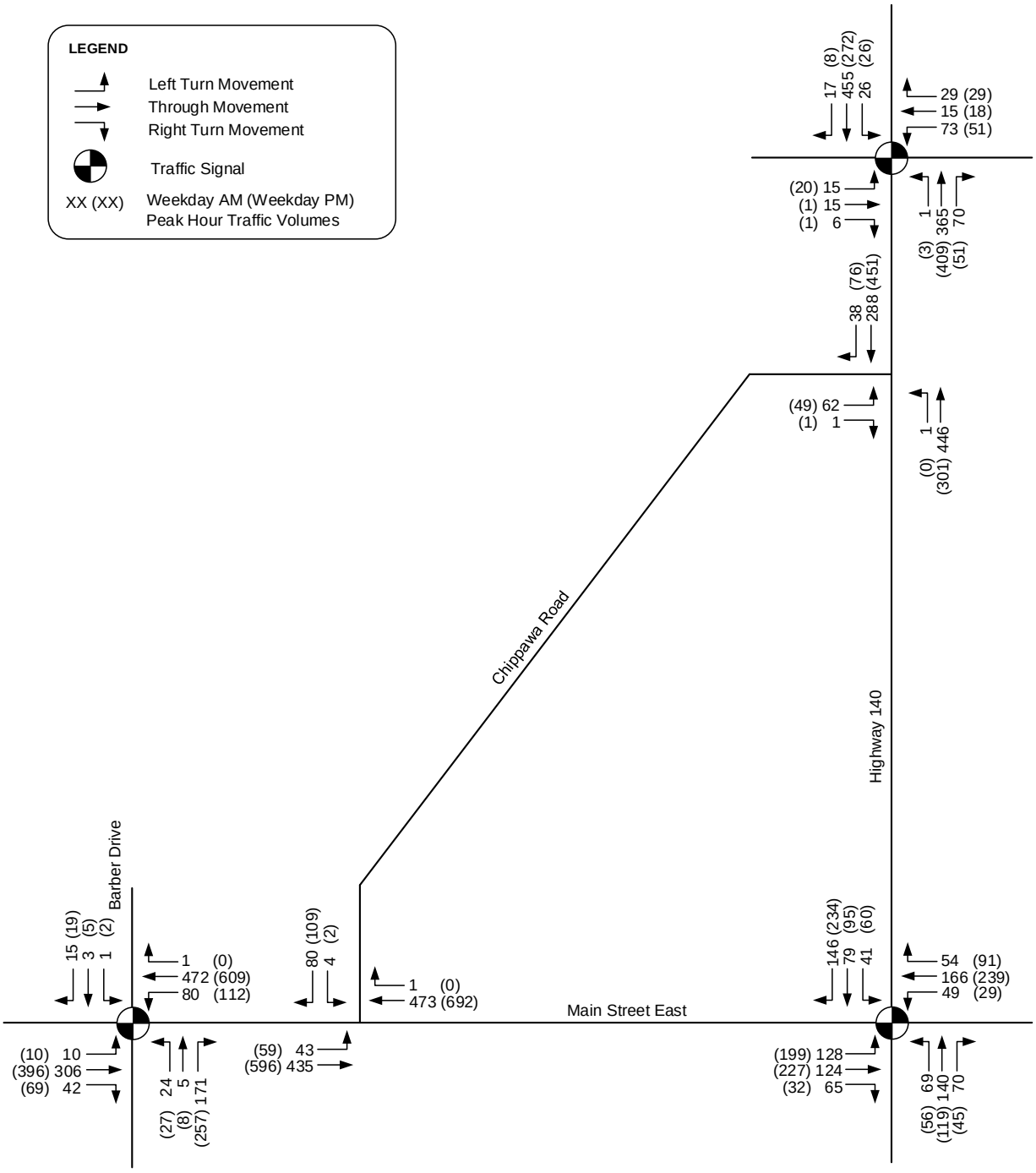

Figure 3: Existing (2021) Traffic Volumes

Table 3: Existing Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	15	0.33	-	B	14	0.40	-	-
EBL	A	8	0.23	20	A	10	0.37	29	155
EBT	A	7	0.15	18	A	8	0.25	28	435
EBR	A	7	0.05	< 7	A	6	0.03	< 7	120
WBL	A	7	0.08	9	A	6	0.06	< 7	135
WBT	A	7	0.20	23	A	8	0.27	29	> 500
WBR	A	7	0.04	< 7	A	6	0.07	< 7	140
NBL	C	21	0.30	18	C	22	0.28	15	110
NBTR	C	23	0.58	40	C	24	0.50	32	> 500
SBL	C	21	0.21	12	C	23	0.32	16	130
SBT	C	21	0.26	19	C	22	0.31	22	> 500
SBR	C	22	0.12	13	C	21	0.18	16	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	10	0.46	-	A	9	0.41	-	-
EBLTR	C	27	0.15	11	C	27	0.13	9	330
WBLTR	D	37	0.64	29	C	32	0.54	24	200
NBL	A	4	0.00	< 7	A	4	0.01	< 7	90
NBT	A	6	0.34	44	A	6	0.38	47	> 500
NBR	A	4	0.05	< 7	A	4	0.04	< 7	170
SBL	A	4	0.06	< 7	A	4	0.07	< 7	50
SBT	A	7	0.42	59	A	5	0.26	30	> 500
SBR	D	36	0.00	<7	D	35	0.00	< 7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	14	0.47	-	B	17	0.58	-	-
EBLTR	A	10	0.43	58	B	13	0.57	86	195
WBL	A	8	0.17	15	A	10	0.29	23	40
WBTR	B	11	0.55	83	B	16	0.71	137	330
NBL	C	26	0.12	10	C	25	0.13	10	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 3: Existing Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.16	17	C	26	0.24	21	> 500
SBL	C	33	0.06	< 7	C	31	0.03	< 7	60
SBTR	C	33	0.11	< 7	C	31	0.09	8	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	1	0.04	< 7	A	2	0.07	< 7	20
SBLR	B	14	0.18	< 7	C	18	0.31	10	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	C	17	0.19	< 7	C	17	0.16	< 7	> 500
NBLT	A	-	0.00	< 7	A	-	0.00	< 7	> 500

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 3** indicate that all movements are operating with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under existing conditions. Moreover, the results in **Table 3** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under existing conditions.

2.2 Pedestrian and Cyclist Infrastructure

Sidewalks are provided alongside and near Main 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.

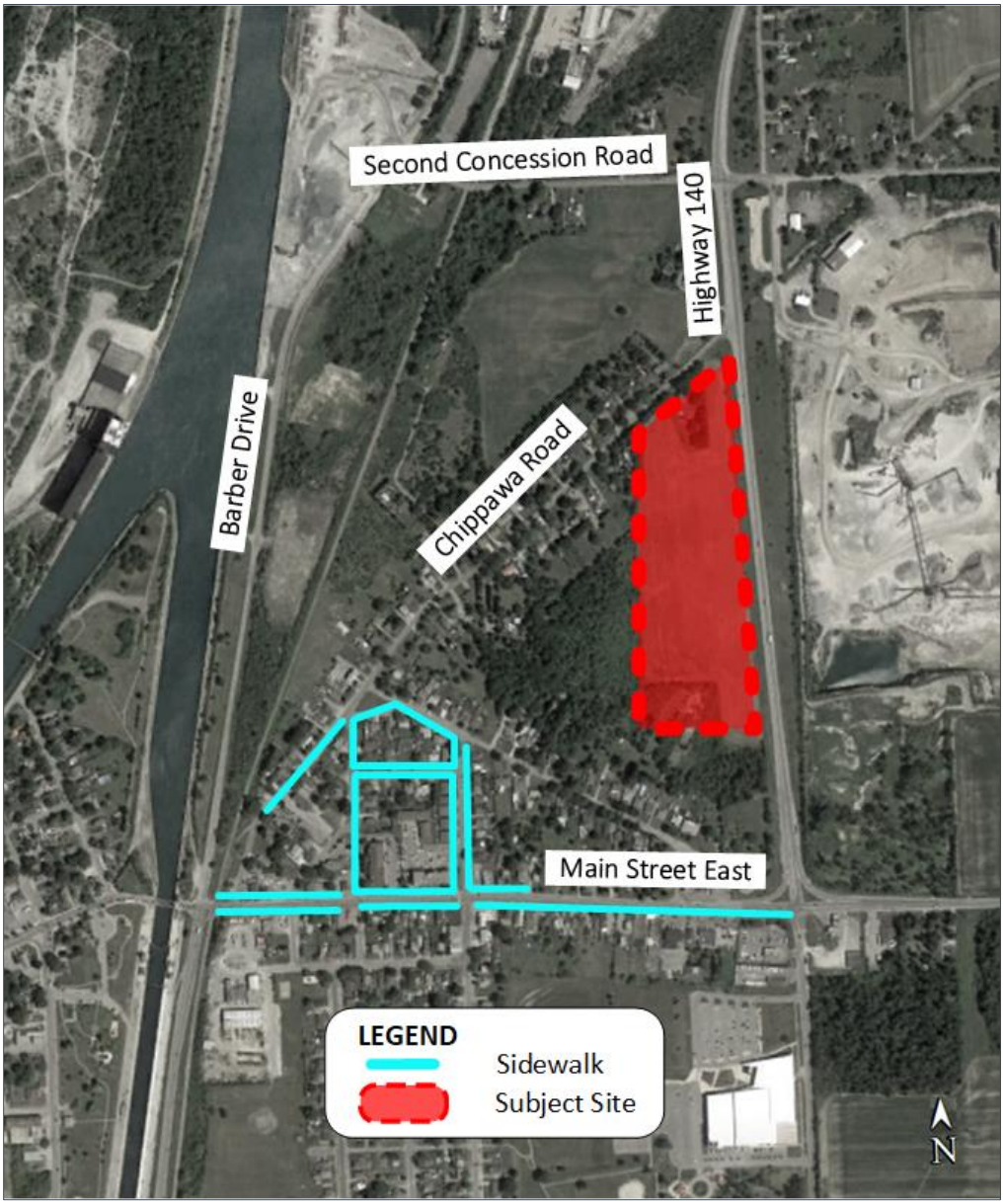

Figure 4: Existing Sidewalks

2.3 Transit Services

The subject site is partially served by public transit provided by Welland Transit. The bus route within the study area is Route 701 which operates on weekdays with service headway of sixty (60) minutes as shown in **Figure 5**. There are four bus stops along Main Street on the south side and one bus stop located at the southeast corner of the Dolphin Street at Willard Avenue intersection which is within 700 metres of the site.

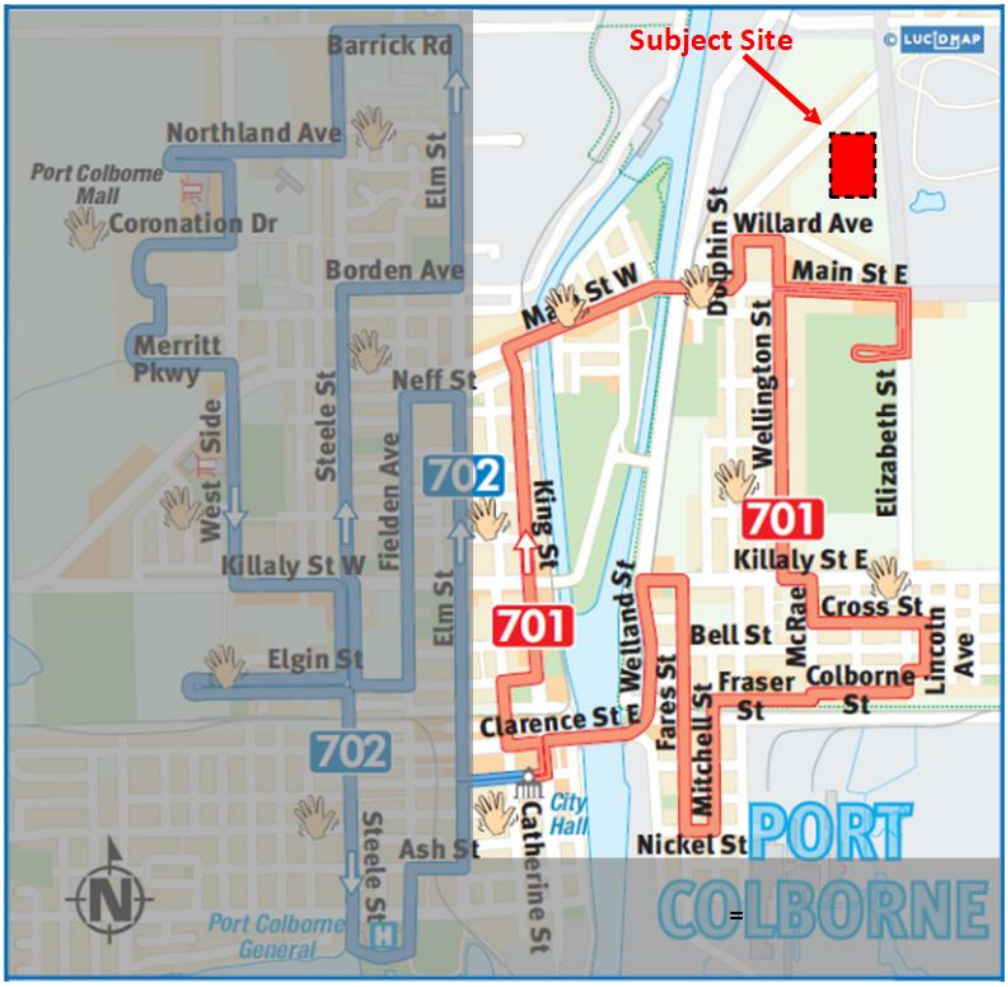

Figure 5: Existing Transit Routes

3.0 Future Background Conditions

The future 2026, 2031, and 2036 horizon years were selected and confirmed with the Region and the MTO staff. The future background conditions assessment is based on projected background growth and transportation improvements planned for the study area corresponding to each horizon year, if applicable. Traffic operations under future background conditions were analyzed for the weekday AM and weekday PM peak hours using the Synchro 11 software.

3.1 Future Planned Transportation Improvements

It is noted that Schedule D of the City of Port Colborne Official Plan shows potential realignment of Main Street / Highway 3 in the future as shown in **Figure 6**. However, based on a review of background traffic reports for other developments in the vicinity of the study area, the MTO has confirmed that there are currently no plans to realign Highway 3 within the ultimate horizon year (i.e., 2036) of this study.

Moreover, based on a review of the future capital projects outlined in the Niagara Region Transportation Mater Plan (TMP) and MTO's Southern Highway Program (2017-2021), there are currently no planned roadway or intersection improvements within the study area road network. Therefore, no future improvements were considered in this study.

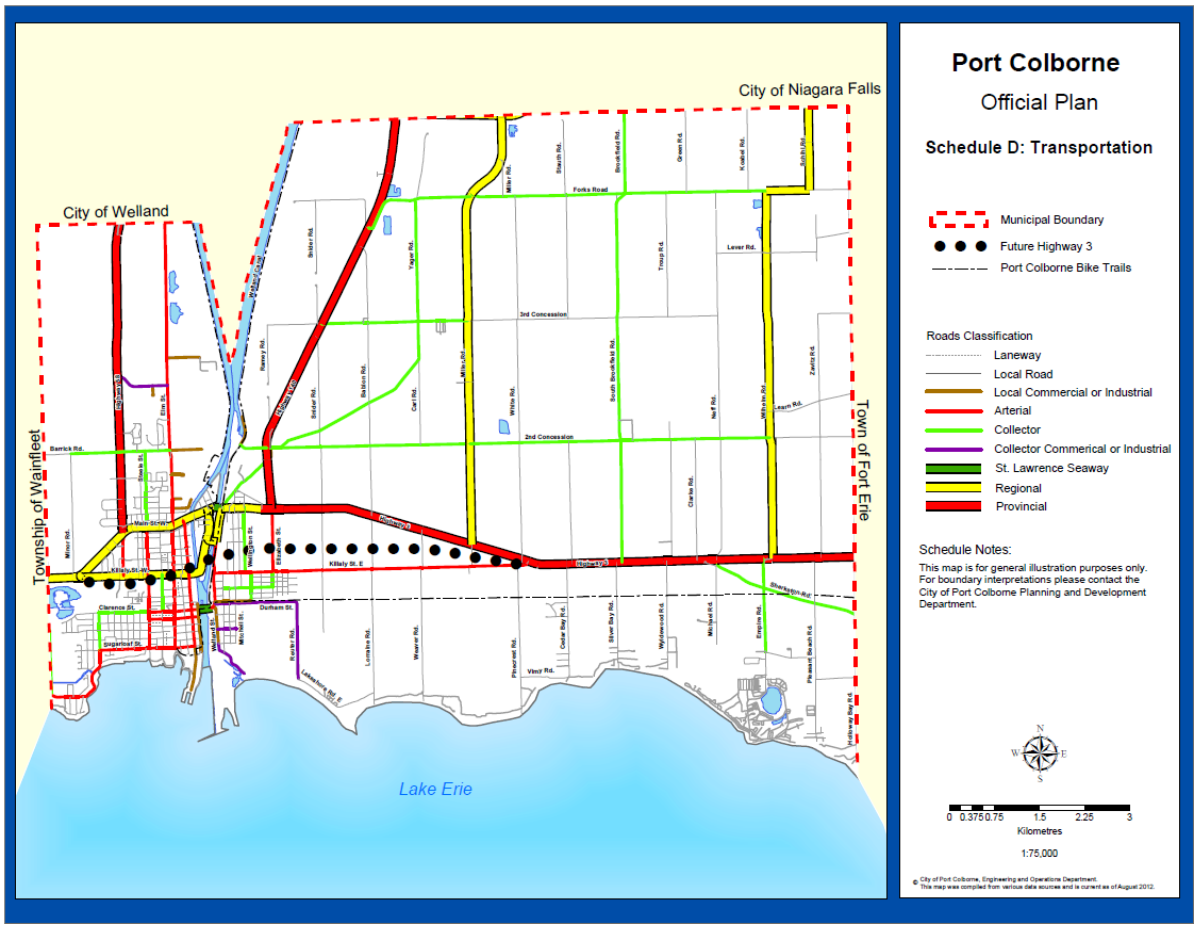

Figure 6: Future Transportation Improvements (Source: Port Colborne Official Plan – Schedule D)

3.2 Future Traffic Growth

Future background traffic for the study area consists of two components: traffic growth outside the study area and other development site traffic within the study area. A compound growth rate of 2% per annum was used in the analysis to estimate future traffic volumes. This growth rate is based on the Region's TIS guidelines and was confirmed with the Region and the MTO staff.

3.3 Future Background Developments

Based on consultations with the City staff, the following background developments were identified and considered in the study.

- **Chippawa Estates** – 19 single family residential units; and,
- **Port Colborne Quarries Pit 3 Expansion** – 106.3 hectare expansion to Pit 3.

The total site trips from the above-noted developments for future 2026, 2031, and 2036 horizon years are provided in **Figure 7**, **Figure 8**, and **Figure 9**, respectively.

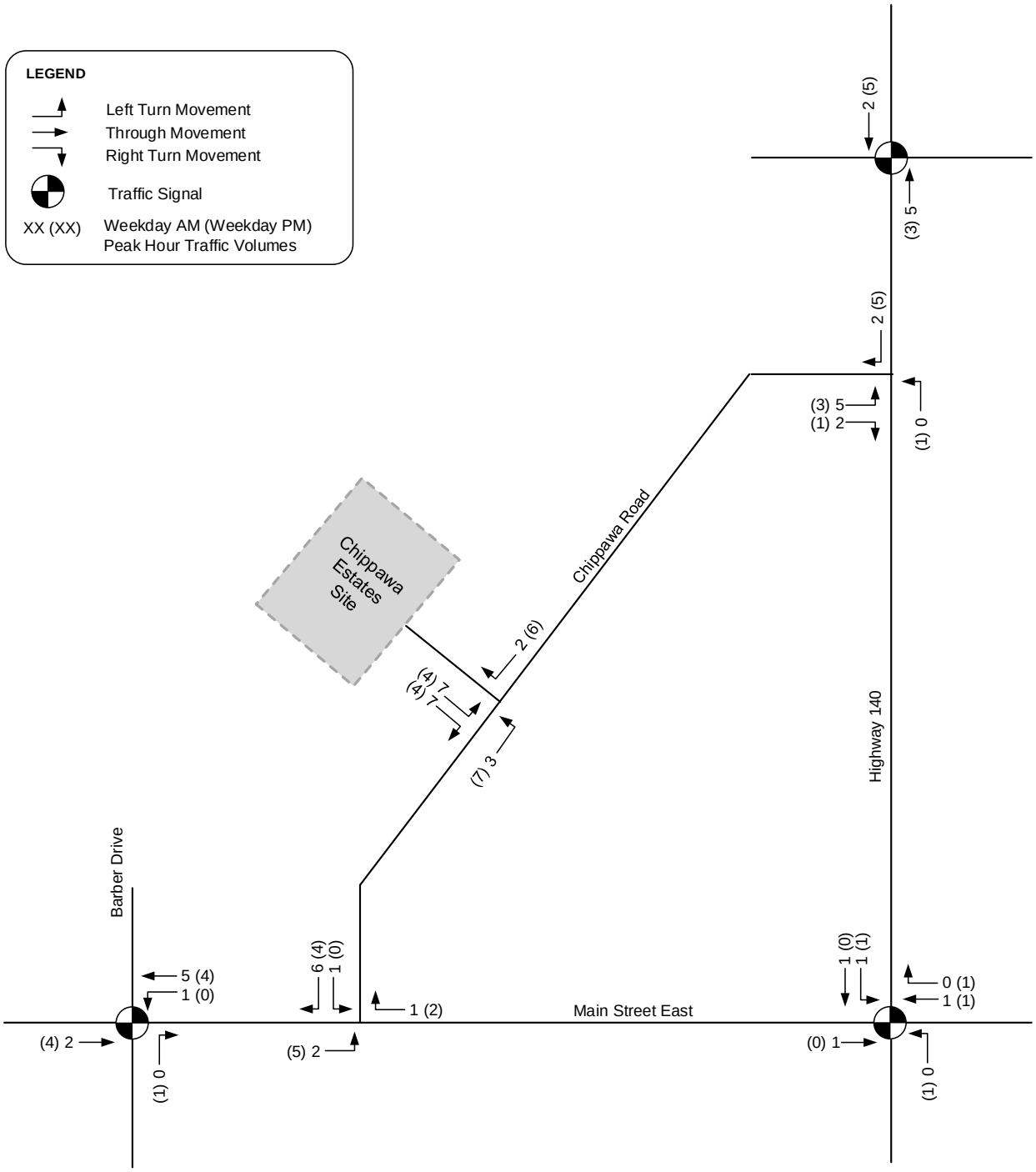

Figure 7: Future (2026) Background Development Site Volumes (Chippawa Estates)

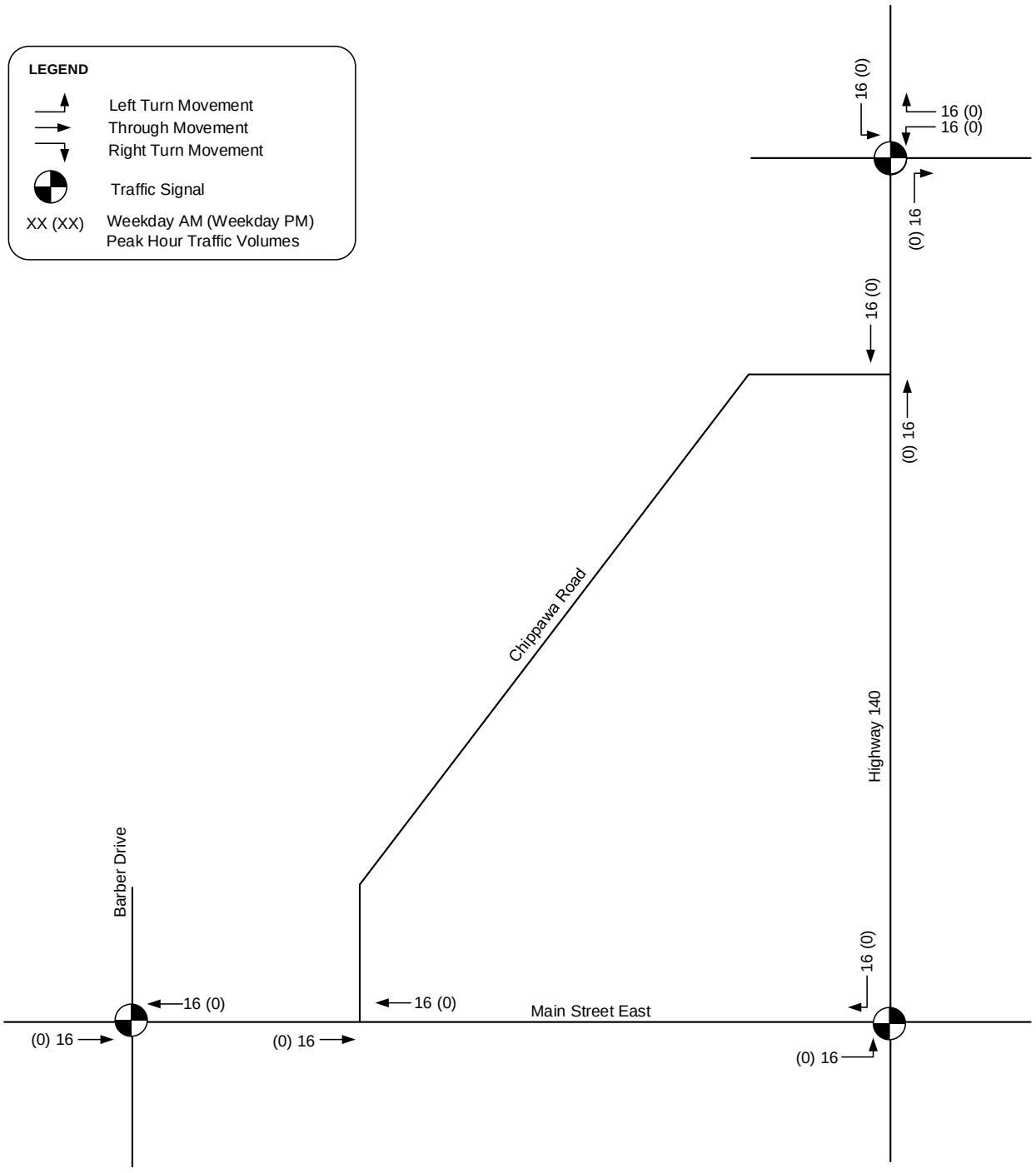

Figure 8: Future (2031) Background Development Site Volumes (Port Colborne Quarries)

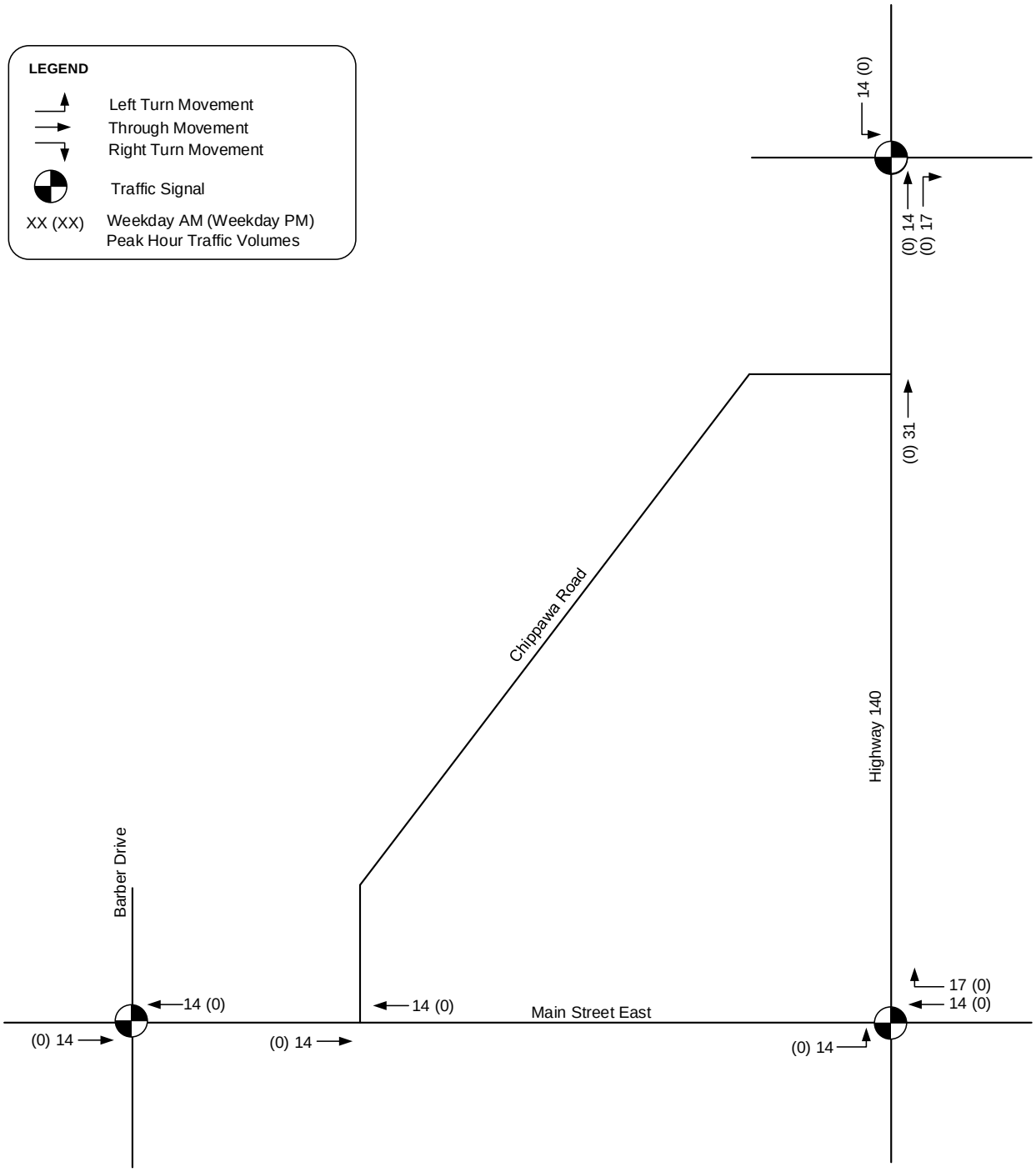

Figure 9: Future (2036) Background Developments Site Volumes (Port Colborne Quarries)

3.4 Future (2026) Background Intersection Operations

Future (2026) traffic volumes were estimated using a compound growth rate of 2% per annum applied to the existing traffic volumes (**Figure 3**) plus the site generated traffic from the background development shown in **Figure 7**. The resulting future (2026) traffic volumes are illustrated in **Figure 10**.

Future (2026) background intersection operations were analyzed using the existing lane configurations illustrated in **Figure 2** and the future (2026) background traffic volumes shown in **Figure 10**. The analysis results are provided in **Table 4** and detailed calculations are provided in **Appendix D**.

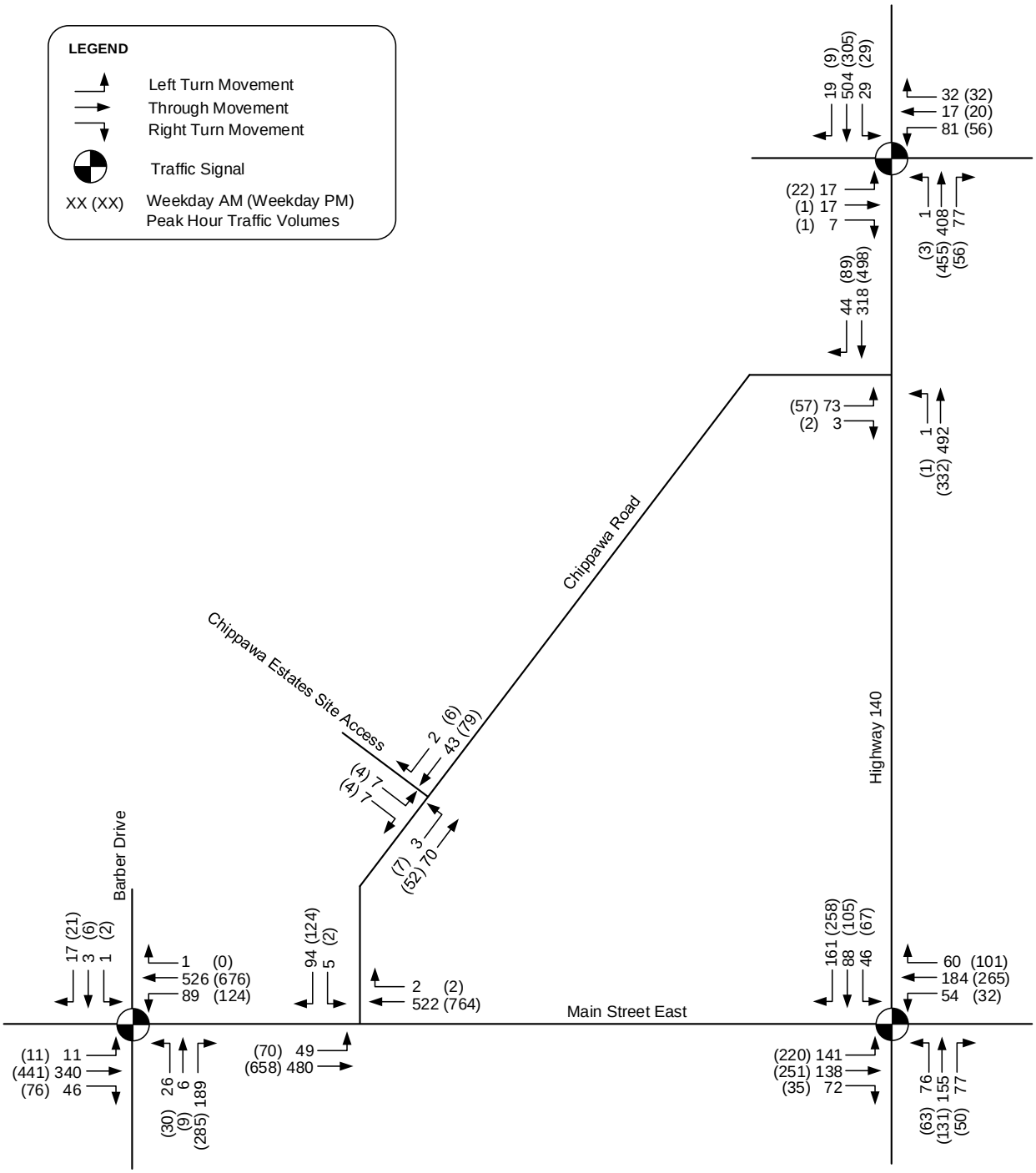

Figure 10: Future (2026) Background Traffic Volumes

Table 4: Future (2026) Background Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	15	0.37	-	B	14	0.45	-	-
EBL	A	9	0.27	23	B	10	0.42	35	155
EBT	A	8	0.17	21	A	8	0.28	32	435
EBR	A	7	0.05	<7	A	<7	0.03	<7	120
WBL	A	7	0.09	10	A	<7	0.06	<7	135
WBT	A	8	0.22	27	A	8	0.30	34	> 500
WBR	A	7	0.05	<7	A	<7	0.08	<7	140
NBL	C	22	0.31	19	C	22	0.30	17	110
NBTR	C	26	0.62	44	C	24	0.54	35	> 500
SBL	C	21	0.24	13	C	23	0.35	18	130
SBT	C	21	0.27	20	C	22	0.34	24	> 500
SBR	C	20	0.13	13	C	21	0.19	16	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	11	0.52	-	A	10	0.46	-	-
EBLTR	C	27	0.16	12	C	27	0.14	9	330
WBLTR	D	39	0.69	32	C	34	0.59	26	200
NBL	A	4	0.00	<7	A	4	0.01	<7	90
NBT	A	6	0.38	54	A	6	0.43	56	> 500
NBR	A	4	0.06	<7	A	4	0.05	<7	170
SBL	A	5	0.07	<7	A	4	0.09	<7	50
SBT	A	7	0.47	72	A	5	0.30	35	> 500
SBR	D	36	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	14	0.52	-	B	17	0.62	-	-
EBLTR	B	10	0.48	67	B	12	0.59	103	195
WBL	A	8	0.21	17	A	10	0.31	26	40
WBTR	B	13	0.62	99	B	16	0.72	167	330
NBL	C	26	0.13	10	C	29	0.15	12	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 4: Future (2026) Background Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.19	18	C	30	0.27	24	> 500
SBL	C	33	0.06	<7	C	35	0.03	<7	60
SBTR	C	33	0.12	<7	D	36	0.14	9	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	2	0.05	<7	A	2	0.09	<7	20
SBLR	B	15	0.23	<7	C	22	0.39	14	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	C	20	0.25	8	C	20	0.21	<7	> 500
NBLT	A	-	0.00	<7	A	-	0.00	<7	> 500
Chippawa Road at Chippawa Estates Site Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 4** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2026) background conditions.

Moreover, the results in **Table 4** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2026) background conditions.

3.4.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 4**, no mitigation measures are required under future (2026) background conditions.

3.5 Future (2031) Background Intersection Operations

Future (2031) traffic volumes were estimated using a compound growth rate of 2% per annum applied to the existing traffic volumes (**Figure 3**) plus the site generated traffic from the background developments shown in **Figure 7** and **Figure 8**. The resulting future (2031) traffic volumes are illustrated in **Figure 11**.

Future (2031) background intersection operations were analyzed using the existing lane configurations illustrated in **Figure 2** and the future (2031) background traffic volumes shown in **Figure 11**. The analysis results are provided in **Table 5** and detailed calculations are provided in **Appendix E**.

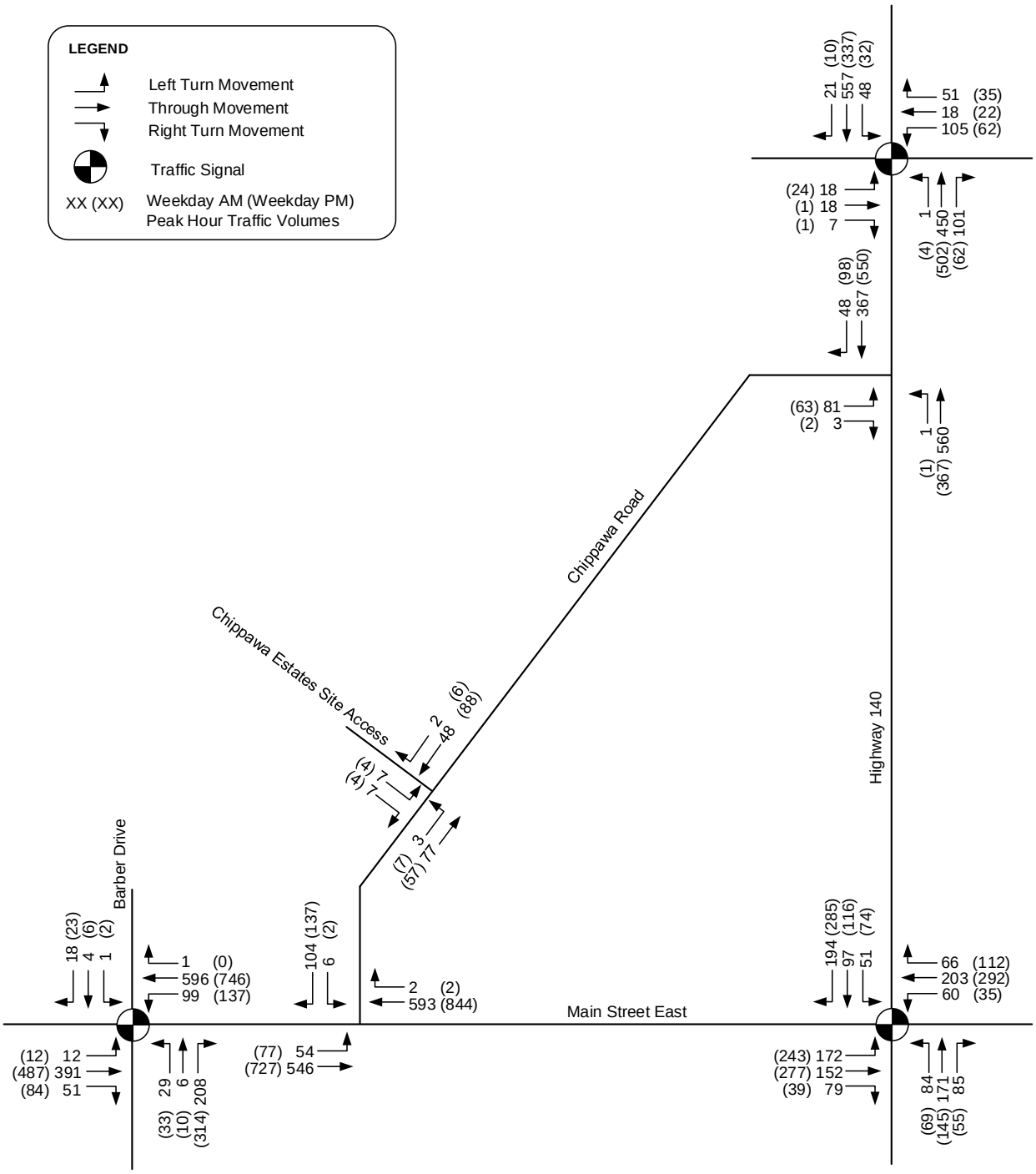

Figure 11: Future (2031) Background Traffic Volumes

Table 5: Future (2031) Background Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	16	0.43	-	B	15	0.51	-	-
EBL	B	10	0.34	31	B	12	0.49	42	155
EBT	A	8	0.19	24	A	9	0.31	37	435
EBR	A	8	0.06	<7	A	7	0.03	<7	120
WBL	A	8	0.11	12	A	7	0.07	<7	135
WBT	A	9	0.25	31	A	9	0.33	39	> 500
WBR	A	7	0.05	<7	A	7	0.09	<7	140
NBL	C	22	0.33	20	C	22	0.32	18	110
NBTR	C	27	0.65	49	C	25	0.58	39	> 500
SBL	C	21	0.27	14	C	23	0.38	19	130
SBT	C	21	0.28	22	C	22	0.36	26	> 500
SBR	C	20	0.15	14	C	21	0.21	17	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	14	0.60	-	B	10	0.50	-	-
EBLTR	C	24	0.13	13	C	27	0.15	10	330
WBLTR	C	34	0.68	42	D	36	0.63	28	200
NBL	A	6	0.00	<7	A	4	0.01	<7	90
NBT	A	10	0.46	72	A	7	0.48	68	> 500
NBR	A	6	0.08	<7	A	4	0.05	<7	170
SBL	A	7	0.15	10	A	5	0.11	<7	50
SBT	B	11	0.58	97	A	6	0.33	41	> 500
SBR	D	37	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	17	0.59	-	B	19	0.68	-	-
EBLTR	B	13	0.57	82	B	14	0.65	124	195
WBL	A	9	0.26	20	B	11	0.37	31	40
WBTR	B	16	0.72	137	B	19	0.80	198	330
NBL	C	26	0.14	11	C	29	0.16	13	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 5: Future (2031) Background Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.20	19	C	30	0.29	26	> 500
SBL	C	31	0.03	<7	C	35	0.03	<7	60
SBTR	C	31	0.08	<7	D	36	0.14	10	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	2	0.06	<7	A	3	0.11	<7	20
SBLR	C	18	0.30	10	D	28	0.49	20	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	C	25	0.33	11	C	23	0.26	8	> 500
NBLT	A	-	0.00	<7	A	-	0.00	<7	> 500
Chippawa Road at Chippawa Estates Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 5** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2031) background conditions.

Moreover, the results in **Table 5** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2031) background conditions.

3.5.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 5**, no mitigation measures are required under future (2031) background conditions.

3.6 Future (2036) Background Intersection Operations

Future (2036) traffic volumes were estimated using a compound growth rate of 2% per annum applied to the existing traffic volumes (**Figure 3**) plus the site generated traffic from the background developments shown in **Figure 7** and **Figure 9**. The resulting future (2036) traffic volumes are illustrated in **Figure 12**. Future (2036) background intersection operations were analyzed using the existing lane configurations illustrated in **Figure 2** and the future (2036) background traffic volumes shown in **Figure 12**. The analysis results are provided in **Table 6** and detailed calculations are provided in **Appendix F**.

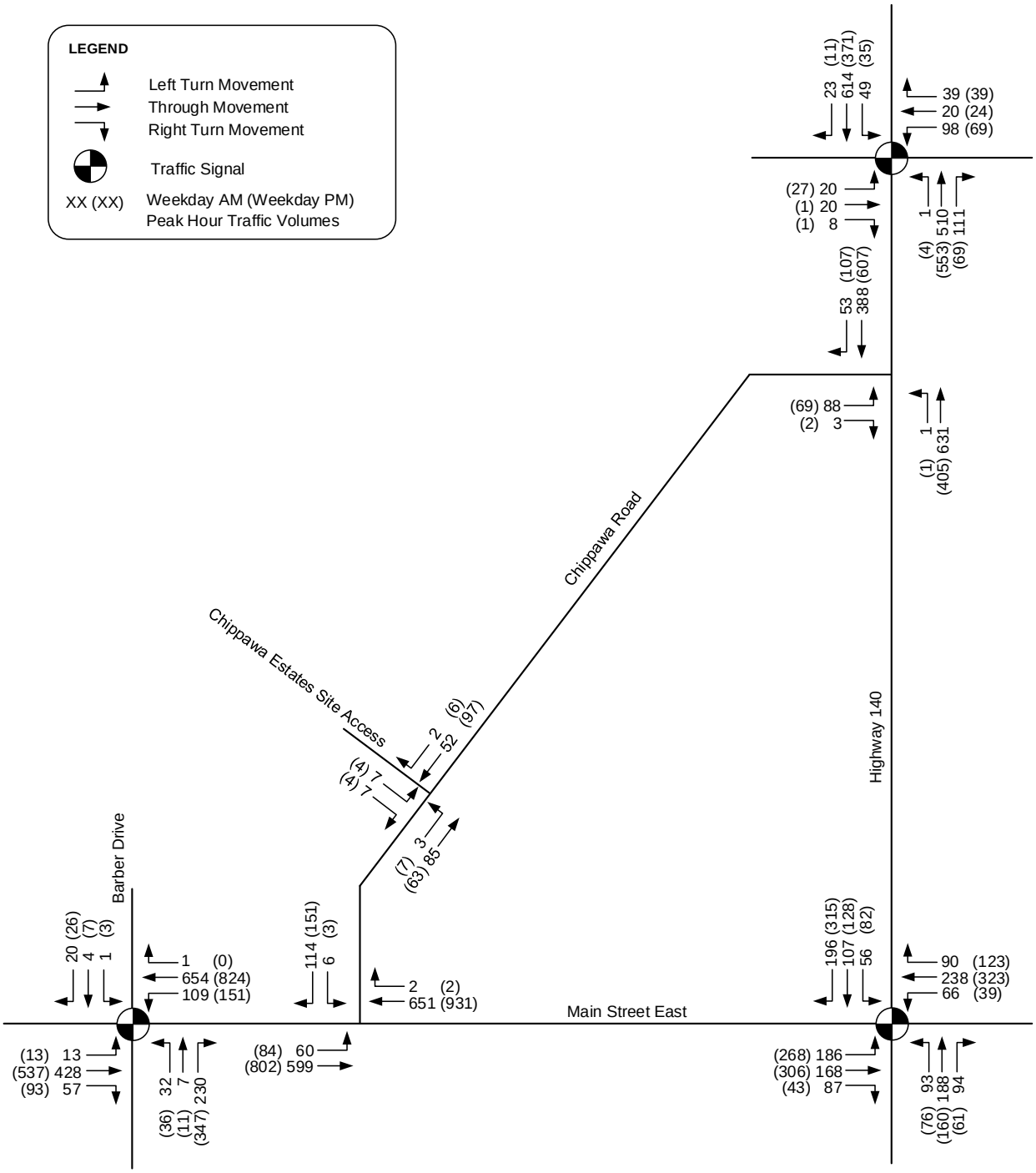

Figure 12: Future (2036) Background Traffic Volumes

Table 6: Future (2036) Background Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	16	0.48	-	B	16	0.57	-	-
EBL	B	12	0.38	36	B	14	0.56	53	155
EBT	A	9	0.21	27	A	9	0.35	44	435
EBR	A	8	0.06	7	A	7	0.03	<7	120
WBL	A	8	0.12	13	A	7	0.08	8	135
WBT	A	10	0.30	39	A	10	0.38	47	> 500
WBR	A	8	0.07	8	A	7	0.09	8	140
NBL	C	22	0.35	22	C	22	0.34	19	110
NBTR	C	28	0.69	54	C	26	0.61	43	> 500
SBL	C	22	0.31	16	C	23	0.42	21	130
SBT	C	21	0.29	24	C	22	0.37	28	> 500
SBR	C	20	0.16	14	C	21	0.24	17	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	13	0.63	-	B	11	0.56	-	-
EBLTR	C	24	0.15	14	C	25	0.13	10	330
WBLTR	C	32	0.64	38	C	30	0.57	31	200
NBL	A	6	0.00	<7	A	5	0.01	<7	90
NBT	A	10	0.52	82	A	9	0.55	83	> 500
NBR	A	6	0.09	<7	A	5	0.06	<7	170
SBL	A	7	0.16	10	A	6	0.14	<7	50
SBT	B	12	0.63	109	A	7	0.39	49	> 500
SBR	D	37	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	19	0.65	-	C	26	0.75	-	-
EBLTR	B	14	0.63	96	C	21	0.81	179	195
WBL	B	10	0.30	23	B	14	0.47	39	40
WBTR	B	20	0.80	160	C	29	**0.91**	234	330
NBL	C	26	0.15	12	C	30	0.18	14	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 6: Future (2036) Background Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.22	20	C	31	0.32	27	> 500
SBL	C	31	0.03	<7	C	34	0.03	<7	60
SBTR	C	31	0.08	8	C	35	0.11	10	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	2	0.07	<7	A	4	0.13	<7	20
SBLR	C	21	0.37	13	**E**	46	0.68	34	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	D	31	0.42	15	D	29	0.34	11	> 500
NBLT	A	-	0.00	<7	A	-	0.00	<7	> 500
Chippawa Road at Chippawa Estates Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 6** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2036) background conditions except for the westbound through-right movement at the intersection of Main street at Barber Drive / Welland Street which is expected to operate with a v/c ratio of 0.91 during the weekday PM peak hour.

In addition, the southbound left-right movement at the intersection of Main Street at Chippawa Road is expected to operate with level of service "E" during the weekday PM peak hour. It is noted that the volumes for the southbound left turn movement is only 3 vehicles during the weekday PM peak hour. Therefore, a sensitivity analysis was conducted by removing the southbound left volumes assuming the intersection of Highway 140 at Chippawa Road can be used as an alternative. It is noted that the level of service for the southbound left-right movement improves from "E" to "D" with a v/c ratio of 0.56.

Moreover, the results in **Table 6** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2036) background conditions.

3.6.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 6**, the following mitigation measures are proposed under future (2036) background conditions.

- Increase the cycle length at the intersection of Main Street at Barber Drive / Welland Street from 101.6 seconds to 120 seconds during the weekday PM peak period

The analysis results with mitigation are provided in **Table 7** and detailed calculations are provided in **Appendix F**.

Table 7: Future (2036) Background Conditions Intersection Operations with Mitigation

Intersection / Movement	PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Main Street at Barber Drive / Welland Street (Signalized)					
Overall	C	21	0.69	-	-
EBLTR	B	13	0.65	151	195
WBL	B	11	0.39	37	40
WBTR	B	18	0.80	250	330
NBL	D	39	0.21	17	60
NBTR	D	40	0.33	31	> 500
SBL	D	44	0.04	<7	60
SBTR	D	44	0.13	12	> 500

Note: LOS – level of service, v/c – volume to capacity ratio

4.0 Proposed Development

4.1 Development Concept

The proposed development, located at 281 Chippawa Road in Port Colborne, will consist of 188 residential townhouse units. The total number of parking spaces provided for the site is 218 spaces. The site concept plan in shown in **Figure 13**.

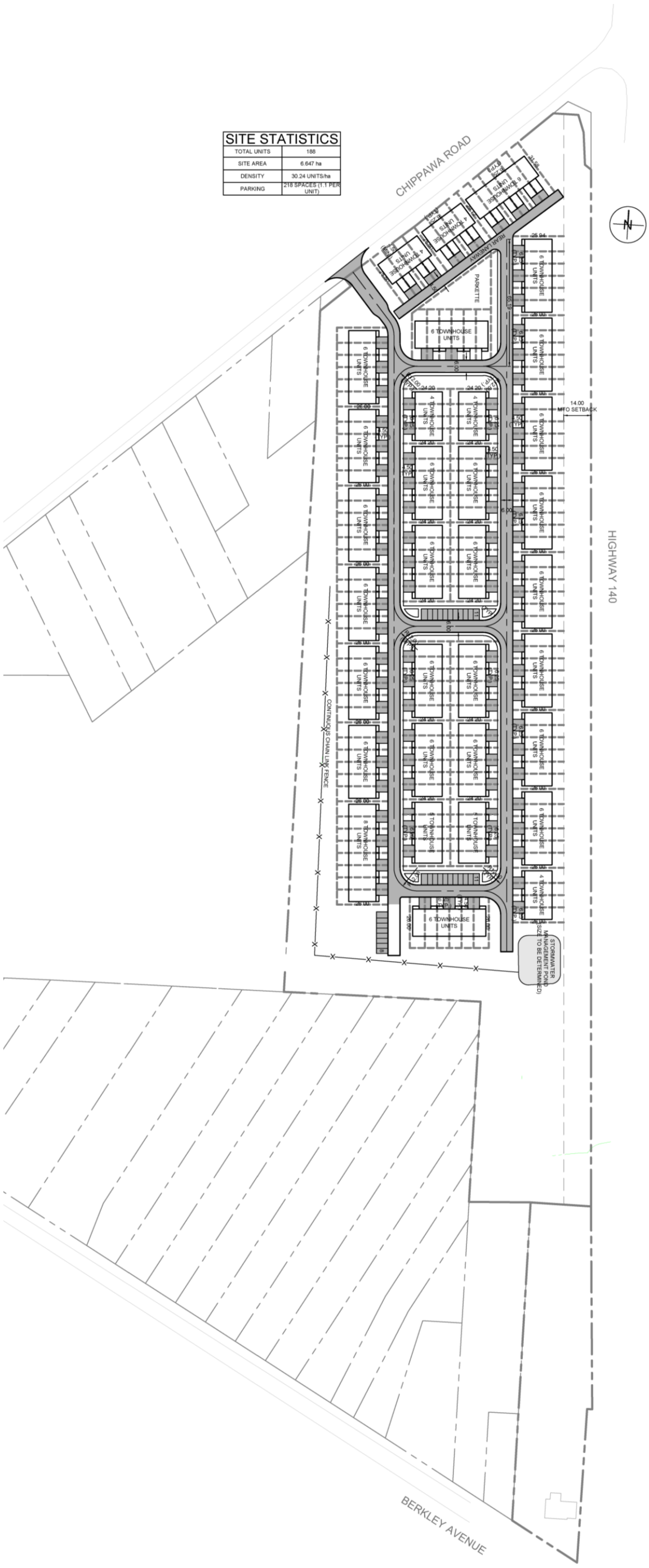

Figure 13: Site Concept Plan

4.2 Trip Generation

The estimates of trip generated by the proposed development are based on the Multifamily Housing (Low-Rise) Land Use (LU Code 220) from the Institute of Transportation Engineers (ITE) publication, Trip Generation Manual, 10th Edition. Based on a modal split analysis using the 2016 Transportation Tomorrow Survey (TTS) data, it is noted that auto is the primary mode of travel to / from the proposed site. Therefore, it was assumed that all trips generated by the proposed site will consist of auto trips (i.e., a conservative approach). The projected trip generation for the proposed development during the weekday AM and weekday PM peak hours are summarized in **Table 8**.

Table 8: Trip Generation Summary

ITE Land Use	Units	Parameter	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (ITE LU Code 220)	188	Equation	Ln(T) = 0.95 Ln(X) - 0.51			Ln(T) = 0.89 Ln(X) - 0.02		
		Gross Trips	20	67	87	66	38	104
		Non-Auto (0%)	-	-	-	-	-	-
		Net Auto Trips	**20**	**67**	**87**	**66**	**38**	**104**

As detailed in **Table 8**, the proposed development is expected to generate 87 new auto trips during the weekday AM peak hour (20 trips in / 67 trips out) and 104 new auto trips during the weekday PM peak hour (66 trips in / 38 trips out).

4.3 Trip Distribution

The trip distribution for the proposed development is based on the 2016 TTS data and existing travel patterns. The resulting trip distribution is summarized in **Table 9**.

Table 9: Trip Distribution Summary

From/To	Via	Inbound	Outbound
North	Hwy 140	35%	35%
South	Welland Street	5%	5%
	Elizabeth Street	5%	5%
East	Main Street	15%	15%
West	Main Street	40%	40%
Total		**100%**	**100%**

The resulting site generated trips are illustrated in **Figure 14**.

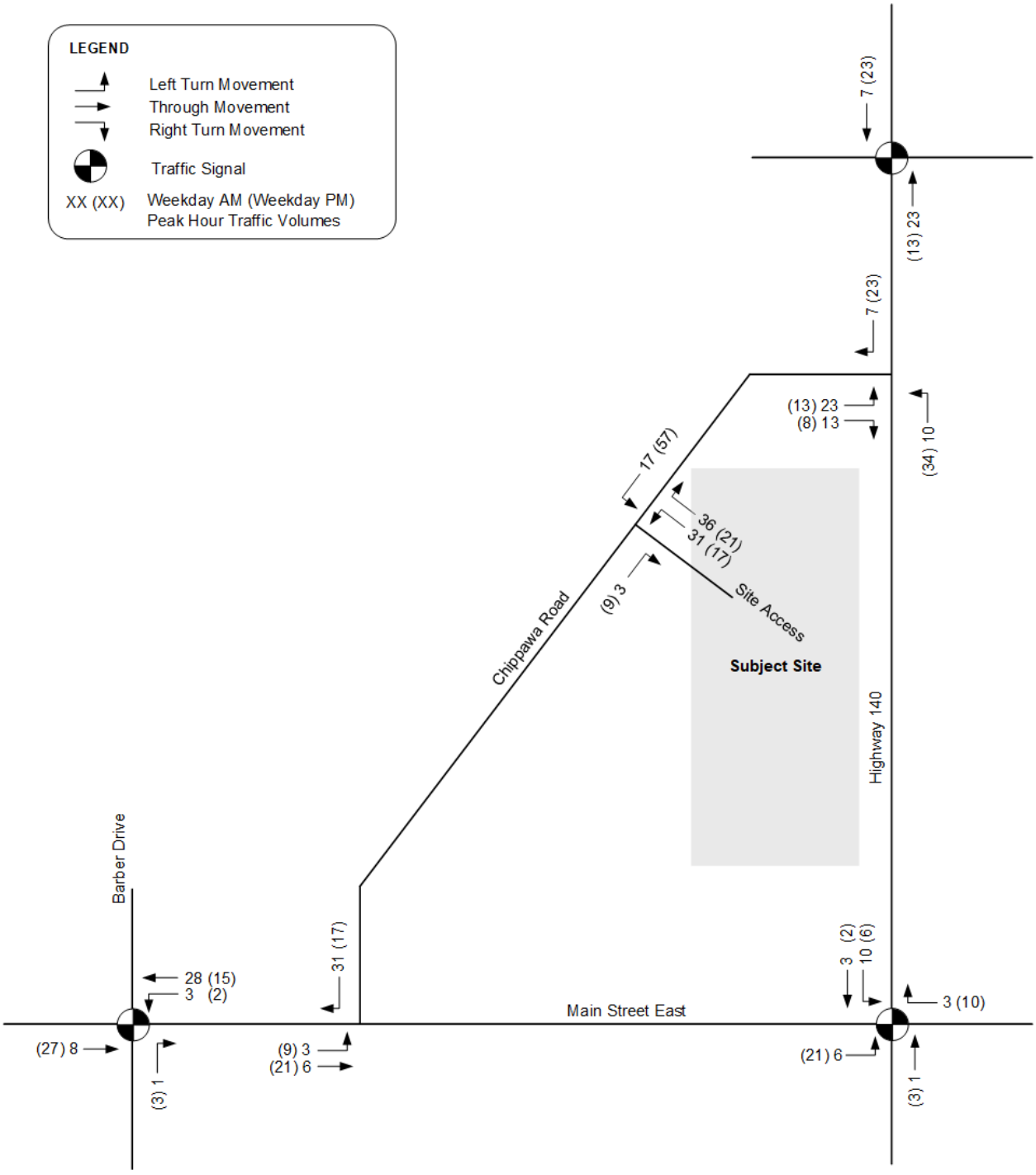

Figure 14: Site Traffic

5.0 Future Total Conditions

Traffic operations under future 2026, 2031, and 2036 total conditions were analyzed for the weekday AM and weekday PM peak hours using the Synchro 11 software. The traffic analysis and results for the future total conditions are discussed in this section.

5.1 Future (2026) Total Intersection Operations

Future (2026) total intersection operations were assessed using the future lane configurations illustrated in **Figure 15**. The future (2026) total traffic volumes were estimated by adding the site traffic (**Figure 14**) to future (2026) background volumes (**Figure 10**) and the resulting future (2026) total traffic volumes are illustrated in **Figure 16**. The analysis results are provided in **Table 10** and detailed calculations are provided in **Appendix G**.

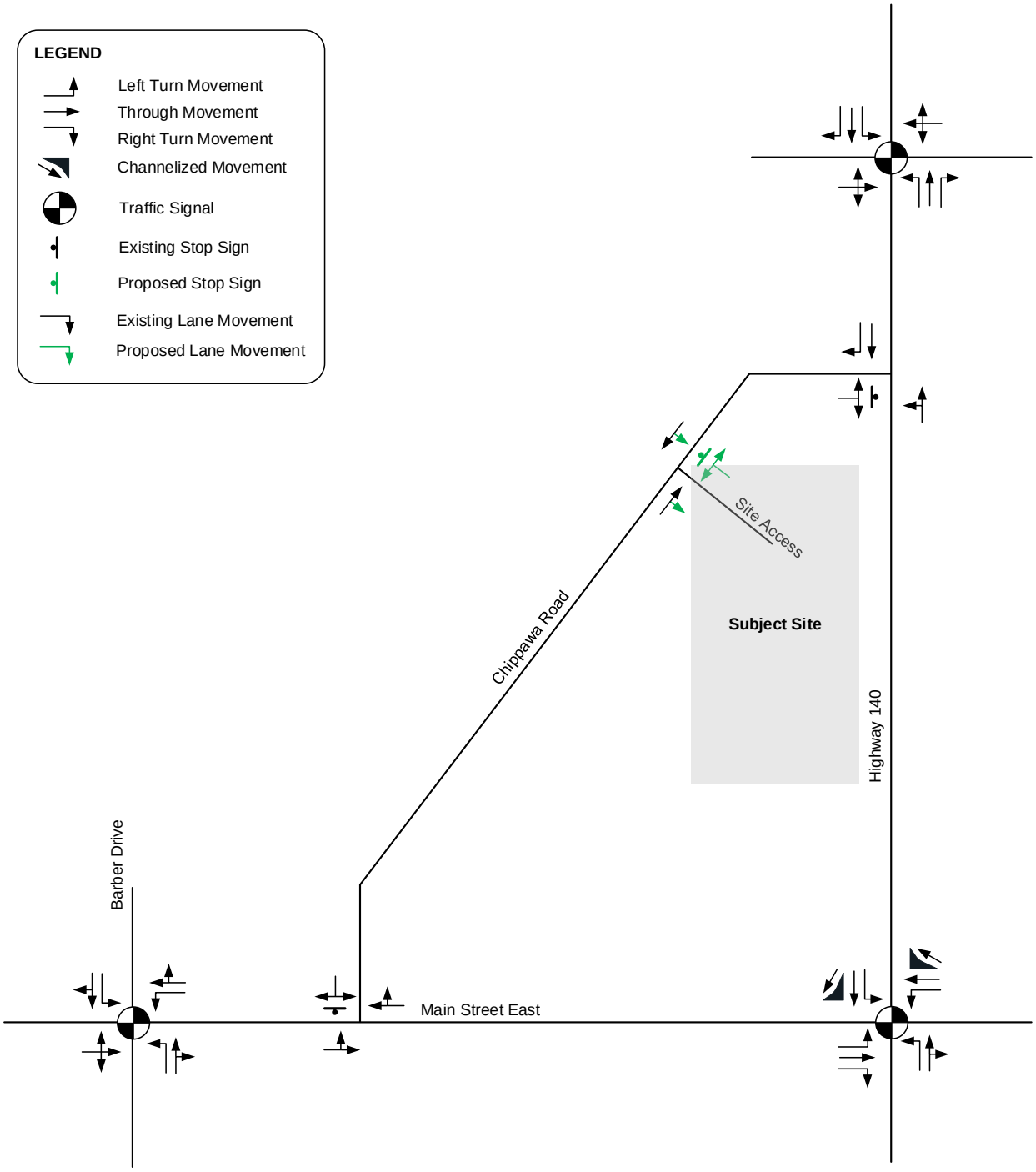

Figure 15: Future Intersection Lane Configuration

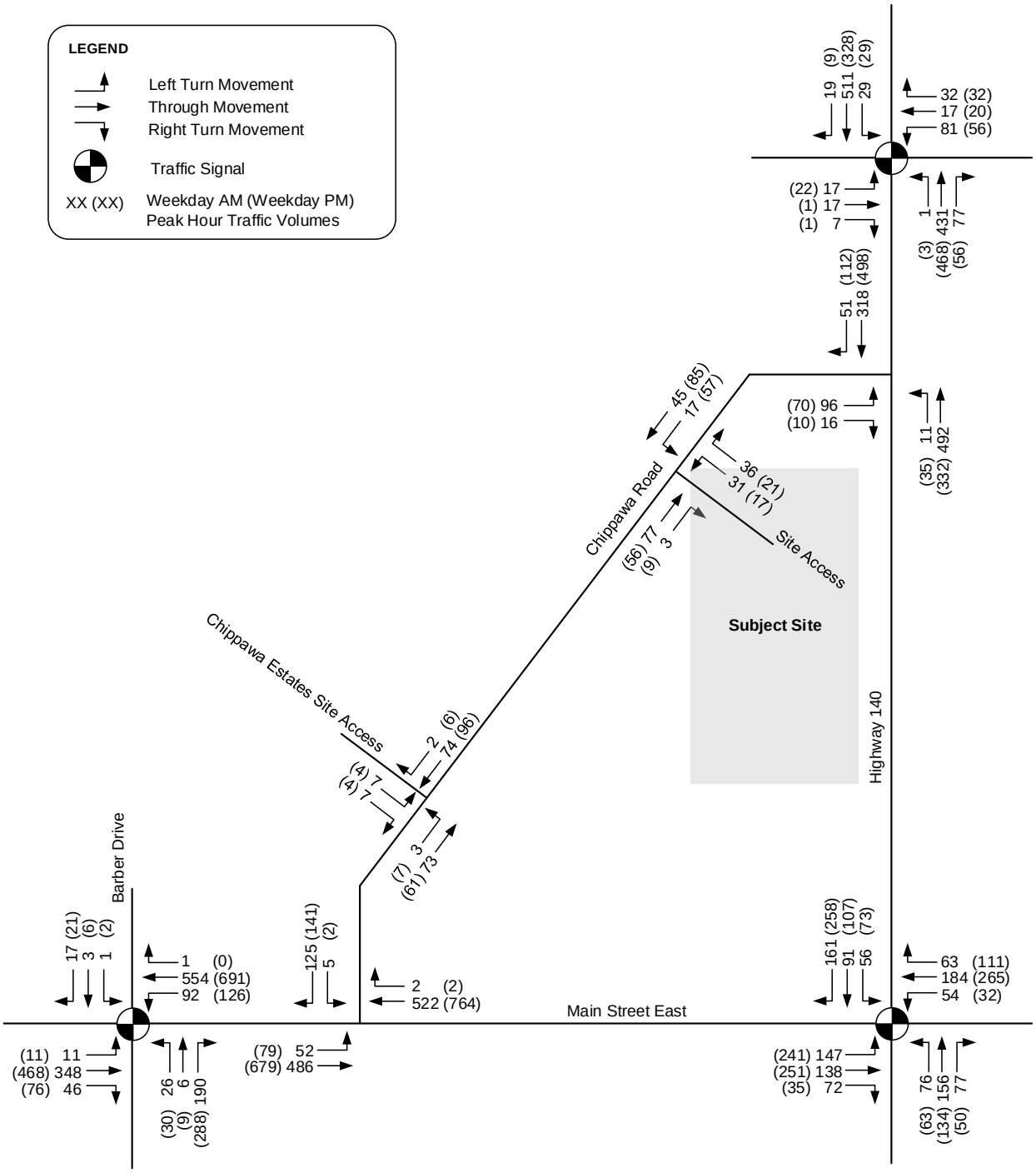

Figure 16: Future (2026) Total Traffic Volumes

Table 10: Future (2026) Total Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	15	0.38	-	B	15	0.49	-	
EBL	A	9	0.28	25	B	11	0.46	39	155
EBT	A	8	0.17	21	A	8	0.28	32	435
EBR	A	7	0.05	<7	A	6	0.03	<7	120
WBL	A	8	0.09	10	A	7	0.06	<7	135
WBT	A	8	0.23	27	A	8	0.30	34	> 500
WBR	A	7	0.05	<7	A	7	0.09	<7	140
NBL	C	22	0.31	19	C	22	0.30	17	110
NBTR	C	26	0.62	44	C	25	0.55	36	> 500
SBL	C	22	0.29	15	C	23	0.38	19	130
SBT	C	21	0.28	21	C	22	0.34	24	> 500
SBR	C	20	0.13	13	C	21	0.19	16	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	11	0.52	-	A	10	0.47	-	
EBLTR	C	27	0.16	12	C	27	0.14	9	330
WBLTR	D	39	0.69	32	C	34	0.59	26	200
NBL	A	4	0.00	<7	A	4	0.01	<7	90
NBT	A	7	0.41	58	A	7	0.44	59	> 500
NBR	A	4	0.06	<7	A	4	0.05	<7	170
SBL	A	5	0.08	<7	A	4	0.09	<7	50
SBT	A	7	0.48	73	A	6	0.32	38	> 500
SBR	D	36	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	15	0.55	-	B	19	0.66	-	
EBLTR	B	11	0.49	69	B	15	0.67	125	195
WBL	A	8	0.21	18	B	12	0.37	28	40
WBTR	B	13	0.65	113	B	20	0.81	169	330
NBL	C	25	0.13	10	C	25	0.14	11	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 10: Future (2026) Total Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.19	18	C	26	0.26	23	> 500
SBL	C	33	0.06	<7	C	31	0.03	<7	60
SBTR	C	33	0.12	7	C	31	0.13	9	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	<7	0.06	<7	A	3	0.11	<7	20
SBLR	C	16	0.30	10	C	24	0.45	17	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	C	22	0.36	13	C	24	0.31	10	> 500
NBLT	A	-	0.01	<7	A	1	0.04	<7	> 500
Chippawa Road at Chippawa Estates Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50
Site Access at Chippawa Road (Unsignalized)									
WBLT	A	2	0.01	<7	A	3	0.04	<7	140
NBLR	A	9	0.08	<7	A	10	0.05	<7	40

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 10** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2026) total conditions.

Moreover, the results in **Table 10** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2026) total conditions.

5.1.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 10**, no mitigation measures are required under future (2026) total conditions.

5.2 Future (2031) Total Intersection Operations

Future (2031) total intersection operations were assessed using the future lane configurations illustrated in **Figure 15**. The future (2031) total traffic volumes were estimated by adding the site traffic (**Figure 14**) to future (2031) background volumes (**Figure 11**) and the resulting future (2031) total traffic volumes are illustrated in **Figure 17**. The analysis results are provided in **Table 11** and detailed calculations are provided in **Appendix H**.

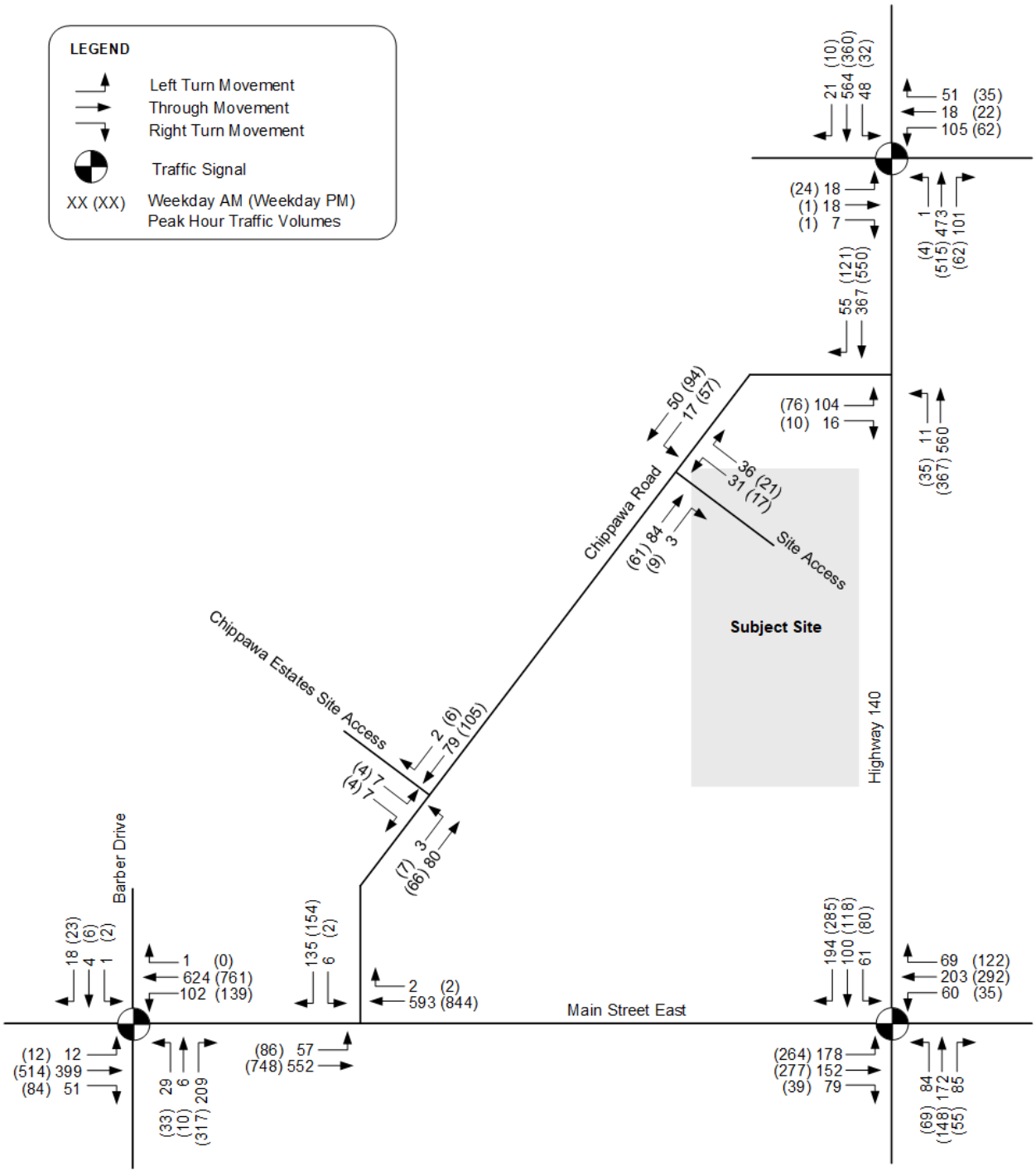

Figure 17: Future (2031) Total Traffic Volumes

Table 11: Future (2031) Total Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	16	0.44	-	B	15	0.54	-	
EBL	B	11	0.35	32	B	13	0.53	47	155
EBT	A	8	0.19	24	A	9	0.31	37	435
EBR	A	8	0.06	<7	A	7	0.03	<7	120
WBL	A	8	0.11	12	A	7	0.07	<7	135
WBT	A	9	0.25	31	A	9	0.34	39	> 500
WBR	A	8	0.05	<7	A	7	0.09	8	140
NBL	C	22	0.33	20	C	22	0.32	18	110
NBTR	C	27	0.66	49	C	25	0.58	40	> 500
SBL	C	22	0.33	17	C	23	0.41	21	130
SBT	C	21	0.29	23	C	22	0.36	26	> 500
SBR	C	20	0.15	14	C	21	0.22	17	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	14	0.61	-	B	10	0.51	-	
EBLTR	C	24	0.13	13	C	27	0.15	10	330
WBLTR	C	34	0.68	42	D	36	0.63	28	200
NBL	A	6	0.00	<7	A	4	0.01	<7	90
NBT	A	10	0.49	77	A	7	0.49	70	> 500
NBR	A	6	0.08	<7	A	4	0.05	<7	170
SBL	A	7	0.15	10	A	5	0.11	<7	50
SBT	B	11	0.58	99	A	6	0.35	44	> 500
SBR	D	37	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	17	0.61	-	C	23	0.73	-	
EBLTR	B	13	0.58	84	B	19	0.77	152	195
WBL	A	10	0.27	21	B	13	0.44	33	40
WBTR	B	18	0.75	147	C	26	0.89	198	330
NBL	C	26	0.14	11	C	25	0.15	12	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 11: Future (2031) Total Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.20	19	C	26	0.29	24	> 500
SBL	C	31	0.03	<7	C	31	0.03	<7	60
SBTR	C	31	0.08	7	C	32	0.13	9	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	2	0.07	<7	A	3	0.13	<7	20
SBLR	C	19	0.38	14	D	31	0.56	25	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	D	29	0.47	18	D	29	0.39	14	> 500
NBLT	A	-	0.01	<7	A	1	0.04	<7	> 500
Chippawa Road at Chippawa Estates Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50
Site Access at Chippawa Road (Unsignalized)									
WBLT	A	2	0.01	<7	A	3	0.04	<7	140
NBLR	A	9	0.08	<7	A	10	0.05	<7	40

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 11** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2031) total conditions. Moreover, the results in **Table 11** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2031) total conditions.

5.2.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 11**, no mitigation measures are required under future (2031) total conditions.

5.3 Future (2036) Total Intersection Operations

Future (2036) total intersection operations were assessed using the future lane configurations illustrated in **Figure 15**. The future (2036) total traffic volumes were estimated by adding the site traffic (**Figure 14**) to future (2036) background volumes (**Figure 12**) and the resulting future (2036) total traffic volumes are illustrated in **Figure 18**. The analysis results are provided in **Table 11** and detailed calculations are provided in **Appendix I**.

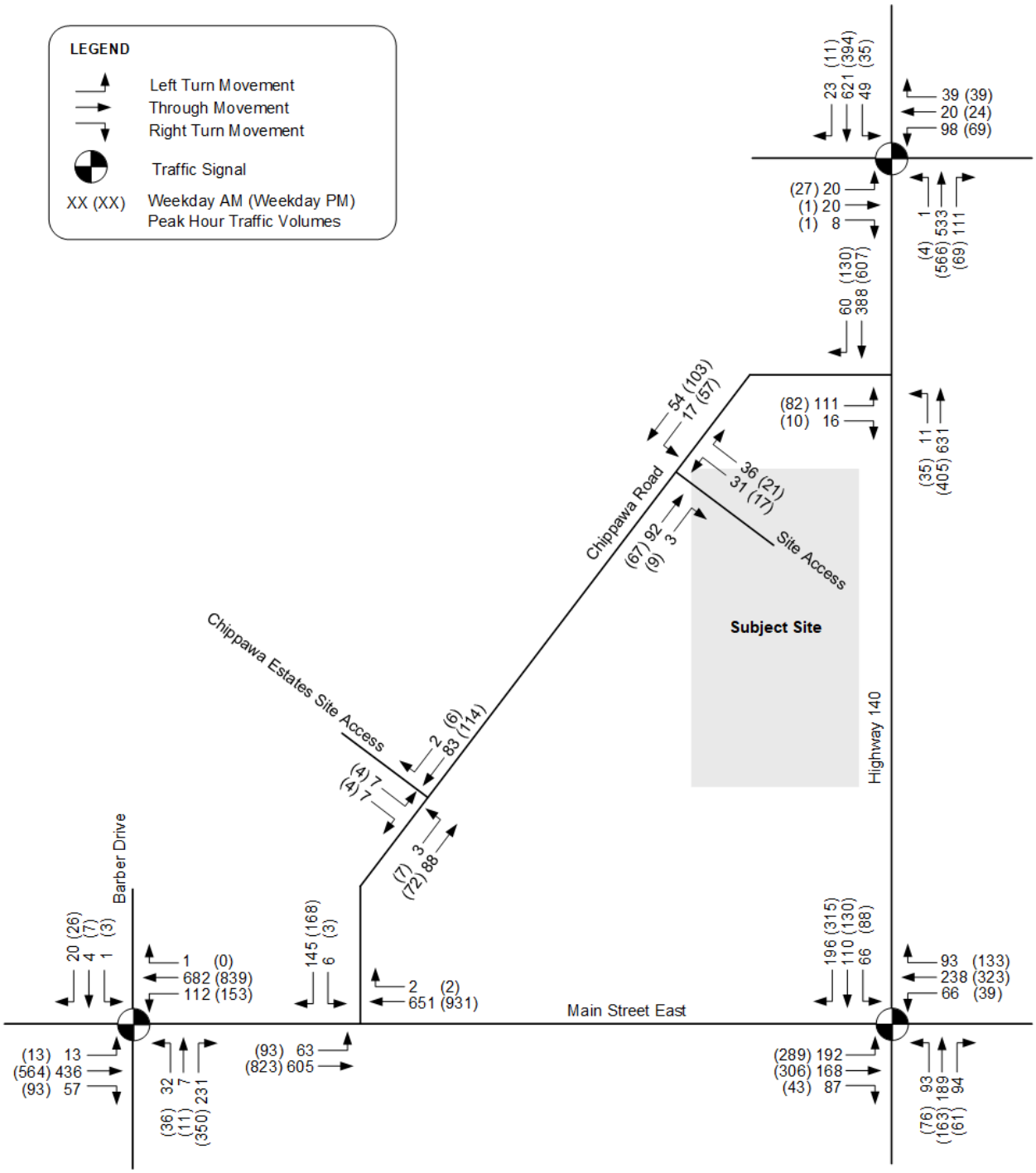

Figure 18: Future (2036) Total Traffic Volumes

Table 12: Future (2036) Total Conditions Intersection Operations

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Highway 140 at Main Street (Signalized)									
Overall	B	16	0.49	-	B	16	0.61	-	
EBL	B	12	0.40	37	B	15	0.61	60	155
EBT	A	9	0.21	27	A	9	0.35	44	435
EBR	A	8	0.06	7	A	7	0.03	<7	120
WBL	A	8	0.12	13	A	7	0.08	8	135
WBT	A	10	0.30	39	A	10	0.38	48	> 500
WBR	A	8	0.07	8	A	7	0.10	8	140
NBL	C	22	0.35	22	C	22	0.34	19	110
NBTR	C	28	0.69	54	C	26	0.61	43	> 500
SBL	C	22	0.37	18	C	23	0.45	22	130
SBT	C	21	0.30	24	C	22	0.37	28	> 500
SBR	C	20	0.16	14	C	21	0.24	17	30
Highway 140 at Second Concession Road (Signalized)									
Overall	B	14	0.64	-	B	11	0.57	-	
EBLTR	C	24	0.15	14	C	25	0.13	10	330
WBLTR	C	32	0.64	38	C	30	0.57	31	200
NBL	A	6	0.00	<7	A	5	0.01	<7	90
NBT	B	10	0.54	87	A	10	0.57	86	> 500
NBR	A	6	0.09	<7	A	5	0.06	<7	170
SBL	A	7	0.17	11	A	6	0.14	7	50
SBT	B	12	0.63	111	A	8	0.41	53	> 500
SBR	D	37	0.00	<7	D	36	0.00	<7	15
Main Street at Barber Drive / Welland Street (Signalized)									
Overall	B	20	0.67	-	C	28	0.76	-	
EBLTR	B	14	0.64	98	C	26	**0.87**	194	195
WBL	B	11	0.32	24	B	15	0.49	**41**	40
WBTR	C	22	0.83	169	C	31	**0.93**	240	330
NBL	C	26	0.15	12	C	30	0.18	14	60

Note: LOS – level of service, v/c – volume to capacity ratio

Table 12: Future (2036) Total Conditions Intersection Operations (Cont'd)

Intersection / Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
NBTR	C	26	0.22	20	C	31	0.32	27	> 500
SBL	C	31	0.03	<7	C	34	0.03	<7	60
SBTR	C	31	0.08	8	C	35	0.11	10	> 500
Main Street at Chippawa Road (Unsignalized)									
EBLT	A	2	0.08	<7	A	4	0.15	<7	20
SBLR	C	23	0.45	18	**F**	58	0.78	44	> 500
Highway 140 at Chippawa Road (Unsignalized)									
EBLR	E	38	0.57	24	E	39	0.49	19	> 500
NBLT	A	-	0.01	<7	A	1	0.05	<7	> 500
Chippawa Road at Chippawa Estates Access (Unsignalized)									
EBLT	A	-	0.00	<7	A	1	0.01	<7	> 50
SBLR	A	9	0.02	<7	A	9	0.01	<7	> 50
Site Access at Chippawa Road (Unsignalized)									
WBLT	A	2	0.01	<7	A	3	0.04	<7	140
NBLR	A	10	0.08	<7	A	10	0.05	<7	40

Note: LOS – level of service, v/c – volume to capacity ratio

The analysis results in **Table 12** indicate that all movements are expected to operate with acceptable level of service and residual capacity during the weekday AM and weekday PM peak hours under future (2036) total conditions except for the eastbound left-through-right and westbound through-right movements at the intersection of Main street at Barber Drive / Welland Street which are expected to operate with v/c ratios of 0.87 and 0.93 during the weekday PM peak hour, respectively.

In addition, the southbound left-right movement at the intersection of Main Street at Chippawa Road is expected to operate with level of service "F" during the weekday PM peak hour. However, it is noted that the volumes for the southbound left turn movement is only 3 vehicles during the weekday PM peak hour. Therefore, a sensitivity analysis was conducted by removing the southbound left volumes assuming the intersection of Highway 140 at Chippawa Road can be used as an alternative. It is noted that the level of service for the southbound left-right movement improves from "F" to "E" and the v/c ratio improves from 0.78 to 0.63.

A signal warrant analysis was conducted for the intersections of Main Street at Chippawa Road and Highway 140 at Chippawa Road under future (2036) total conditions using the criteria outlined in the Ontario Traffic Manual Book 12 (OTM Book 12) to determine if traffic signals are warranted at these intersections. Detailed signal warrant analysis calculations are provided in **Appendix J**. The analysis results indicate that traffic signals are not warranted for both intersections.

Moreover, the results in **Table 12** indicate that the 95th percentile queues can be accommodated within the available storage during the weekday AM and weekday PM peak hours under future (2036) total conditions except for the westbound left movement at the intersection of Main Street at Barber Drive / Welland Street which will exceed the available storage.

5.3.1 Proposed Mitigation Measures

Based on the analysis results provided in **Table 12**, no additional mitigation measures are required under future (2036) total conditions other than the one proposed under future (2036) background conditions **(Section 3.6.1**). The analysis results with mitigation are provided in **Table 13** and detailed calculations are provided in **Appendix I**.

Table 13: Future (2036) Total Conditions Intersection Operations with Mitigation

Intersection / Movement	PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Main Street at Barber Drive / Welland Street (Signalized)					
Overall	C	21	0.71	-	-
EBLTR	B	14	0.68	164	195
WBL	B	11	0.41	38	40
WBTR	B	19	0.81	259	330
NBL	D	39	0.21	17	60
NBTR	D	40	0.34	32	> 500
SBL	D	44	0.04	<7	60
SBTR	D	44	0.13	12	> 500

Note: LOS – level of service, v/c – volume to capacity ratio

6.0 Site Plan and Access Review

6.1 Site Plan Review

The proposed development, located at 281 Chippawa Road in Port Colborne, will consist of 188 residential townhouse units. The total number of parking spaces provided for the site is 218 spaces which include 188 attached parking spaces and 30 visitor parking spaces as shown in the site concept plan (**Figure 13**). The proposed site has a full-move single access fronting on Chippawa Road.

A rear laneway is provided on the north side of the proposed site which will provide access to a total of 14 units. The parking spaces provided in the site concept plan have a width of 2.6 metres and a depth of 5.8 metres which meet the by-law requirements outlined in the City of Port Colborne Zoning By-law 6575/30/18 (**Section 3.2**).

6.2 Site Access Review

The primary access to / from the proposed site is provided on Chippawa Road. It is noted that the distance between the proposed site access on Chippawa Road and Highway 140 is approximately

190 metres (centerline-to-centerline). The desirable offset spacing between a provincial highway and proposed commercial / private road access is 400 metres based on the requirements for the Public Road and Medium / High Volume Commercial / Private Road Access Connections (**Figure 4.6.10**) outlined in the MTO's "*Highway Corridor Management Manual*", and as such, the proposed site access on Chippawa Road does not meet the desirable spacing requirement.

Therefore, a detailed review of alternative access options was conducted to identify the most feasible alternative for the proposed development in consultations with the City and Region staff as discussed earlier in this report. Finally, the proposed site access on Chippawa Road (shown in **Figure 13**) was considered the be the preferred access alternative.

Moreover, additional analysis was conducted to identify any potential issues with the location of the proposed site access on Chippawa Road. An analysis was undertaken using SimTraffic microsimulation modelling to identify any queuing issues on Chippawa Road between the proposed site access and Highway 140. The analysis was carried out under future (2036) total conditions during the weekday AM and PM peak hours based on an average of five (5) simulation runs. The analysis results are provided in **Table 14**.

Table 14: Future (2036) Total Conditions Queuing Summary (SimTraffic)

Intersection / Movement	95th Percentile Queue (m)		Available Storage (m)
	AM Peak Hour	PM Peak Hour	
Site Access at Chippawa Road (Unsignalized)			
WBLT	< 7	< 7	140
Highway 140 at Chippawa Road (Unsignalized)			
EBLR	25	21	140
NBLT	< 7	14	> 500

The analysis results indicate that the 95th percentile queues at the intersections of Site Access at Chippawa Road and Highway 140 at Chippawa Road can be accommodated within the available storage under future (2036) total conditions during the weekday AM and PM peak hours.

Although the traffic analysis does not show any queuing issues at the intersection of Highway 140 at Chippawa Road, a dedicated northbound left turn lane with a storage length of 30 metres will be required on Highway 140 based on the criteria outlined in the TAC Geometric Design for Canadian Roads (MTO Design Supplement, June 2017). Detailed left turn warrant calculations under future 2026, 2031, and 2036 total conditions are provided in **Appendix K** show that the northbound left turn lane is warranted under the future 2026 total conditions. Dedicated lanes are not required at the intersection of Site Access at Chippawa Road.

Moreover, based on the signal warrant analysis discussed in (**Section 5.3**), it is noted that traffic signals are not warranted at the intersection of Highway 140 at Chippawa Road under all three future total conditions.

Therefore, it can be concluded that the location of the proposed site access on Chippawa Road will not impact operations on Highway 140. It is recommended that a dedicated northbound left turn lane with a storage length of 30 metres be provided at intersection of Highway 140 at Chippawa Road in 2026.

6.3 Site Circulation

A swept path analysis was undertaken for the site plan to assess the site circulation using the following design vehicles and the results are provided in **Appendix L**:

1. Garbage Truck – Rear-end Loader (NCHRP 659, 2010);
2. Aerial Fire Truck Tractor (NCHRP 659, 2010); and,
3. Passenger Car (TAC Geometric Design Guide for Canadian Roads, 1999).

The swept path analysis results in **Appendix L** indicate that the garbage truck can be accommodated at the site access and internally through the site. However, the garbage truck will need to reverse to exit the rear laneway located north of the proposed site.

Moreover, the analysis results also indicate that the aerial fire truck can be accommodated at the site access and internally through the site. However, the fire truck will need to reverse to exit the rear laneway located north of the proposed site.

In addition, the site circulation was assessed using a passenger car and the swept path analysis results in **Appendix L** indicate that the passenger car can be accommodated at the site access and internally through the site. Minimal encroachment into the adjacent parking spaces is observed for a passenger car entering and exiting the visitor parking spaces.

6.4 Sightline Review

Based on a review of the proposed site access using Google Streetview, there are no apparent horizontal or vertical curves on Chippawa Road that would impact sightlines. Therefore, there are no potential concerns with the proposed site access location. It is suggested that proper care should be taken to ensure no obstructions are placed in the sight triangles of the proposed access.

7.0 Parking Review

The proposed development, shown in **Figure 13**, will consist of 188 residential townhouse units. The total number of parking spaces provided for the site is 218 spaces which include 188 attached parking spaces and 30 visitor parking spaces.

7.1 Zoning By-law Requirement

The by-law requirement for the Dwelling (Townhouse) land use category as outlined in the City of Port Colborne Zoning By-law 6575/30/18 (**Section 3.1.1**) is:

- Dwelling (Townhouse): 1 parking space per unit.

Based on the preceding by-law requirement, the parking supply for the proposed development is summarized in **Table 15**.

Table 15: Zoning By-law Parking Requirement

Land Use	Units	By-law Requirement	Calculated Parking Supply per By-law	Proposed Parking Supply	Surplus (Deficiency)
Dwelling (Townhouse)	188	1.00 parking space / unit	188	218	30

The parking supply proposed for the development will result in a surplus of 30 spaces according to the current By-law requirement. Therefore, the proposed parking supply meets the requirement.

8.0 Conclusions

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

Existing Conditions

- 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.

Site Traffic Trip Generation

- The site is expected to generate 87 new auto trips during the weekday AM peak hour and 104 new auto trips during the weekday PM peak hour.

Future Background and Future Total Conditions

- 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 both future 2026 and 2031 background and total conditions and no mitigation measures are required.
- Under future (2036) background and future (2036) total conditions, 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 except for the critical movements at the intersection of Main street at Barber Drive / Welland Street during the PM peak hour which are summarized in **Table 16**. The results indicate that the critical movements at this study intersection is due to the background traffic growth and the site traffic is expected to have minimal impact.

Table 16: Summary of Critical Intersection Movements

Intersection / Movement	PM Peak Hour					
	LOS			v/c ratio		
	Existing	Future (2036) Background	Future (2036) Total	Existing	Future (2036) Background	Future (2036) Total
Main Street at Barber Drive / Welland Street (Signalized)						
EBLTR	B	C	E	0.57	0.81	0.87
WBTR	B	C	D	0.71	0.91	0.93

Note: LOS – level of service, v/c – volume to capacity ratio

- A signal warrant analysis was conducted for the intersections of Main Street at Chippawa Road and Highway 140 at Chippawa Road under future (2036) total conditions using the criteria outlined in OTM Book 12 to determine if traffic signals are warranted at these intersections. The analysis results indicate that traffic signals are not warranted for both intersections.

Proposed Mitigation Measures

- It is recommended that the cycle length at the intersection of Main Street at Barber Drive / Welland Street be increased from 101.6 seconds to 120 seconds under future (2036) background conditions during the weekday PM peak period. No additional mitigation measures are required under future (2036) total conditions other than the one proposed for future (2036) background conditions.

Site Plan and Access Review

- The proposed site access is located within 190 m of Highway 140; however, operations at the site access will not impact operations along Highway 140. Operations analysis conducted using SimTraffic microsimulation modelling shows that queues under all future horizons will not extend from the Site Access on Chippawa Road to Highway 140.
- A dedicated northbound left turn lane with a storage length of 30 metres is warranted at the intersection of Highway 140 at Chippawa Road under future (2026) total conditions. Dedicated turning lanes are not required at the intersection of Site Access at Chippawa Road.
- Traffic signals are not warranted at the intersections of Highway 140 at Chippawa Road.
- Based on the swept path analysis, it is observed that the garbage truck can be accommodated at the site access and internally through the site.
- The swept path analysis indicate that the aerial truck can be accommodated at the site access and internally through the site.
- Moreover, the swept path analysis shows that a passenger car be accommodated at the site access and internally through the site. Minimal encroachment into the adjacent parking spaces or curb is observed for a passenger car entering and exiting the parking spaces.

Parking Supply

- The parking supply proposed for the development will result in a surplus of 30 spaces according to the current By-law requirement. Therefore, the proposed parking supply meets the requirement.

Appendix A

Detailed Correspondence

Mustafa Ismatyar

Subject: FW: FW: Letters of Confirmation (281 Chippawa Rd., Port Colborne Condominium)
Attachments: South East Corner Chippawa Road @ Hwy 140, Port Colborne.docx

From: Dunsmore, Susan
Sent: May 2, 2022 3:12 PM
To: Bruno Carrera
Cc: Nicholas Olschansky; David Schulz; Lampman, Cara; Selig, Cheryl; Young, Katie; Alguire, Robert
Subject: RE: Letters of Confirmation (281 Chippawa Rd., Port Colborne Condominium)

Hello Bruno,

Our Manger, Environmental Planning has reviewed the area and provided the following information:

The attached mapping of the subject parcel was reviewed and note that a road connection either west or south of the subject parcel would require construction within a woodland feature.

The current Official Plan policies prohibit development and site alteration within woodland communities of this type, unless no negative impact can be confirmed through the submission of an Environmental Impact Study. Given the size of the woodland and the amount of area required for any road construction, this test would be difficult to meet. Certainly there is limited development potential to the west.

Further, should application be made after the update to the Official Plan, the new policy set would apply. The current draft policies prohibit any development or site alteration within woodland areas of this type.

We trust this information to be satisfactory, do not hesitate to reach out with any questions or concerns, to Cara Lampman or myself.

Thank you

Susan M. Dunsmore, P. Eng.
Manager, Development Engineering
Planning and Development Services

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661

Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7

From: Bruno Carrera <sbcnbc@hotmail.com>
Sent: Thursday, April 28, 2022 9:36 AM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Cc: Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>; David Schulz <David.Schulz@portcolborne.ca>
Subject: RE: Letters of Confirmation (281 Chippawa Rd., Port Colborne Condominium)

Hello Susan. Thankyou for the update.

Regards

Bruno (Sam) Carrera

Sent from Mail for Windows

From: Dunsmore, Susan
Sent: April 28, 2022 9:31 AM

South East Corner Chippawa Road @ Hwy 140, Port Colborne

2. **Lands to the west:**

Please accept this as confirmation that based on the Region's environmental comments, the City of Port Colborne will no longer require the consideration of lands to the west as there is limited development potential.

Regards,

David Schulz, BURPI, MCIP, RPP
Senior Planner
City of Port Colborne

Phone 905-835-2900 x202

Email David.Schulz@portcolborne.ca

66 Charlotte Street
Port Colborne, ON L3K 3C8

www.portcolborne.ca

From: Bruno Carrera
Sent: July 19, 2022 1:58 PM
To: Susan Smyth
Subject: FW: 281 Chippawa Rd., In lieu of Emergency Fire Access Route

Susan.

Just received this email from Fire Inspector.

Bruno

Sent from Mail for Windows

From: Charles Turpin
Sent: July 19, 2022 1:49 PM
To: Bruno Carrera
Cc: David Schulz
Subject: RE: 281 Chippawa Rd., In lieu of Emergency Fire Access Route

Sam

Port Colborne Fire is satisfied with the draft proposal but unit a formal change to the site plan is submitted with the all points proposed to the Planning Department

As discussed Port Colborne Fire will not give the final approval

Charles Turpin CFEI, CCFI-C
Fire Prevention Officer
City of Port Colborne

Phone 905-834-4512 Ext. 404

Email Charles.turpin@portcolborne.ca

3 Killaly St W
Port Colborne, ON L3K 6H1

www.portcolborne.ca

PORT COLBORNE

PORT COLBORNE

www.portcolborne.ca

Charles Turpin
Fire Prevention Officer
City of Port Colborne

3 Killaly Street West
Port Colborne, ON L3K 6H1
Phone 905-834-4512 x
Email Charles.Turpin@portcolborne.ca

"To provide an exceptional small-town experience in a big way"

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permanently delete the original transmission from us, including any attachments, without making a copy.

From: Bruno Carrera <sbcnbc@hotmail.com>
Sent: July 19, 2022 12:14 PM
To: Charles Turpin <Charles.Turpin@portcolborne.ca>
Subject: FW: 281 Chippawa Rd., In lieu of Emergency Fire Access Route

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Charles,

It was good to meet you in person.

See below David Schulz's response of our meeting for your perusal.

Please email acknowledgement of our mutual agreements as per our discussion.

Sincerely

Sam B. Carrera M.A.A.T.O. CRBO CBCO

From: David Schulz
Sent: July 19, 2022 10:29 AM
To: Bruno Carrera
Subject: RE: 281 Chippawa Rd., In lieu of Emergency Fire Access Route

Thanks Sam,

If Charles is satisfied from the Fire Department's perspective that is great.

Regards,

David

From: Bruno Carrera <sbcnbc@hotmail.com>
Sent: July 18, 2022 3:54 PM
To: David Schulz <David.Schulz@portcolborne.ca>
Subject: 281 Chippawa Rd., In lieu of Emergency Fire Access Route

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

David,

The following items listed will be implemented into the Proposed Plan of Condominium as per mutual Agreement in discussions with Charles Turpin, Fire Inspector and myself on Monday July 18, 2022.

- Main Roadway Entrance (only) width will be 8.5 metres
- All Roadway Centreline Turning Radii are minimum 12m as per Clause 3.2.5.6.(1)(b) OBC. To be noted on Plan of Condominium Drawing
- No Street Parking permitted and Signed as required by City Standards
- Automatic Sprinklered Units (only) as per Sentence 3.2.5.13.(3) OBC (NFPA 13D) and will be equipped with 120V Audible Bell on the Flow Switch. Units to be Highlighted on Plan of Condominium Drawing

Please email acknowledgement of these agreements as per our discussion.

Sincerely

Sam B. Carrera M.A.A.T.O. CRBO CBCO

Sent from Mail for Window

Appendix B

Existing Turning Movement Count Data

Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009
Work Order # 050

Date: August / 01 Day: Tue / Hrs: 7 - 10 + 12 - 14 + 15 - 18

Location: HWY-3 @ HWY 140-NIAG RD 140-ELIZABETH ST(S) Ramps: /

Reg/Mun: CR Town/City: Port Colborne Area:

File Name: 0117300000 Device: Gretch / Jamar Unit # 11 / Interval 1: AM / NN / PM

Observer: Yevgeniya Proskuryakova Weather: Clear / Cloudy Clear Road Condition: Dry / Dry

LHRS & O/S: 11730 0

GPS: C-Star IV

Datum: WGS 84 Y / N

Lat: 42.90124

Long: -79.23463

Comments:

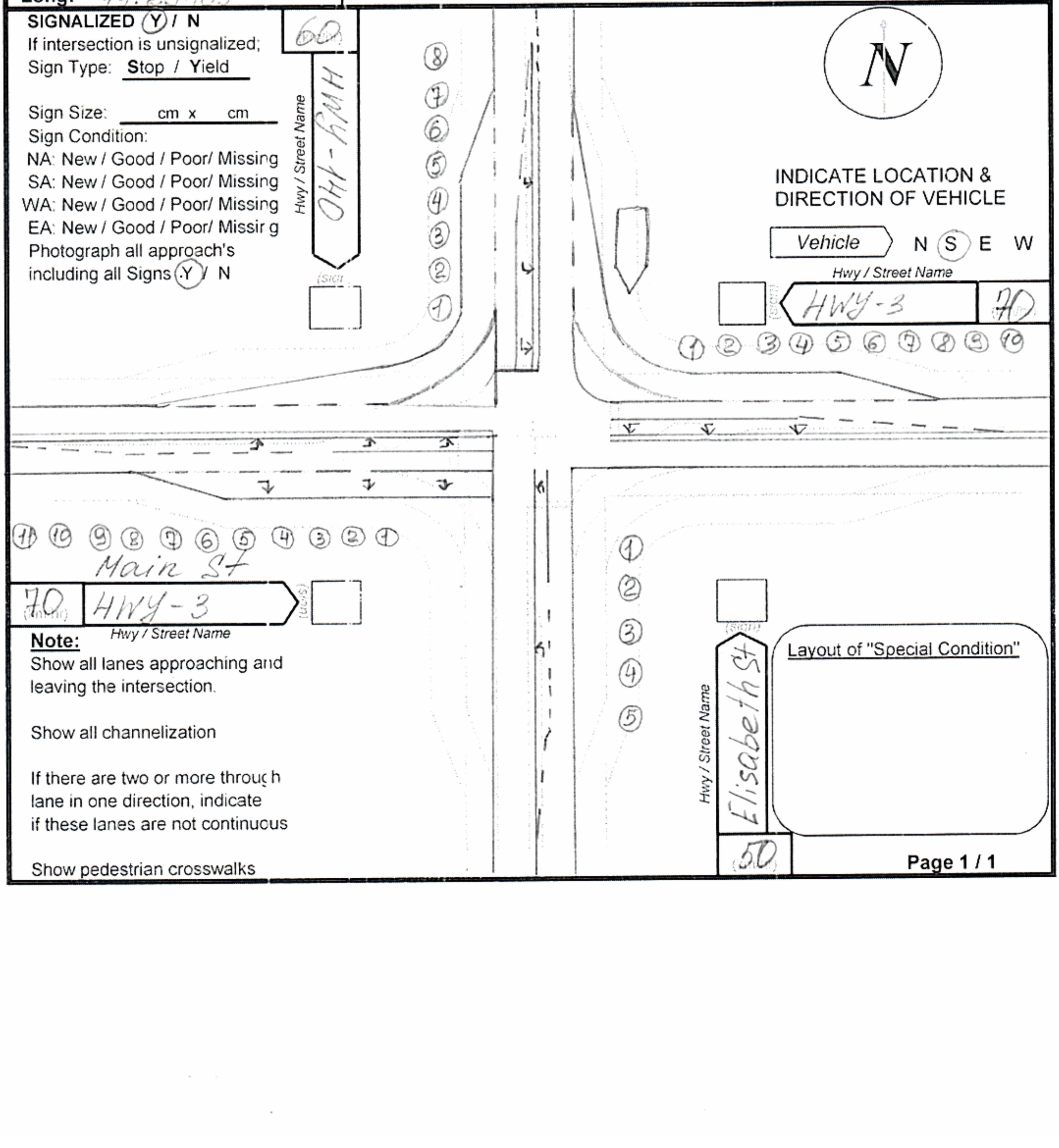
SIGNALIZED (Y) / N

If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: cm x cm

Sign Condition:
NA: New / Good / Poor/ Missing
SA: New / Good / Poor/ Missing
WA: New / Good / Poor/ Missing
EA: New / Good / Poor/ Missir g

Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continucus

Show pedestrian crosswalks

Layout of "Special Condition"

Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

AdHoc Turning Movement Total Count and Peak Summary Report

Description: HWY 3 @ HWY 140/ELIZABETH STREET

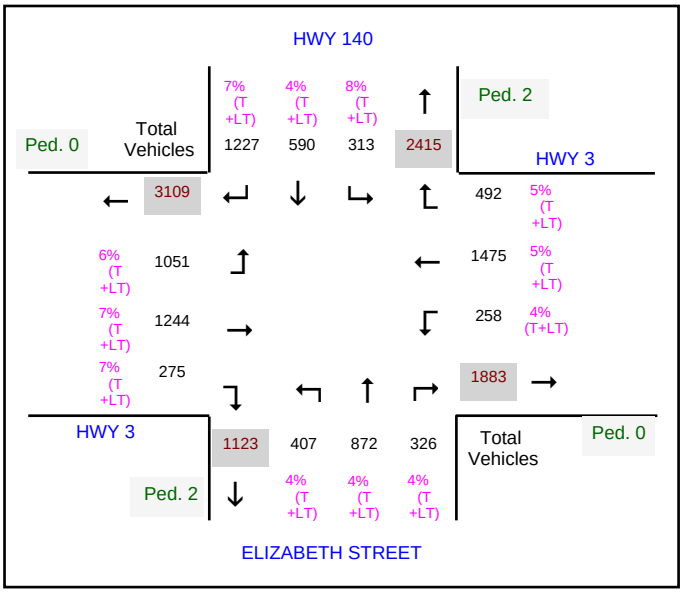
Region: CENTRAL | **Survey Type:** TM – Intersection | **Hwy:** 3

Start Date: 01-Aug-2017 (Tue) | **I/C Side:** | **LHRS:** 11720

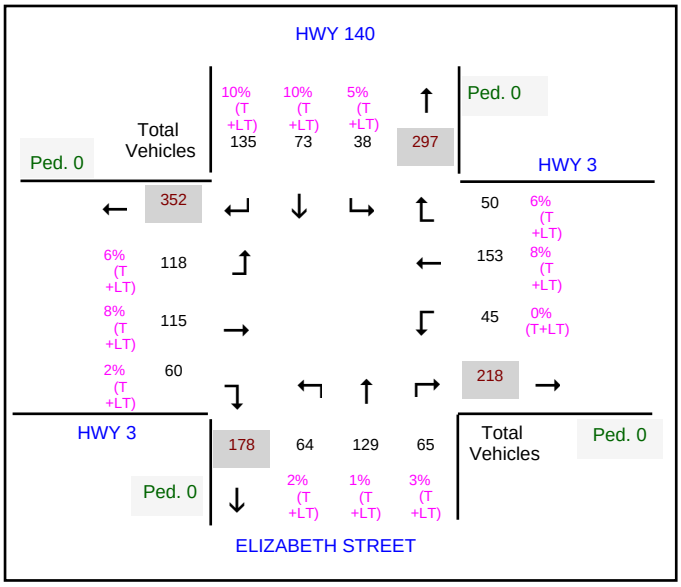
End Date: 01-Aug-2017 (Tue) | **Int. Type:** Four Leg | **Offset:** 15.800

Schedule Summary: TUES-THURS, 07:00-10:00, 12:00-14:00, 15:00-18:00

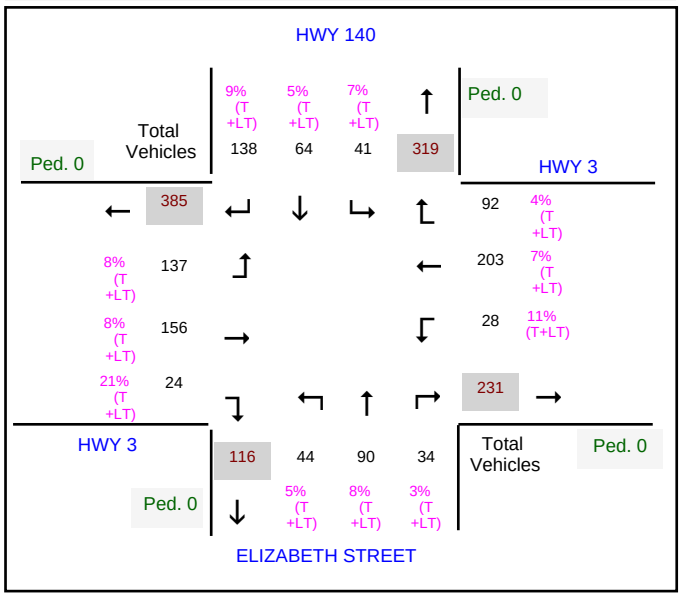
Total Count — Number of hours: 8



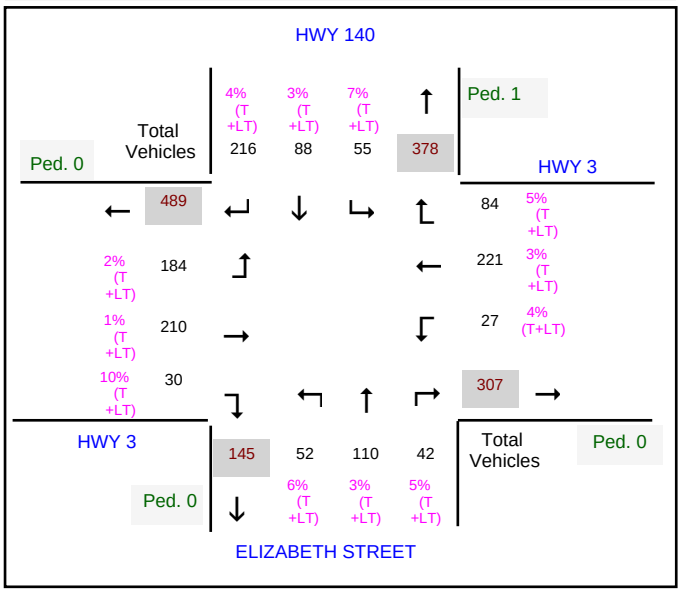
AM Peak Hour Report — Start Time: 08:00



Midday Peak Hour Report — Start Time: 12:15



PM Peak Hour Report — Start Time: 16:15



Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 3 @ HWY 140/ELIZABETH STREET
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 3
Start Date: 01-Aug-2017 (Tue) **I/C Side:** **LHRS:** 11720
End Date: 01-Aug-2017 (Tue) **Int. Type:** Four Leg **Offset:** 15.800
Schedule Summary: TUES-THURS, 07:00-10:00, 12:00-14:00, 15:00-18:00

	Major Road Approaches																				Minor Road Approaches																				
	East HWY 3										West HWY 3										North HWY 140										South ELIZABETH STREET									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 1																																									
07:00	11	23	6	2	0	1	0	0	0	0	22	21	6	2	0	1	3	0	0	0	2	7	13	0	2	0	1	0	0	0	9	29	10	2	0	0	0	0	0	0	**173**
07:15	19	21	5	0	2	0	0	1	0	0	27	33	6	2	1	0	0	0	0	0	2	12	19	0	1	1	0	0	1	0	16	40	11	0	1	0	0	0	0	0	**221**
07:30	10	35	18	1	2	1	0	0	0	0	31	25	4	3	0	0	0	1	0	0	5	9	14	1	0	2	0	0	3	0	7	35	11	0	1	1	0	0	0	0	**220**
07:45	2	33	11	0	0	1	0	0	1	0	33	17	5	2	2	0	0	0	0	0	4	12	29	1	0	2	0	0	2	0	16	24	7	0	0	0	0	0	0	0	**204**
08:00	14	31	10	0	1	0	0	1	1	0	40	31	13	2	3	1	2	0	0	0	6	20	27	1	0	1	0	0	1	0	11	29	15	1	1	1	0	0	0	0	**264**
08:15	12	31	12	0	0	2	0	3	0	0	17	18	18	0	1	0	1	1	0	0	10	13	29	0	2	1	0	1	2	0	19	39	15	0	0	0	0	0	0	0	**247**
08:30	10	40	12	0	3	0	0	3	0	0	26	33	7	1	0	0	1	1	0	0	12	16	20	0	4	2	0	0	2	0	13	35	23	0	0	0	0	0	0	0	**264**
08:45	9	39	13	0	1	0	0	0	0	0	28	24	21	0	0	0	0	3	0	0	8	17	45	0	0	1	1	0	4	0	20	25	10	0	0	1	0	0	0	0	**270**
09:00	13	41	10	0	0	1	0	0	0	0	24	26	17	4	1	2	1	1	0	0	7	9	29	1	1	2	0	0	2	0	19	28	9	0	1	0	0	0	0	0	**249**
09:15	11	35	12	0	0	1	0	0	0	0	28	21	9	2	3	2	0	1	0	0	8	15	27	2	1	2	0	0	0	0	27	17	10	2	1	0	0	0	0	0	**237**
09:30	8	35	14	1	0	0	0	0	0	0	21	38	6	1	1	0	0	0	0	0	7	19	28	0	1	3	0	0	1	0	11	29	15	1	2	0	0	1	1	0	**244**
09:45	7	33	5	0	2	0	0	2	0	0	25	40	7	0	5	0	2	2	0	0	7	15	31	0	0	3	0	0	1	0	14	18	12	0	2	1	0	0	0	2	**234**
Period 2																																									
12:00	5	44	12	0	3	0	0	1	0	0	22	41	11	3	3	0	1	2	0	0	10	18	43	1	0	2	1	1	3	0	14	25	16	0	2	1	0	0	0	0	**285**
12:15	6	42	24	2	3	2	0	0	0	0	28	34	6	1	2	0	3	2	0	0	8	13	32	2	1	2	0	0	1	0	15	13	9	0	1	0	0	0	0	0	**252**
12:30	6	41	15	1	3	0	0	0	0	0	31	53	2	0	2	0	1	1	1	0	12	16	29	0	1	0	0	0	5	0	6	16	7	1	1	0	0	2	0	0	**253**
12:45	9	48	25	0	2	1	0	0	1	0	29	30	4	0	1	0	1	1	0	0	8	16	35	1	1	0	0	0	1	0	7	30	6	1	0	0	0	1	1	0	**260**
13:00	4	58	24	0	4	0	0	2	0	0	38	26	7	3	3	4	2	1	0	0	10	16	29	0	0	0	0	0	4	0	14	24	11	0	2	0	0	0	0	0	**286**
13:15	9	50	15	0	2	0	0	0	0	0	23	37	3	0	2	1	0	1	0	0	7	13	18	0	0	2	0	0	1	0	9	15	9	0	1	0	0	1	0	0	**219**
13:30	4	36	11	1	1	1	0	2	1	0	28	41	5	0	4	0	3	2	0	0	3	18	19	0	1	1	1	0	0	0	10	33	13	0	1	0	0	1	0	0	**241**
13:45	3	48	17	0	1	2	0	0	0	0	36	50	9	0	5	0	2	2	0	0	4	8	24	0	1	3	3	0	0	0	4	22	12	1	0	0	0	1	0	0	**258**

Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 3 @ HWY 140/ELIZABETH STREET
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 3
Start Date: 01-Aug-2017 (Tue) **I/C Side:** **LHRS:** 11720
End Date: 01-Aug-2017 (Tue) **Int. Type:** Four Leg **Offset:** 15.800
Schedule Summary: TUES-THURS, 07:00-10:00, 12:00-14:00, 15:00-18:00

	Major Road Approaches																					Minor Road Approaches																					
	East HWY 3										West HWY 3										North HWY 140										South ELIZABETH STREET										
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 3																																										
15:00	6	42	8	1	1	0	0	0	1	0	29	46	3	1	5	1	2	1	0	0	9	18	32	0	2	1	0	0	0	0	11	31	6	1	0	0	0	0	0	0	**258**
15:15	3	57	13	0	3	0	0	1	0	0	39	34	3	0	0	0	1	1	0	0	13	20	51	0	0	1	0	0	1	0	6	20	8	2	1	0	0	0	0	0	**278**
15:30	5	75	17	0	2	0	0	1	0	0	25	59	3	0	1	1	2	0	0	0	16	18	40	0	0	0	0	0	1	0	4	26	6	0	0	0	0	1	0	0	**303**
15:45	8	56	8	0	1	0	0	1	1	0	41	39	8	0	4	0	2	1	0	0	19	18	57	0	0	1	0	0	0	0	12	20	4	0	3	0	0	0	0	0	**304**
16:00	2	44	18	0	2	1	0	0	0	0	19	20	7	2	2	0	2	1	0	0	11	25	57	1	0	2	0	1	0	0	14	30	7	0	1	0	0	0	0	0	**269**
16:15	5	50	17	0	0	0	0	0	0	0	52	62	7	1	1	1	1	0	0	0	14	23	45	1	2	2	0	0	2	0	11	23	14	1	0	0	0	1	0	0	**336**
16:30	6	72	22	1	2	1	0	1	0	0	48	59	5	0	0	0	0	0	0	0	11	24	59	0	1	0	1	0	0	1	9	24	9	1	0	0	0	0	0	0	**356**
16:45	5	45	16	0	3	0	0	0	0	0	36	42	11	0	0	1	1	1	0	0	6	17	49	2	0	0	0	0	0	0	18	31	9	0	1	1	0	0	0	0	**295**
17:00	10	47	25	0	1	2	0	0	1	0	45	44	4	0	0	1	0	1	0	0	20	21	55	0	0	2	0	0	2	0	11	29	8	1	1	1	0	0	0	0	**332**
17:15	4	67	19	0	2	0	0	0	0	0	33	37	15	0	2	0	0	0	0	0	13	33	60	0	0	1	2	0	0	1	11	29	4	0	2	1	0	0	0	0	**335**
17:30	7	55	23	0	2	0	0	0	0	0	41	50	10	1	0	1	1	0	0	0	6	36	61	0	0	0	0	0	0	0	11	28	5	0	1	0	0	0	0	0	**339**
17:45	15	31	10	0	0	1	0	2	0	0	18	31	15	1	0	0	1	0	0	0	11	30	40	0	0	0	0	0	1	0	13	19	3	0	0	2	0	0	0	0	**244**

Ministry of Transportation
Ministère des Transports

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 9015-E-0009
Work Order # 471

2016

Typo - Should read Hwy 140

Date: June 09 / Day: Th Hrs: 6 – 10 + 15 – 19 + ___ – ___

Location: HWY 471 @ CONC 2 Rd Ramps: ___ / ___

Reg/Mun: CR Town/City: Hamilton Area: ___

File Name: 0457000103 Device: Gretch / Jamar Unit # 12 / ___ Interval 1: (AM) / NN / PM

Observer: David Slavin Weather: Clear / ___ Road Condition: Good / ___

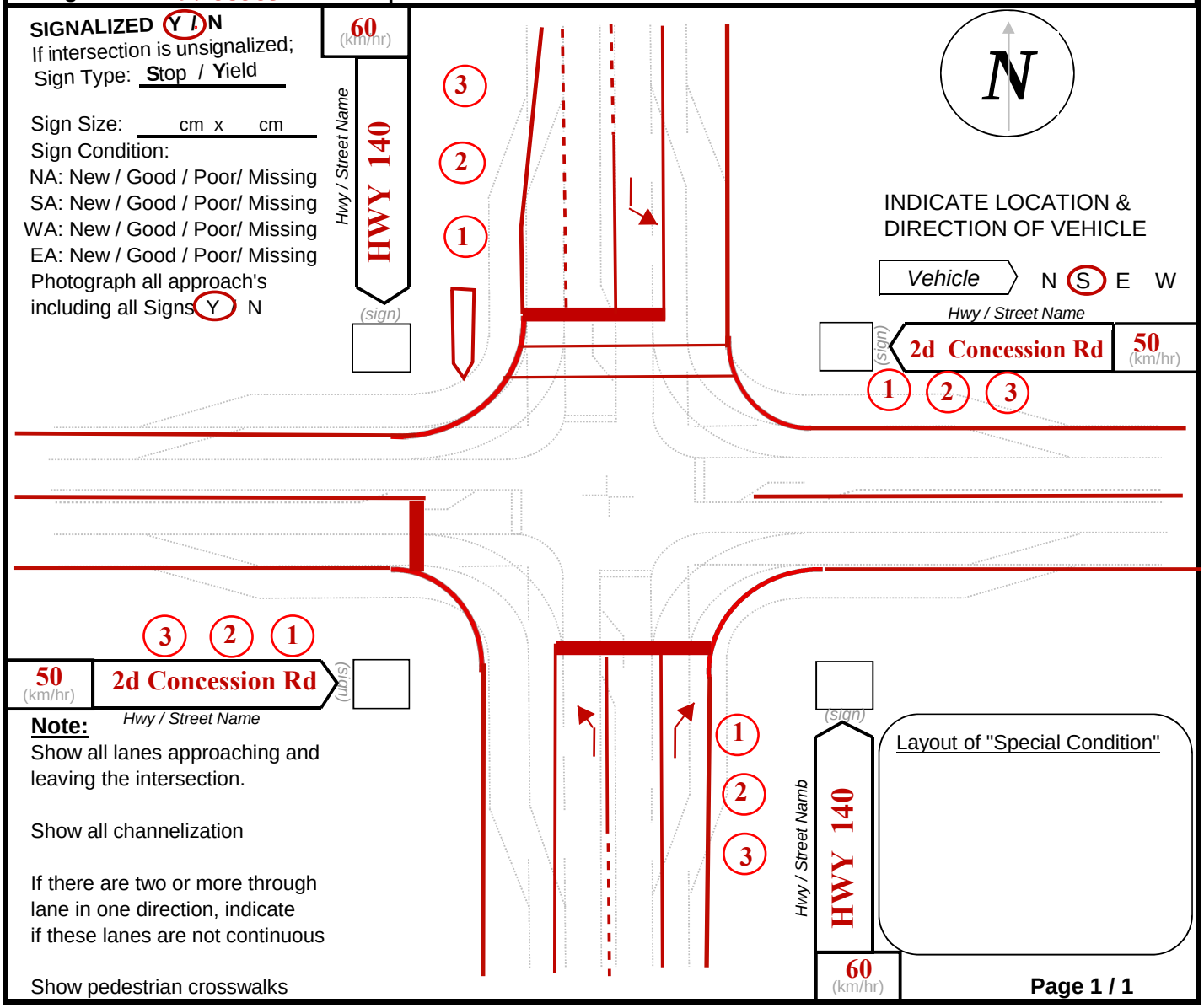
LHRS & O/S: 45700 1.03

GPS: G - Star IV
Datum: WGS 84 (Y) / N
Lat: 42.910284
Long: -79.235385

Comments:

SIGNALIZED (Y) / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: ___ cm x ___ cm
Sign Condition:
NA: New / Good / Poor/ Missing
SA: New / Good / Poor/ Missing
WA: New / Good / Poor/ Missing
EA: New / Good / Poor/ Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks

Layout of "Special Condition"

Fr

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Ministry of Transportation

TVIS II - Traffic Volume Information System

AdHoc Turning Movement Total Count and Peak Summary Report

Description: HWY 140 @ 2ND CONCESSION RD

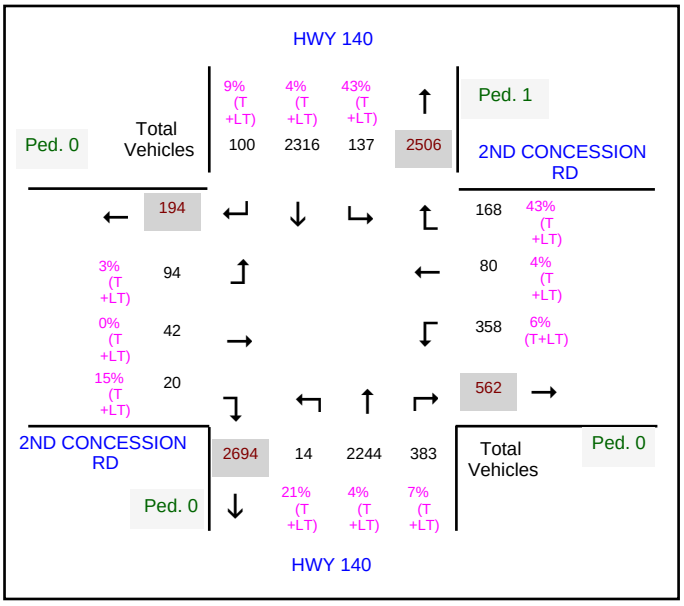
Region: CENTRAL | **Survey Type:** TM – Intersection | **Hwy:** 140

Start Date: 09-Jun-2016 (Thu) | **I/C Side:** | **LHRS:** 45700

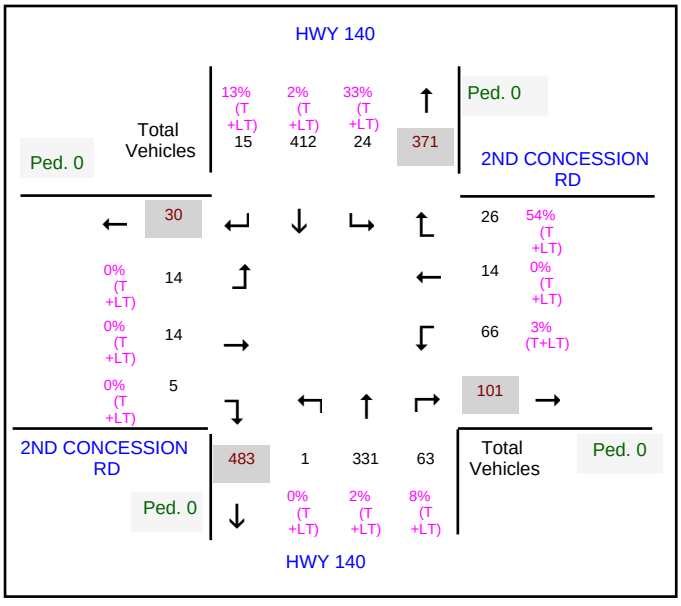
End Date: 09-Jun-2016 (Thu) | **Int. Type:** Four Leg | **Offset:** 1.030

Schedule Summary: TUES-THURS, 06:00-10:00, 15:00-19:00

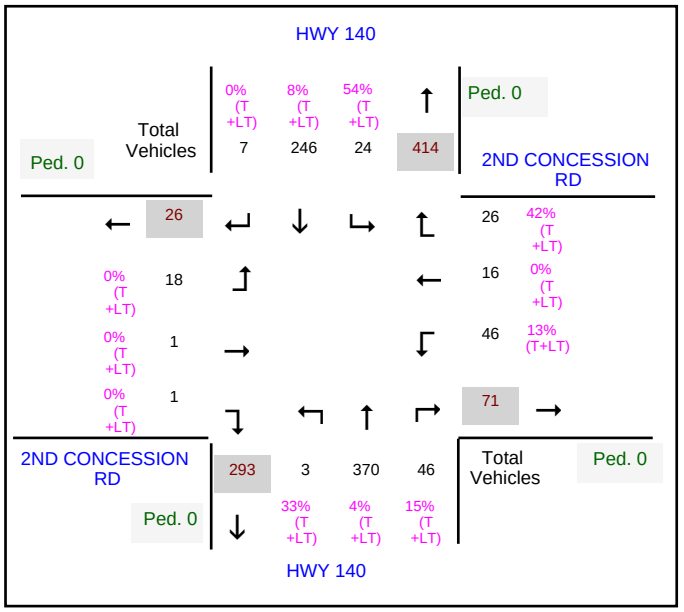
Total Count — Number of hours: 8



AM Peak Hour Report — Start Time: 06:45



PM Peak Hour Report — Start Time: 16:15



Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 140 @ 2ND CONCESSION RD
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 140
Start Date: 09-Jun-2016 (Thu) **I/C Side:** **LHRS:** 45700
End Date: 09-Jun-2016 (Thu) **Int. Type:** Four Leg **Offset:** 1.030
Schedule Summary: TUES-THURS, 06:00-10:00, 15:00-19:00

	Major Road Approaches																		Minor Road Approaches															
	North HWY 140										South HWY 140										East 2ND CONCESSION RD										West 2ND CONCESSION RD									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 1																																								
06:00	3	77	6	0	1	0	0	0	0	0	0	60	16	0	2	2	0	1	0	0	11	4	2	0	0	2	0	0	0	0	4	2	0	1	0	0	0	0	0	0	194
06:15	2	80	4	0	4	0	3	2	1	0	1	82	17	0	2	1	0	1	0	0	9	3	5	1	0	1	2	0	1	0	4	2	0	0	0	0	0	0	0	0	228
06:30	1	81	4	1	0	0	5	0	0	0	0	82	14	0	8	0	0	1	1	0	6	5	4	0	0	0	0	0	2	0	5	0	0	0	0	0	0	0	0	0	220
06:45	5	92	7	2	1	0	1	1	1	0	0	75	13	0	1	0	0	0	3	0	10	2	2	0	0	2	0	0	3	0	8	2	2	0	0	0	0	0	0	0	233
07:00	3	84	0	0	1	1	2	0	0	0	1	90	13	0	0	0	0	1	1	0	15	4	5	1	0	3	0	0	3	0	0	6	2	0	0	0	0	0	0	0	236
07:15	5	118	1	1	0	0	2	1	0	0	0	85	18	0	0	0	0	1	1	0	12	6	1	0	0	0	0	0	2	0	3	4	1	0	0	0	0	0	0	0	262
07:30	3	109	5	0	3	0	0	2	0	0	0	75	14	0	2	0	0	1	0	0	27	2	4	1	0	1	0	0	0	0	3	2	0	0	0	0	0	0	0	0	254
07:45	1	98	4	0	1	0	0	0	0	0	1	68	20	0	3	0	0	0	0	0	14	0	6	1	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	221
08:00	1	107	5	0	2	0	0	0	0	0	0	63	15	0	1	1	0	0	1	0	10	2	8	2	0	0	0	0	0	0	4	4	1	0	0	0	0	0	0	0	227
08:15	2	109	3	0	2	0	0	1	0	0	1	74	11	0	2	0	0	1	0	0	21	2	1	0	0	0	0	0	0	0	9	2	0	0	0	0	0	0	1	0	242
08:30	2	110	5	0	1	0	0	2	0	1	0	73	10	0	1	0	0	1	0	0	8	4	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	223
08:45	3	102	2	0	1	0	0	0	1	0	0	60	11	0	0	0	0	1	1	0	15	3	6	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	209
09:00	4	89	2	0	0	0	0	0	0	0	0	70	10	0	0	0	0	0	0	0	9	1	2	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0	192
09:15	0	80	3	0	0	0	0	0	0	0	1	61	7	0	1	0	0	0	0	0	9	1	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	169
09:30	0	66	4	0	1	0	0	0	0	0	1	48	14	0	1	0	1	1	0	0	13	2	1	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	157
09:45	2	67	1	0	2	0	0	1	0	0	0	38	8	0	0	1	0	0	0	0	4	1	1	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	129
Period 2																																								
15:00	3	34	1	0	0	0	2	2	0	0	0	58	11	0	1	0	0	2	1	0	5	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	123
15:15	6	14	2	1	2	0	1	0	0	0	0	67	8	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	109
15:30	3	29	1	0	3	0	1	1	0	0	0	58	6	0	0	1	0	1	2	0	3	1	2	0	0	1	1	0	4	0	2	1	0	0	0	0	0	0	0	0	121
15:45	5	37	2	3	2	0	0	1	0	0	0	45	11	0	1	1	0	2	0	0	9	0	3	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	124
16:00	0	34	5	1	4	0	1	1	0	0	2	59	8	0	1	0	0	3	0	0	6	1	2	1	0	4	0	0	2	0	2	2	1	0	0	0	0	0	0	0	140

Ontario

Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 140 @ 2ND CONCESSION RD
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 140
Start Date: 09-Jun-2016 (Thu) **I/C Side:** **LHRS:** 45700
End Date: 09-Jun-2016 (Thu) **Int. Type:** Four Leg **Offset:** 1.030
Schedule Summary: TUES-THURS, 06:00-10:00, 15:00-19:00

	Major Road Approaches																						Minor Road Approaches																						
	North HWY 140										South HWY 140										East 2ND CONCESSION RD										West 2ND CONCESSION RD											
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
16:15	3	48	3	2	2	0	4	2	0	0	1	83	15	0	2	1	0	1	1	0	12	5	6	0	0	0	1	0	3	0	4	1	1	0	0	0	0	0	0	0	**201**
16:30	5	55	1	2	3	0	1	0	0	0	0	105	12	0	4	1	0	1	0	0	11	4	3	1	0	1	1	0	5	0	6	0	0	0	0	0	0	0	0	0	**222**
16:45	0	74	0	0	2	0	0	2	0	0	0	80	6	0	0	1	1	1	1	0	11	6	2	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	**193**
17:00	3	50	3	4	5	0	0	3	0	0	1	88	6	0	3	1	0	2	1	0	6	1	4	1	0	1	0	0	1	0	4	0	0	0	0	0	0	0	0	0	**188**
17:15	3	67	2	3	2	0	2	1	0	0	0	79	7	0	0	1	0	3	0	0	13	3	2	1	0	2	0	0	3	0	1	0	0	0	0	0	0	0	0	0	**195**
17:30	1	53	3	1	3	0	1	4	0	0	1	82	13	0	3	0	0	1	0	0	9	2	1	0	0	2	0	0	3	0	1	0	1	0	0	0	0	0	0	0	**185**
17:45	2	68	2	1	2	0	1	0	0	0	0	47	6	0	1	0	0	6	0	0	12	2	5	1	0	2	0	0	1	0	5	3	0	0	0	0	1	0	0	0	**168**
18:00	1	43	0	2	2	1	4	1	1	0	0	50	4	0	0	1	1	0	0	0	13	2	4	1	1	1	0	0	2	0	1	2	0	0	0	0	0	0	0	0	**138**
18:15	0	41	2	0	2	1	2	2	0	0	0	58	8	0	0	0	0	3	0	0	10	3	4	2	0	1	0	0	3	0	1	0	2	0	0	0	0	0	0	0	**145**
18:30	1	53	2	0	3	1	1	2	0	0	0	48	10	0	2	0	0	0	0	0	12	1	1	1	1	1	0	0	5	0	0	4	1	1	0	0	0	0	1	0	**152**
18:45	5	56	6	0	1	0	1	1	1	0	0	52	13	0	1	0	0	0	0	0	9	4	0	0	1	0	0	0	0	0	3	1	0	0	0	1	0	0	0	0	**156**

Ministry of Transportation
Ministère des Transports

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 2015-E-0009
Work Order # 145

Date: November 06 2018 Day: Tu / Hrs: 7 - 9 + 11 - 14 + 15 - 18

Location: HWY 140 & Chippawa Rd Ramps: /

Reg/Mun: CR Town/City: Port Colborne Area:

File Name: 0457000080 Device: Gretch / Jamar Unit # 16 / Interval 1: (AM) / NN / PM

Observer: Alena Mariyskaya Weather: Cloudy / Rain Road Condition: Wet / Wet
Cloudy Dry

LHRS & O/S: 45700 0.80

GPS: G-Star IV

Datum: WGS 84 (Y) / N

Lat: 42.908500

Long: -79.235132

Comments:

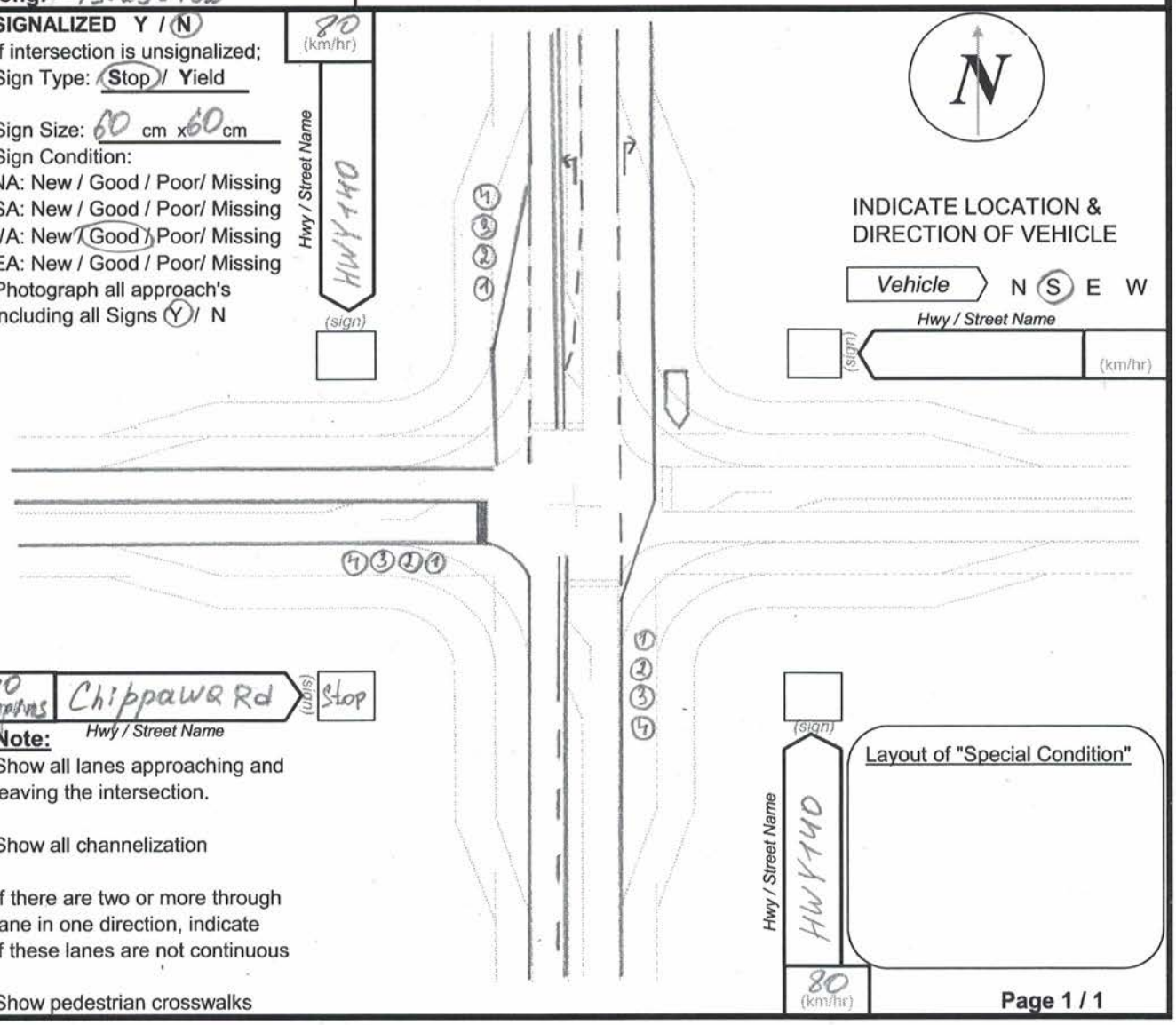
SIGNALIZED Y / (N)

If intersection is unsignalized;
Sign Type: (Stop) / Yield

Sign Size: 60 cm x 60 cm

Sign Condition:
NA: New / Good / Poor / Missing
SA: New / Good / Poor / Missing
WA: New / (Good) / Poor / Missing
EA: New / Good / Poor / Missing

Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks

Layout of "Special Condition"

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TVIS II - Traffic Volume Information System

Turning Movement Total Count and Peak Summary Report

Description: HWY 140 @ CHIPPAWA RD

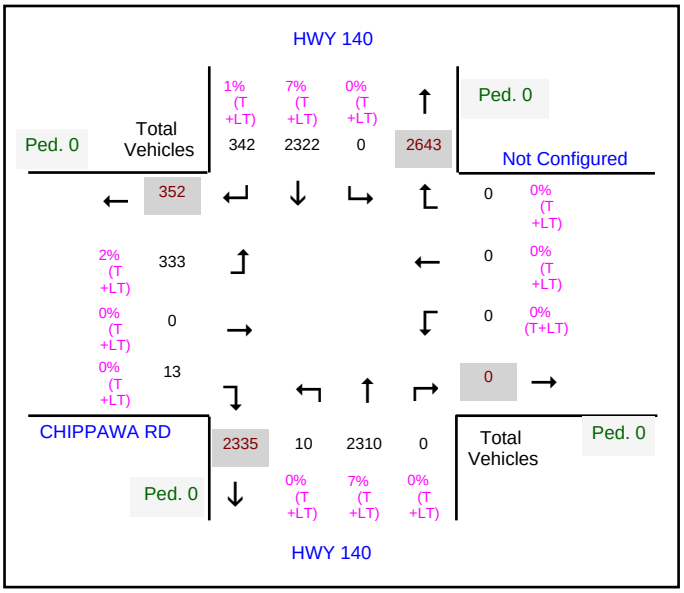
Region: CENTRAL | **Survey Type:** TM – Intersection | **Hwy:** 140

Start Date: 06-Nov-2018 (Tue) | **I/C Side:** | **LHRS:** 45700

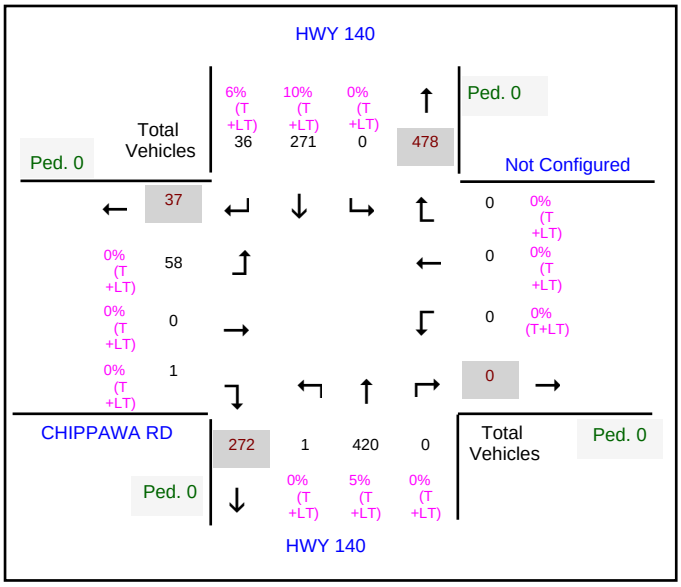
End Date: 06-Nov-2018 (Tue) | **Int. Type:** T - W | **Offset:** 0.800

Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

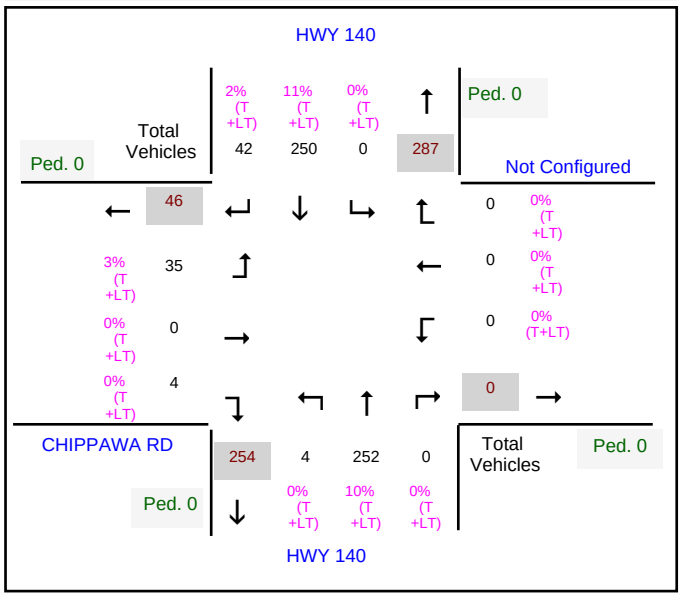
Total Count — Number of hours: 8



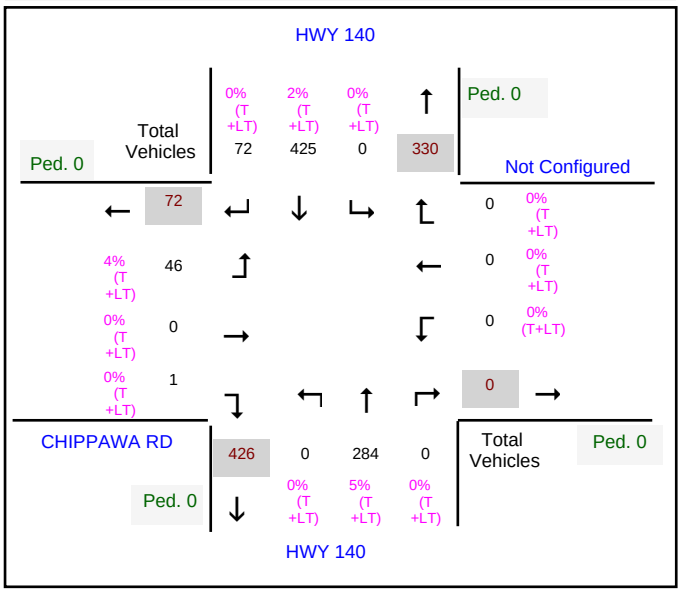
AM Peak Hour Report — Start Time: 07:30



Midday Peak Hour Report — Start Time: 12:15



PM Peak Hour Report — Start Time: 16:15



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Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 140 @ CHIPPAWA RD
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 140
Start Date: 06-Nov-2018 (Tue) **I/C Side:** **LHRS:** 45700
End Date: 06-Nov-2018 (Tue) **Int. Type:** T - W **Offset:** 0.800
Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

	Major Road Approaches																		Minor Road Approaches																
	North HWY 140										South HWY 140										West CHIPPAWA RD										Not Configured									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Heavy Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
Period 1																																								
07:00	0	24	5	0	3	0	0	2	0	0	0	78	0	0	0	0	0	1	0	0	11	0	1	0	0	0	0	0	0	0										125
07:15	0	40	9	0	2	0	0	3	0	0	0	86	0	0	2	0	0	1	0	0	15	0	0	0	0	0	0	0	0	0										158
07:30	0	54	6	0	2	0	0	6	0	0	1	97	0	0	2	0	0	2	0	0	17	0	0	0	0	0	0	0	0	0										187
07:45	0	70	14	0	4	0	0	4	2	0	0	105	0	0	0	0	0	6	0	0	11	0	0	0	0	0	0	0	0	0										216
08:00	0	67	7	0	4	0	0	2	0	0	0	110	0	0	2	0	0	4	0	0	15	0	0	0	0	0	0	0	0	0										211
08:15	0	53	7	0	2	0	0	3	0	0	0	85	0	0	4	0	0	3	0	0	15	0	1	0	0	0	0	0	0	0										173
08:30	0	65	9	0	4	0	0	7	2	0	1	68	0	0	2	0	0	3	0	0	8	0	0	0	0	0	0	0	0	0										169
08:45	0	65	17	0	1	0	0	6	0	0	0	56	0	0	3	0	0	7	0	0	9	0	1	0	0	0	0	0	0	0										165
Period 2																																								
11:00	0	44	6	0	2	0	0	6	0	0	0	62	0	0	3	0	0	1	0	0	8	0	0	0	0	0	0	0	0	0										132
11:15	0	49	9	0	1	0	0	4	0	0	0	61	0	0	2	0	0	3	0	0	7	0	1	0	0	0	0	0	0	0										137
11:30	0	43	6	0	3	0	0	2	0	0	0	66	0	0	1	0	0	5	0	0	9	0	1	0	0	0	0	0	0	0										136
11:45	0	46	6	0	4	0	0	0	0	0	0	54	0	0	2	0	0	4	0	0	11	0	0	0	0	0	0	0	0	0										127
12:00	0	46	5	0	2	0	0	4	0	0	0	43	0	0	3	0	0	3	0	0	9	0	0	0	0	0	0	0	0	0										115
12:15	0	47	11	0	4	0	0	1	0	0	1	53	0	0	2	0	0	6	0	0	6	0	1	0	0	0	0	0	0	0										132
12:30	0	62	12	0	3	1	0	3	0	0	0	71	0	0	4	0	0	2	0	0	14	0	1	1	0	0	0	0	0	0										174
12:45	0	69	8	0	0	0	0	8	0	0	1	42	0	0	3	0	0	4	0	0	8	0	2	0	0	0	0	0	0	0										145
13:00	0	45	10	0	1	0	0	7	0	0	2	60	0	0	2	0	0	3	0	0	6	0	0	0	0	0	0	0	0	0										136
13:15	0	48	10	0	0	0	0	3	0	0	1	56	0	0	1	0	0	3	0	0	9	0	0	0	0	0	0	0	0	0										131
13:30	0	55	8	0	3	0	0	2	0	0	0	51	0	0	1	0	0	8	0	0	14	0	1	0	0	0	0	0	0	0										143
13:45	0	41	2	0	2	0	0	3	0	0	0	69	0	0	1	0	0	8	0	0	11	0	0	0	0	0	0	0	0	0										137
Period 3																																								
15:00	0	86	16	0	0	0	0	5	0	0	1	64	0	0	3	0	0	3	0	0	9	0	1	0	0	0	0	0	0	0										188
15:15	0	84	10	0	0	0	0	3	0	0	0	75	0	0	2	0	0	4	0	0	17	0	0	0	0	0	0	0	0	0										195

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Ministry of Transportation

TVIS II - Traffic Volume Information System

Turning Movement 15 Minute Report

Description: HWY 140 @ CHIPPAWA RD
Region: CENTRAL **Survey Type:** TM – Intersection **Hwy:** 140
Start Date: 06-Nov-2018 (Tue) **I/C Side:** **LHRS:** 45700
End Date: 06-Nov-2018 (Tue) **Int. Type:** T - W **Offset:** 0.800
Schedule Summary: TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00

	Major Road Approaches																				Minor Road Approaches																				
	North HWY 140										South HWY 140										West CHIPPAWA RD										Not Configured									
Start Time	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Heavy Trucks			Ped	Total Veh.
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		
15:30	0	79	15	0	2	0	0	2	0	0	0	70	0	0	0	0	0	5	0	0	8	0	0	0	0	0	2	0	0	0												**183**
15:45	0	70	7	0	2	0	0	5	0	0	0	55	0	0	1	0	0	6	0	0	9	0	0	0	0	0	1	0	0	0												**156**
16:00	0	83	15	0	1	0	0	4	0	0	0	68	0	0	3	0	0	6	0	0	7	0	0	0	0	0	0	0	0	0												**187**
16:15	0	95	21	0	0	0	0	4	0	0	0	65	0	0	4	0	0	3	0	0	13	0	0	1	0	0	0	0	0	0												**206**
16:30	0	115	20	0	1	0	0	2	0	0	0	69	0	0	0	0	0	2	0	0	14	0	1	0	0	0	0	0	0	0												**224**
16:45	0	106	19	0	0	0	0	0	0	0	0	68	0	0	2	0	0	2	0	0	4	0	0	0	0	0	0	0	0	0												**201**
17:00	0	101	12	0	0	0	0	1	0	0	0	68	0	0	1	0	0	0	0	0	13	0	0	1	0	0	0	0	0	0												**197**
17:15	0	119	11	0	0	0	0	1	0	0	1	66	0	0	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0												**205**
17:30	0	109	15	0	1	0	0	3	0	0	0	56	0	0	0	0	0	0	0	0	9	0	0	0	0	0	1	0	0	0												**194**
17:45	0	82	9	0	0	0	0	0	0	0	1	46	0	0	0	0	0	1	0	0	5	0	1	0	0	0	0	0	0	0												**145**

Main Street & Chippawa Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

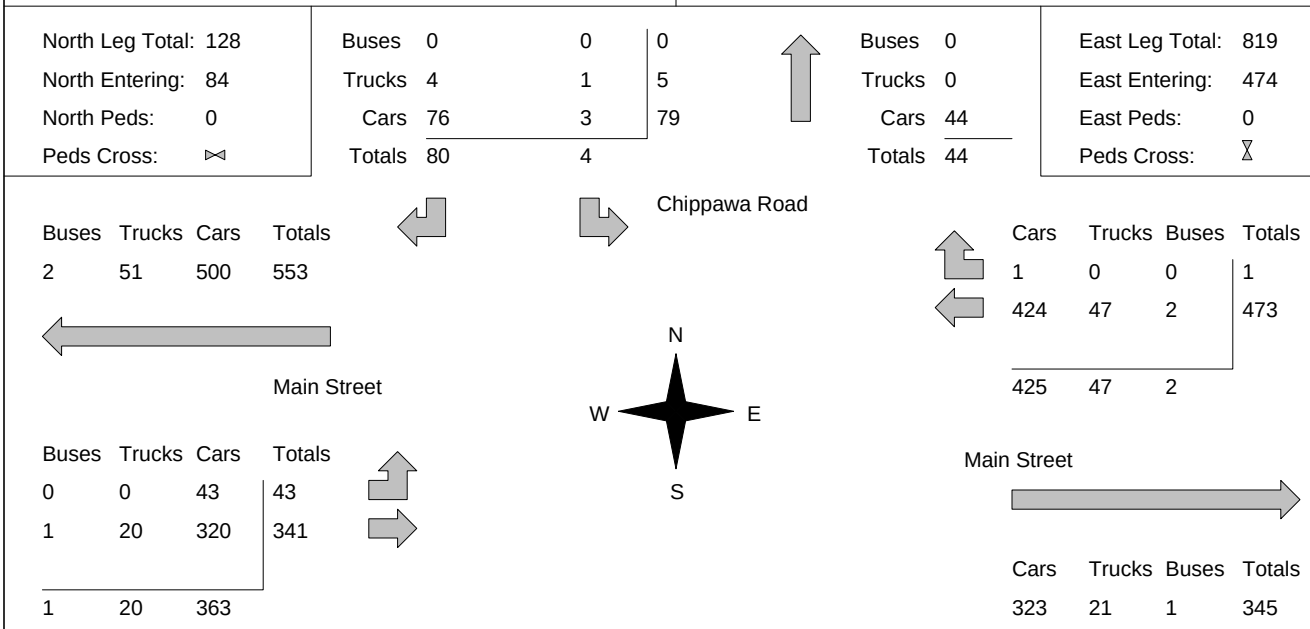
Municipality: Port Colborne
Site #: 0000000602
Intersection: Main Street & Chippawa Road
TFR File #: 1
Count date: 15-Jul-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Main Street runs W/E



Peds Cross:
West Peds: 0
West Entering: 384
West Leg Total: 937

Comments

Main Street & Chippawa Road

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Port Colborne
Site #: 0000000602
Intersection: Main Street & Chippawa Road
TFR File #: 1
Count date: 15-Jul-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Main Street runs W/E

North Leg Total: 170
North Entering: 111
North Peds: 0
Peds Cross: ⋈

Buses	0	0	0
Trucks	1	0	1
Cars	108	2	110
Totals	109	2	

Buses	0
Trucks	1
Cars	58
Totals	59

East Leg Total: 1169
East Entering: 692
East Peds: 0
Peds Cross: ⧖

Chippawa Road

Buses	Trucks	Cars	Totals
1	19	781	801

Main Street

Buses	Trucks	Cars	Totals
0	1	58	59
1	10	464	475
1	11	522	

N
W E
S

Cars	Trucks	Buses	Totals
0	0	0	0
673	18	1	692
673	18	1	

Main Street

Cars	Trucks	Buses	Totals
466	10	1	477

Peds Cross: ⧖
West Peds: 0
West Entering: 534
West Leg Total: 1335

Comments

Main Street & Chippawa Road

Total Count Diagram

Municipality: Port Colborne
Site #: 0000000602
Intersection: Main Street & Chippawa Road
TFR File #: 1
Count date: 15-Jul-2021

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Main Street runs W/E

North Leg Total: 585
North Entering: 378
North Peds: 3
Peds Cross: ⋈

Buses	0	0	0
Trucks	7	2	9
Cars	361	8	369
Totals	368	10	

Buses	0
Trucks	7
Cars	200
Totals	207

East Leg Total: 3815
East Entering: 2176
East Peds: 0
Peds Cross: ⧖

Chippawa Road

Buses	Trucks	Cars	Totals
6	122	2409	2537

Main Street

Buses	Trucks	Cars	Totals
0	4	196	200
4	62	1563	1629
4	66	1759	

Cars	Trucks	Buses	Totals
4	3	0	7
2048	115	6	2169
2052	118	6	

N
W E
S

Main Street

Cars	Trucks	Buses	Totals
1571	64	4	1639

Peds Cross: ⧖
West Peds: 0
West Entering: 1829
West Leg Total: 4366

Comments

Main Street & Chippawa Road
Traffic Count Summary

Intersection: Main Street & Chippawa Road | **Count Date:** 15-Jul-2021 | **Municipality:** Port Colborne

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	1	0	59	60	0	60
9:00:00	4	0	80	84	0	84
16:00:00	0	0	0	0	0	0
17:00:00	3	0	112	115	0	115
18:00:00	2	0	117	119	3	119
Totals:	10	0	368	378	3	378

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
Totals:	0	0	0	0	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	397	3	400	0	782
9:00:00	0	473	1	474	0	858
16:00:00	0	0	0	0	0	0
17:00:00	0	679	2	681	0	1212
18:00:00	0	620	1	621	0	1153
Totals:	0	2169	7	2176	0	4005

West Approach Totals

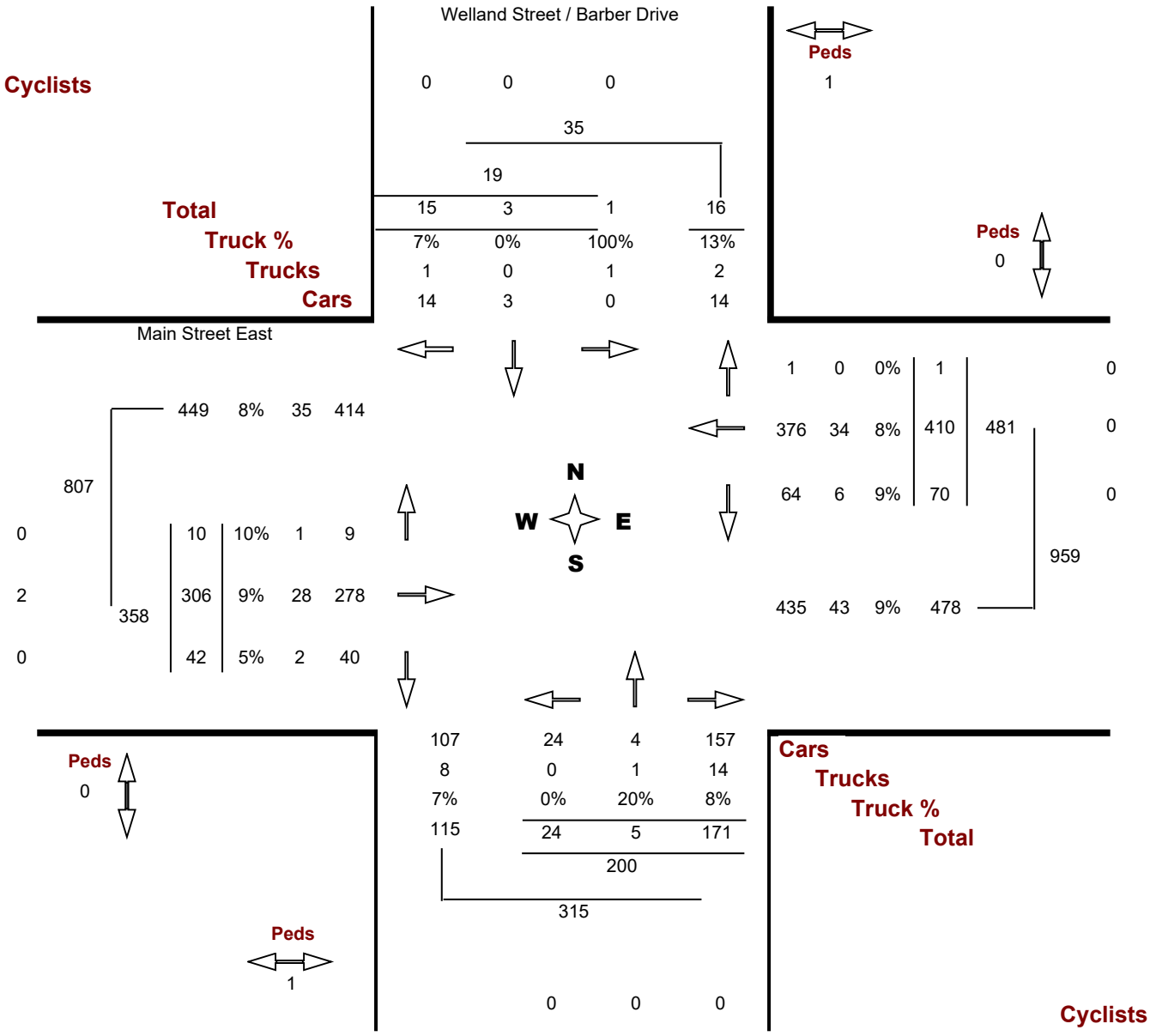
Hour Ending	Includes Cars, Trucks, & Buses: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	40	342	0	382	0
9:00:00	43	341	0	384	0
16:00:00	0	0	0	0	0
17:00:00	58	473	0	531	0
18:00:00	59	473	0	532	0
Totals:	200	1629	0	1829	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00
Crossing Values:	0	1	4	0	3	682	2	682

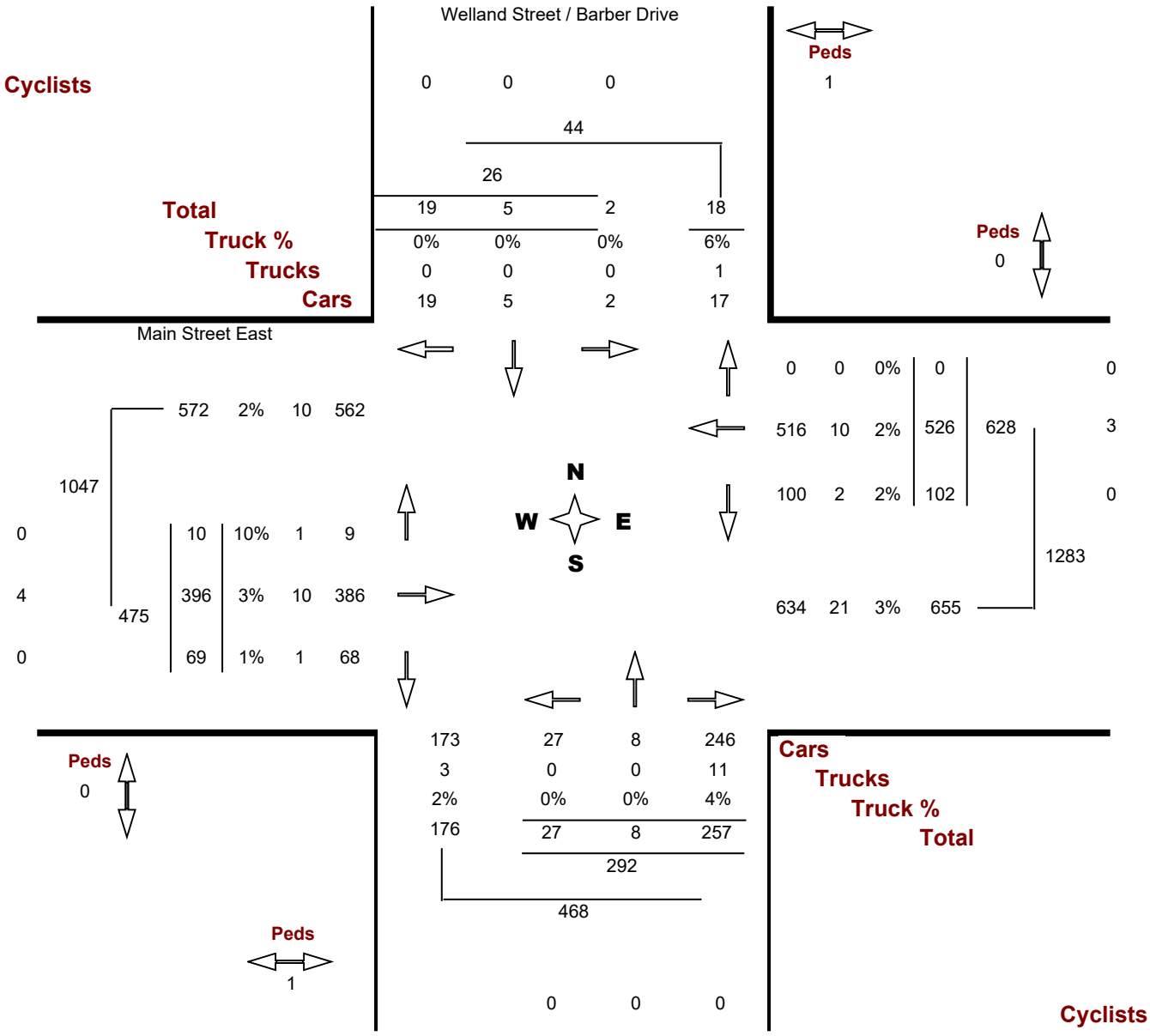
Turning Movements Report - AM Period

Location.....	Main Street East @ Welland Street / Barber Drive	**GeoID.....**	00358
Municipality.	PORT COLBORNE	**Count Date.**	Thursday, 23 May, 2019
Traffic Cont.		**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	East west	**Peak Hour..**	07:45 AM — 08:45 AM



Turning Movements Report - PM Period

Location.....	Main Street East @ Welland Street / Barber Drive	**GeoID.....**	00358
Municipality.	PORT COLBORNE	**Count Date.**	Thursday, 23 May, 2019
Traffic Cont.		**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	East west	**Peak Hour..**	04:30 PM — 05:30 PM



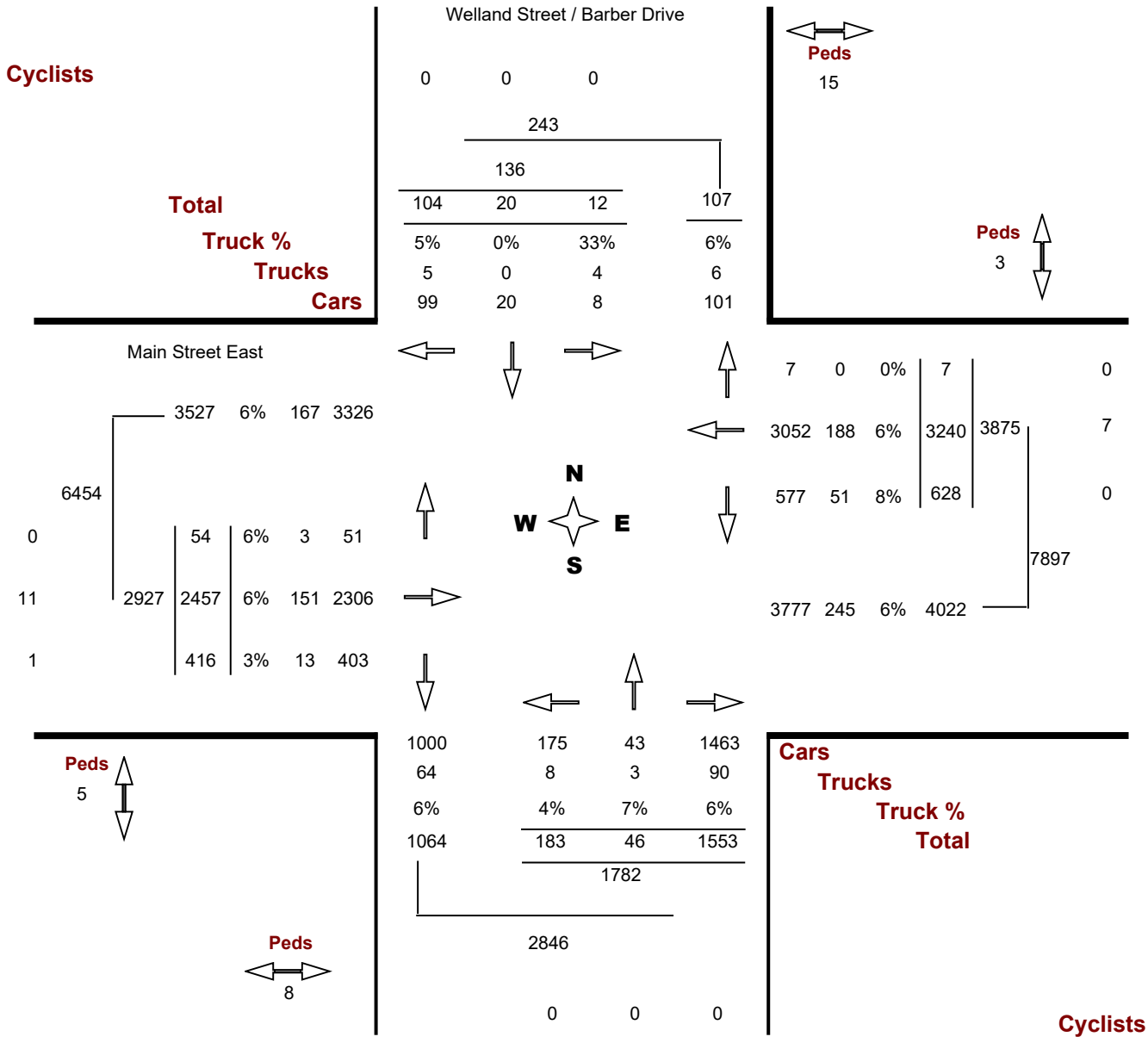
Turning Movement Count Report
Full Study

Location..... Main Street East @ Welland Street / Barber Drive

Municipality..... PORT COLBORNE

GeoID..... 00358

Count Date..... Thursday, 23 May, 2019



Turning Movement Count - Details Report (15 min)

Location..... Main Street East @ Welland Street / Barber Drive

Municipality..... PORT COLBORNE

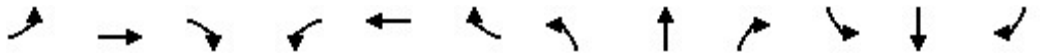
Count Date..... Thursday, May 23, 2019

		Welland Street / Barber Drive										Main Street East									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	0	0	2	0	2	2	2	22	0	26	5	43	2	0	50	3	62	7	0	72
07:15	07:30	1	1	1	0	3	1	0	50	0	51	27	47	0	0	74	0	46	4	0	50
07:30	07:45	1	3	0	0	4	0	2	123	0	125	72	0	0	0	72	0	0	0	0	0
07:45	08:00	0	0	7	0	7	1	1	54	0	56	41	104	0	0	145	2	62	7	0	71
Hourly Total		2	4	10	0	16	4	5	249	0	258	145	194	2	0	341	5	170	18	0	193
08:00	08:15	0	0	3	0	3	19	2	22	0	43	6	104	1	0	111	5	104	13	0	122
08:15	08:30	1	1	2	0	4	2	1	55	0	58	13	94	0	0	107	2	64	9	0	75
08:30	08:45	0	2	3	0	5	2	1	40	0	43	10	108	0	0	118	1	76	13	0	90
08:45	09:00	0	0	3	0	3	5	1	44	0	50	14	120	0	0	134	2	77	11	0	90
Hourly Total		1	3	11	0	15	28	5	161	0	194	43	426	1	0	470	10	321	46	0	377
11:00	11:15	0	0	2	0	2	7	2	46	0	55	15	99	0	0	114	2	66	14	0	82
11:15	11:30	0	0	0	0	0	4	1	39	0	44	11	91	0	0	102	0	76	14	0	90
11:30	11:45	0	0	1	0	1	4	1	39	0	44	3	105	0	0	108	1	72	14	0	87
11:45	12:00	0	0	3	0	3	3	0	33	0	36	11	98	1	0	110	1	51	7	0	59
Hourly Total		0	0	6	0	6	18	4	157	0	179	40	393	1	0	434	4	265	49	0	318
12:00	12:15	1	0	6	0	7	2	2	45	0	49	11	103	0	0	114	1	75	13	0	89
12:15	12:30	0	0	2	0	2	2	2	32	0	36	8	95	0	0	103	2	73	13	0	88
12:30	12:45	0	0	2	0	2	2	3	46	0	51	16	97	0	0	113	2	62	19	0	83
12:45	13:00	0	0	4	0	4	2	0	41	0	43	14	95	0	0	109	3	81	19	0	103
Hourly Total		1	0	14	0	15	8	7	164	0	179	49	390	0	0	439	8	291	64	0	363
13:00	13:15	1	0	2	0	3	4	2	35	0	41	11	94	0	0	105	1	93	15	0	109
13:15	13:30	0	1	3	0	4	3	0	36	0	39	12	107	1	0	120	3	77	15	0	95
13:30	13:45	0	0	2	0	2	4	2	42	0	48	12	89	0	0	101	4	66	14	0	84
13:45	14:00	1	0	3	0	4	7	0	48	0	55	11	103	0	0	114	3	78	12	0	93
Hourly Total		2	1	10	0	13	18	4	161	0	183	46	393	1	0	440	11	314	56	0	381
15:00	15:15	0	0	5	0	5	3	2	45	0	50	9	131	0	0	140	1	90	14	0	105
15:15	15:30	0	0	5	0	5	44	0	22	0	66	10	111	1	0	122	4	142	28	0	174
15:30	15:45	2	0	3	0	5	18	2	45	0	65	12	119	0	0	131	0	115	11	0	126
15:45	16:00	0	2	3	0	5	3	2	67	0	72	79	76	0	0	155	0	41	4	0	45
Hourly Total		2	2	16	0	20	68	6	179	0	253	110	437	1	0	548	5	388	57	0	450
16:00	16:15	1	2	4	0	7	1	2	82	0	85	48	89	1	0	138	0	68	9	0	77

		Welland Street / Barber Drive										Main Street East									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15	16:30	0	1	4	0	5	2	1	41	0	44	27	130	0	0	157	1	73	16	0	90
16:30	16:45	1	4	3	0	8	5	1	96	0	102	62	107	0	0	169	2	66	13	0	81
16:45	17:00	0	0	9	0	9	12	1	44	0	57	14	145	0	0	159	2	120	23	0	145
Hourly Total		2	7	20	0	29	20	5	263	0	288	151	471	1	0	623	5	327	61	0	393
17:00	17:15	1	0	3	0	4	7	4	56	0	67	12	137	0	0	149	4	110	22	0	136
17:15	17:30	0	1	4	0	5	3	2	61	0	66	14	137	0	0	151	2	100	11	0	113
17:30	17:45	1	2	3	0	6	3	3	43	0	49	13	131	0	0	144	0	85	17	0	102
17:45	18:00	0	0	7	0	7	6	1	59	0	66	5	131	0	0	136	0	86	15	0	101
Hourly Total		2	3	17	0	22	19	10	219	0	248	44	536	0	0	580	6	381	65	0	452
Grand Total		12	20	104	0	136	183	46	1553	0	1782	628	3240	7	0	3875	54	2457	416	0	2927
Truck %		33%	0%	5%	0%	7%	4%	7%	6%	0%	6%	8%	6%	0%	0%	6%	6%	6%	3%	0%	6%

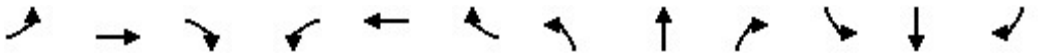
Appendix C

Existing Intersection Operation Calculations (Synchro)



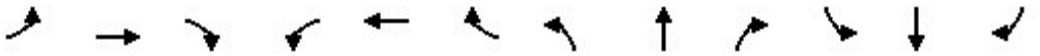
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	124	65	49	166	54	69	140	70	41	79	146
Future Volume (vph)	128	124	65	49	166	54	69	140	70	41	79	146
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1653		1601	1609	1367
Flt Permitted	0.64	1.00	1.00	0.67	1.00	1.00	0.70	1.00		0.62	1.00	1.00
Satd. Flow (perm)	1075	1638	1475	1187	1638	1419	1216	1653		1039	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	135	71	53	180	59	75	152	76	45	86	159
RTOR Reduction (vph)	0	0	32	0	0	26	0	29	0	0	0	126
Lane Group Flow (vph)	139	135	39	53	180	33	75	199	0	45	86	33
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.2	13.2		13.2	13.2	13.2
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.2	13.2		13.2	13.2	13.2
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	593	903	814	655	903	783	252	343		215	333	283
v/s Ratio Prot		0.08			0.11			c0.12			0.05	
v/s Ratio Perm	c0.13		0.03	0.04		0.02	0.06			0.04		0.02
v/c Ratio	0.23	0.15	0.05	0.08	0.20	0.04	0.30	0.58		0.21	0.26	0.12
Uniform Delay, d1	7.3	7.0	6.6	6.7	7.2	6.5	21.3	22.7		20.9	21.1	20.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	0.4	0.1	0.2	0.5	0.1	0.7	2.5		0.5	0.4	0.2
Delay (s)	8.3	7.3	6.7	6.9	7.7	6.6	21.9	25.2		21.4	21.5	20.6
Level of Service	A	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		7.6			7.3			24.4			21.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	15.3
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	15	6	73	15	29	1	365	70	26	455	17
Future Volume (vph)	15	15	6	73	15	29	1	365	70	26	455	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1692			1436		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.79		0.46	1.00	1.00	0.53	1.00	1.00
Satd. Flow (perm)		1491			1166		820	1735	1393	702	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	16	7	79	16	32	1	397	76	28	495	18
RTOR Reduction (vph)	0	6	0	0	18	0	0	0	25	0	0	18
Lane Group Flow (vph)	0	33	0	0	109	0	1	397	51	28	495	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		10.5			10.5		48.3	48.3	48.3	48.3	48.3	0.0
Effective Green, g (s)		10.5			10.5		48.3	48.3	48.3	48.3	48.3	0.0
Actuated g/C Ratio		0.15			0.15		0.67	0.67	0.67	0.67	0.67	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		218			170		551	1167	937	472	1167	0
v/s Ratio Prot								0.23			c0.29	
v/s Ratio Perm		0.02			c0.09		0.00		0.04	0.04		
v/c Ratio		0.15			0.64		0.00	0.34	0.05	0.06	0.42	0.00
Uniform Delay, d1		26.8			28.9		3.9	5.0	4.0	4.0	5.4	35.9
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3			8.0		0.0	0.8	0.1	0.2	1.1	0.0
Delay (s)		27.1			36.9		3.9	5.8	4.1	4.2	6.5	35.9
Level of Service		C			D		A	A	A	A	A	D
Approach Delay (s)		27.1			36.9			5.5			7.4	
Approach LOS		C			D			A			A	

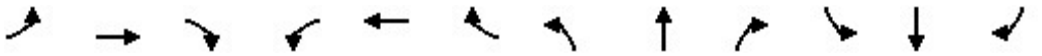
Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	306	42	80	472	1	24	5	171	1	3	15
Future Volume (vph)	10	306	42	80	472	1	24	5	171	1	3	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1598		1541	1638		1681	1395		840	1460	
Flt Permitted		0.98		0.54	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1575		882	1638		1681	1395		840	1460	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	333	46	87	513	1	26	5	186	1	3	16
RTOR Reduction (vph)	0	3	0	0	0	0	0	162	0	0	16	0
Lane Group Flow (vph)	0	387	0	87	514	0	26	29	0	1	3	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		38.4		38.4	38.4		8.7	8.7		1.4	1.4	
Effective Green, g (s)		38.4		38.4	38.4		8.7	8.7		1.4	1.4	
Actuated g/C Ratio		0.57		0.57	0.57		0.13	0.13		0.02	0.02	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		901		504	937		217	180		17	30	
v/s Ratio Prot					c0.31		0.02	c0.02		0.00	c0.00	
v/s Ratio Perm		0.25		0.10								
v/c Ratio		0.43		0.17	0.55		0.12	0.16		0.06	0.11	
Uniform Delay, d1		8.1		6.8	8.9		25.8	26.0		32.2	32.2	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5		0.7	2.3		0.2	0.3		1.1	1.2	
Delay (s)		9.6		7.6	11.3		26.0	26.3		33.3	33.4	
Level of Service		A		A	B		C	C		C	C	
Approach Delay (s)		9.6			10.7			26.2			33.4	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

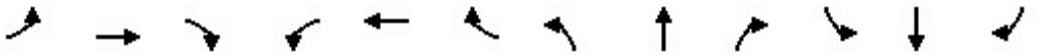
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	227	32	29	239	91	56	119	45	60	95	234
Future Volume (vph)	199	227	32	29	239	91	56	119	45	60	95	234
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1638		1571	1718	1446
Flt Permitted	0.60	1.00	1.00	0.61	1.00	1.00	0.69	1.00		0.64	1.00	1.00
Satd. Flow (perm)	1038	1752	1367	1030	1718	1414	1153	1638		1067	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	247	35	32	260	99	61	129	49	65	103	254
RTOR Reduction (vph)	0	0	15	0	0	43	0	22	0	0	0	205
Lane Group Flow (vph)	216	247	20	32	260	56	61	156	0	65	103	49
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.0	35.0	35.0	35.0	35.0	35.0	11.9	11.9		11.9	11.9	11.9
Effective Green, g (s)	35.0	35.0	35.0	35.0	35.0	35.0	11.9	11.9		11.9	11.9	11.9
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56	0.56	0.19	0.19		0.19	0.19	0.19
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	584	985	769	579	966	795	220	313		204	328	276
v/s Ratio Prot		0.14			0.15			c0.10			0.06	
v/s Ratio Perm	c0.21		0.01	0.03		0.04	0.05			0.06		0.03
v/c Ratio	0.37	0.25	0.03	0.06	0.27	0.07	0.28	0.50		0.32	0.31	0.18
Uniform Delay, d1	7.5	6.9	6.0	6.1	7.0	6.2	21.5	22.5		21.7	21.6	21.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	0.6	0.1	0.2	0.7	0.2	0.7	1.3		0.9	0.6	0.3
Delay (s)	9.3	7.5	6.1	6.3	7.7	6.4	22.2	23.7		22.6	22.2	21.4
Level of Service	A	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		8.2			7.2			23.3			21.7	
Approach LOS		A			A			C			C	

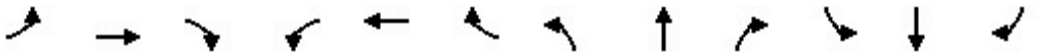
Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	15.3
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1	1	51	18	29	3	409	51	26	272	8
Future Volume (vph)	20	1	1	51	18	29	3	409	51	26	272	8
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1682			1388		1264	1701	1308	1092	1638	1504
Flt Permitted		0.76			0.83		0.58	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)		1329			1176		771	1701	1308	576	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1	1	55	20	32	3	445	55	28	296	9
RTOR Reduction (vph)	0	1	0	0	23	0	0	0	17	0	0	9
Lane Group Flow (vph)	0	23	0	0	84	0	3	445	38	28	296	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		9.4			9.4		48.2	48.2	48.2	48.2	48.2	0.0
Effective Green, g (s)		9.4			9.4		48.2	48.2	48.2	48.2	48.2	0.0
Actuated g/C Ratio		0.13			0.13		0.68	0.68	0.68	0.68	0.68	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		176			156		526	1161	892	393	1118	0
v/s Ratio Prot								c0.26			0.18	
v/s Ratio Perm		0.02			c0.07		0.00		0.03	0.05		
v/c Ratio		0.13			0.54		0.01	0.38	0.04	0.07	0.26	0.00
Uniform Delay, d1		27.0			28.6		3.6	4.8	3.7	3.7	4.3	35.3
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3			3.8		0.0	1.0	0.1	0.4	0.6	0.0
Delay (s)		27.3			32.4		3.6	5.8	3.7	4.1	4.9	35.3
Level of Service		C			C		A	A	A	A	A	D
Approach Delay (s)		27.3			32.4			5.5			5.7	
Approach LOS		C			C			A			A	

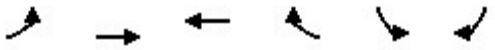
Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	396	69	112	609	0	27	8	257	2	5	19
Future Volume (vph)	10	396	69	112	609	0	27	8	257	2	5	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1679		1647	1735		1681	1456		1681	1555	
Flt Permitted		0.98		0.45	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1655		785	1735		1681	1456		1681	1555	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	430	75	122	662	0	29	9	279	2	5	21
RTOR Reduction (vph)	0	4	0	0	0	0	0	241	0	0	20	0
Lane Group Flow (vph)	0	512	0	122	662	0	29	47	0	2	6	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		36.0		36.0	36.0		9.1	9.1		2.8	2.8	
Effective Green, g (s)		36.0		36.0	36.0		9.1	9.1		2.8	2.8	
Actuated g/C Ratio		0.54		0.54	0.54		0.14	0.14		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		895		424	939		230	199		70	65	
v/s Ratio Prot					c0.38		0.02	c0.03		0.00	c0.00	
v/s Ratio Perm		0.31		0.16								
v/c Ratio		0.57		0.29	0.71		0.13	0.24		0.03	0.09	
Uniform Delay, d1		10.1		8.3	11.3		25.2	25.6		30.5	30.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.7		1.7	4.4		0.2	0.4		0.1	0.4	
Delay (s)		12.8		10.0	15.7		25.4	26.1		30.7	31.1	
Level of Service		B		A	B		C	C		C	C	
Approach Delay (s)		12.8			14.8			26.0			31.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	18.6
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	435	473	1	4	80
Future Volume (Veh/h)	43	435	473	1	4	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	473	514	1	4	87
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.88	
vC, conflicting volume	515				1082	514
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	515				1026	514
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	96				98	84
cM capacity (veh/h)	1061				199	554

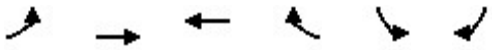
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	520	515	91
Volume Left	47	0	4
Volume Right	0	1	87
cSH	1061	1700	514
Volume to Capacity	0.04	0.30	0.18
Queue Length 95th (m)	1.1	0.0	4.8
Control Delay (s)	1.3	0.0	13.5
Lane LOS	A		B
Approach Delay (s)	1.3	0.0	13.5
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	1	1	446	288	38
Future Volume (Veh/h)	62	1	1	446	288	38
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)	67	1	1	485	313	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	800	313	354			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	800	313	354			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	100	100			
cM capacity (veh/h)	357	732	1216			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	68	486	313	41
Volume Left	67	1	0	0
Volume Right	1	0	0	41
cSH	359	1216	1700	1700
Volume to Capacity	0.19	0.00	0.18	0.02
Queue Length 95th (m)	5.2	0.0	0.0	0.0
Control Delay (s)	17.3	0.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	17.3	0.0	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	59	596	692	0	2	109
Future Volume (Veh/h)	59	596	692	0	2	109
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	648	752	0	2	118
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.81	
vC, conflicting volume	752				1528	752
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752				1534	752
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				98	71
cM capacity (veh/h)	858				97	412

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	712	752	120
Volume Left	64	0	2
Volume Right	0	0	118
cSH	858	1700	391
Volume to Capacity	0.07	0.44	0.31
Queue Length 95th (m)	1.8	0.0	9.7
Control Delay (s)	1.9	0.0	18.2
Lane LOS	A		C
Approach Delay (s)	1.9	0.0	18.2
Approach LOS			C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

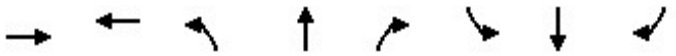
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	1	0	301	451	76
Future Volume (Veh/h)	49	1	0	301	451	76
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	1	0	327	490	83
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	817	490	573			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	801	466	551			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	100	100			
cM capacity (veh/h)	343	587	1005			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	54	327	490	83
Volume Left	53	0	0	0
Volume Right	1	0	0	83
cSH	346	1005	1700	1700
Volume to Capacity	0.16	0.00	0.29	0.05
Queue Length 95th (m)	4.2	0.0	0.0	0.0
Control Delay (s)	17.3	0.0	0.0	0.0
Lane LOS	C			
Approach Delay (s)	17.3	0.0	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	139	135	71	53	180	59	75	228	45	86	159
v/c Ratio	0.23	0.15	0.08	0.08	0.20	0.07	0.30	0.61	0.21	0.26	0.39
Control Delay	9.5	8.3	2.8	8.1	8.6	2.9	24.2	26.7	22.9	22.8	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.5	8.3	2.8	8.1	8.6	2.9	24.2	26.7	22.9	22.8	7.1
Queue Length 50th (m)	7.4	6.8	0.0	2.6	9.4	0.0	7.5	20.3	4.4	8.5	0.0
Queue Length 95th (m)	19.3	17.1	5.2	8.3	22.2	4.7	17.3	39.2	11.9	18.5	12.2
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	593	903	845	654	903	809	574	800	490	760	730
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.15	0.08	0.08	0.20	0.07	0.13	0.28	0.09	0.11	0.22

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	39	127	1	397	76	28	495	18
v/c Ratio	0.14	0.56	0.00	0.32	0.08	0.06	0.40	0.14
Control Delay	21.9	32.1	6.0	7.0	2.0	6.2	7.8	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	32.1	6.0	7.0	2.0	6.2	7.8	2.2
Queue Length 50th (m)	3.6	12.8	0.1	20.2	0.0	1.1	27.1	0.0
Queue Length 95th (m)	10.8	28.2	0.6	43.8	4.6	4.7	58.2	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	534	427	577	1223	1004	495	1223	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.30	0.00	0.32	0.08	0.06	0.40	0.14

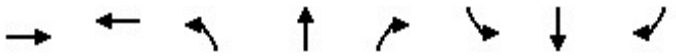
Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	390	87	514	26	191	1	19
v/c Ratio	0.40	0.16	0.51	0.11	0.54	0.01	0.09
Control Delay	9.0	8.0	10.5	24.8	11.2	26.0	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	8.0	10.5	24.8	11.2	26.0	16.1
Queue Length 50th (m)	15.4	3.0	22.9	2.3	0.5	0.1	0.3
Queue Length 95th (m)	57.3	14.8	82.2	9.5	16.8	1.5	5.9
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	975	545	1013	659	660	329	582
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.16	0.51	0.04	0.29	0.00	0.03

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	216	247	35	32	260	99	61	178	65	103	254
v/c Ratio	0.37	0.25	0.04	0.06	0.27	0.12	0.28	0.53	0.32	0.31	0.53
Control Delay	10.4	8.2	1.3	7.2	8.4	2.3	24.8	25.3	26.1	24.3	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	8.2	1.3	7.2	8.4	2.3	24.8	25.3	26.1	24.3	7.8
Queue Length 50th (m)	11.7	12.2	0.0	1.4	13.1	0.0	6.0	15.5	6.5	10.3	0.0
Queue Length 95th (m)	28.7	27.1	2.0	5.3	28.6	5.7	14.9	31.7	16.0	21.5	15.4
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	584	986	796	580	967	839	556	805	515	829	829
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.25	0.04	0.06	0.27	0.12	0.11	0.22	0.13	0.12	0.31

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	24	107	3	445	55	28	296	9
v/c Ratio	0.11	0.50	0.01	0.37	0.06	0.07	0.25	0.07
Control Delay	24.8	28.9	5.3	6.8	1.9	5.7	5.9	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	28.9	5.3	6.8	1.9	5.7	5.9	1.0
Queue Length 50th (m)	2.6	9.6	0.1	21.7	0.0	1.1	13.0	0.0
Queue Length 95th (m)	8.3	23.1	1.0	46.3	3.6	4.4	29.1	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	480	441	551	1217	951	412	1171	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.24	0.01	0.37	0.06	0.07	0.25	0.07

Intersection Summary

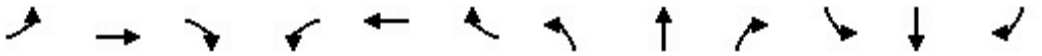
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	516	122	662	29	288	2	26
v/c Ratio	0.54	0.27	0.66	0.12	0.64	0.01	0.12
Control Delay	13.0	11.6	16.3	26.6	11.8	28.5	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	11.6	16.3	26.6	11.8	28.5	17.0
Queue Length 50th (m)	22.2	4.4	32.6	2.6	0.8	0.2	0.4
Queue Length 95th (m)	85.7	22.4	#136.9	10.0	20.7	2.1	7.4
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	954	450	996	655	737	655	618
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.27	0.66	0.04	0.39	0.00	0.04

Intersection Summary

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

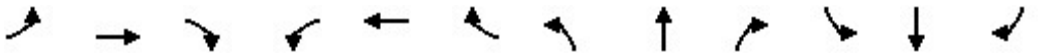
Appendix D

Future (2026) Background Intersection Operation Calculations (Synchro)



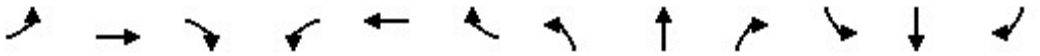
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	138	72	54	184	60	76	155	77	46	88	161
Future Volume (vph)	141	138	72	54	184	60	76	155	77	46	88	161
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1653		1601	1609	1367
Flt Permitted	0.63	1.00	1.00	0.66	1.00	1.00	0.69	1.00		0.57	1.00	1.00
Satd. Flow (perm)	1055	1638	1475	1171	1638	1419	1205	1653		958	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	150	78	59	200	65	83	168	84	50	96	175
RTOR Reduction (vph)	0	0	36	0	0	30	0	28	0	0	0	137
Lane Group Flow (vph)	153	150	42	59	200	35	83	224	0	50	96	38
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.2	14.2		14.2	14.2	14.2
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.2	14.2		14.2	14.2	14.2
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.22	0.22		0.22	0.22	0.22
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	573	889	801	636	889	771	264	363		210	353	300
v/s Ratio Prot		0.09			0.12			c0.14			0.06	
v/s Ratio Perm	c0.14		0.03	0.05		0.02	0.07			0.05		0.03
v/c Ratio	0.27	0.17	0.05	0.09	0.22	0.05	0.31	0.62		0.24	0.27	0.13
Uniform Delay, d1	7.9	7.4	6.9	7.1	7.7	6.9	21.1	22.7		20.7	20.9	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.4	0.1	0.3	0.6	0.1	0.7	3.1		0.6	0.4	0.2
Delay (s)	9.0	7.8	7.1	7.4	8.3	7.0	21.8	25.8		21.3	21.3	20.4
Level of Service	A	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		8.1			7.9			24.8			20.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	15.3
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	17	7	81	17	32	1	408	77	29	504	19
Future Volume (vph)	17	17	7	81	17	32	1	408	77	29	504	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1691			1439		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.78		0.43	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)		1481			1163		752	1735	1393	661	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	18	8	88	18	35	1	443	84	32	548	21
RTOR Reduction (vph)	0	7	0	0	17	0	0	0	28	0	0	21
Lane Group Flow (vph)	0	37	0	0	124	0	1	443	56	32	548	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		11.2			11.2		48.1	48.1	48.1	48.1	48.1	0.0
Effective Green, g (s)		11.2			11.2		48.1	48.1	48.1	48.1	48.1	0.0
Actuated g/C Ratio		0.15			0.15		0.67	0.67	0.67	0.67	0.67	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		229			180		500	1154	926	439	1154	0
v/s Ratio Prot								0.26			c0.32	
v/s Ratio Perm		0.03			c0.11		0.00		0.04	0.05		
v/c Ratio		0.16			0.69		0.00	0.38	0.06	0.07	0.47	0.00
Uniform Delay, d1		26.5			28.9		4.1	5.4	4.2	4.3	5.9	36.1
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3			10.5		0.0	1.0	0.1	0.3	1.4	0.0
Delay (s)		26.8			39.4		4.1	6.4	4.3	4.6	7.3	36.1
Level of Service		C			D		A	A	A	A	A	D
Approach Delay (s)		26.8			39.4			6.1			8.2	
Approach LOS		C			D			A			A	

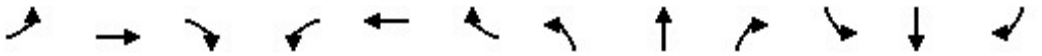
Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	72.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	340	46	89	526	1	26	6	189	1	3	17
Future Volume (vph)	11	340	46	89	526	1	26	6	189	1	3	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1598		1541	1638		1681	1396		840	1455	
Flt Permitted		0.98		0.52	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1572		835	1638		1681	1396		840	1455	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	370	50	97	572	1	28	7	205	1	3	18
RTOR Reduction (vph)	0	3	0	0	0	0	0	178	0	0	18	0
Lane Group Flow (vph)	0	429	0	97	573	0	28	34	0	1	3	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		37.5		37.5	37.5		8.8	8.8		1.3	1.3	
Effective Green, g (s)		37.5		37.5	37.5		8.8	8.8		1.3	1.3	
Actuated g/C Ratio		0.57		0.57	0.57		0.13	0.13		0.02	0.02	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		890		472	927		223	185		16	28	
v/s Ratio Prot					c0.35		0.02	c0.02		0.00	c0.00	
v/s Ratio Perm		0.27		0.12								
v/c Ratio		0.48		0.21	0.62		0.13	0.19		0.06	0.12	
Uniform Delay, d1		8.6		7.0	9.6		25.3	25.5		31.9	31.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9		1.0	3.1		0.2	0.4		1.2	1.4	
Delay (s)		10.4		8.0	12.7		25.5	25.9		33.0	33.3	
Level of Service		B		A	B		C	C		C	C	
Approach Delay (s)		10.4			12.0			25.8			33.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	18.6
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

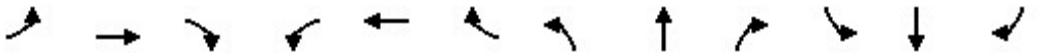
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	251	35	32	265	101	63	131	50	67	105	258
Future Volume (vph)	220	251	35	32	265	101	63	131	50	67	105	258
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1638		1571	1718	1446
Flt Permitted	0.58	1.00	1.00	0.59	1.00	1.00	0.68	1.00		0.63	1.00	1.00
Satd. Flow (perm)	1012	1752	1367	1006	1718	1414	1141	1638		1049	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	273	38	35	288	110	68	142	54	73	114	280
RTOR Reduction (vph)	0	0	17	0	0	49	0	22	0	0	0	225
Lane Group Flow (vph)	239	273	21	35	288	61	68	174	0	73	114	55
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	12.4	12.4		12.4	12.4	12.4
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	12.4	12.4		12.4	12.4	12.4
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56	0.56	0.20	0.20		0.20	0.20	0.20
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	565	979	764	562	960	790	225	323		207	339	285
v/s Ratio Prot		0.16			0.17			c0.11			0.07	
v/s Ratio Perm	c0.24		0.02	0.03		0.04	0.06			0.07		0.04
v/c Ratio	0.42	0.28	0.03	0.06	0.30	0.08	0.30	0.54		0.35	0.34	0.19
Uniform Delay, d1	8.0	7.2	6.2	6.3	7.3	6.4	21.5	22.6		21.7	21.7	21.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	0.7	0.1	0.2	0.8	0.2	0.8	1.7		1.0	0.6	0.3
Delay (s)	10.3	7.9	6.3	6.5	8.1	6.6	22.3	24.4		22.8	22.3	21.4
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		8.9			7.6			23.8			21.8	
Approach LOS		A			A			C			C	

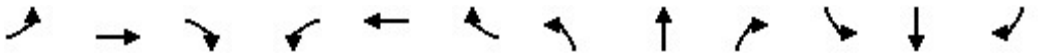
Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	15.3
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	1	56	20	32	3	455	56	29	305	9
Future Volume (vph)	22	1	1	56	20	32	3	455	56	29	305	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1389		1264	1701	1308	1092	1638	1504
Flt Permitted		0.73			0.82		0.56	1.00	1.00	0.47	1.00	1.00
Satd. Flow (perm)		1280			1174		746	1701	1308	535	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	1	1	61	22	35	3	495	61	32	332	10
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	20	0	0	10
Lane Group Flow (vph)	0	25	0	0	96	0	3	495	41	32	332	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		9.9			9.9		48.2	48.2	48.2	48.2	48.2	0.0
Effective Green, g (s)		9.9			9.9		48.2	48.2	48.2	48.2	48.2	0.0
Actuated g/C Ratio		0.14			0.14		0.68	0.68	0.68	0.68	0.68	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		178			163		505	1153	886	362	1110	0
v/s Ratio Prot								c0.29			0.20	
v/s Ratio Perm		0.02			c0.08		0.00		0.03	0.06		
v/c Ratio		0.14			0.59		0.01	0.43	0.05	0.09	0.30	0.00
Uniform Delay, d1		26.9			28.7		3.7	5.2	3.8	3.9	4.6	35.5
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4			5.3		0.0	1.2	0.1	0.5	0.7	0.0
Delay (s)		27.2			34.0		3.7	6.4	3.9	4.4	5.3	35.5
Level of Service		C			C		A	A	A	A	A	D
Approach Delay (s)		27.2			34.0			6.1			6.0	
Approach LOS		C			C			A			A	

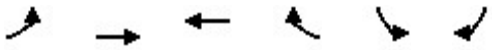
Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	441	76	124	676	0	30	9	285	2	6	21
Future Volume (vph)	11	441	76	124	676	0	30	9	285	2	6	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.89	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1680		1647	1735		1681	1456		1681	1566	
Flt Permitted		0.98		0.43	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1653		741	1735		1681	1456		1681	1566	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	479	83	135	735	0	33	10	310	2	7	23
RTOR Reduction (vph)	0	4	0	0	0	0	0	270	0	0	22	0
Lane Group Flow (vph)	0	570	0	135	735	0	33	50	0	2	8	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		43.7		43.7	43.7		9.6	9.6		2.8	2.8	
Effective Green, g (s)		43.7		43.7	43.7		9.6	9.6		2.8	2.8	
Actuated g/C Ratio		0.59		0.59	0.59		0.13	0.13		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		967		433	1014		216	187		63	58	
v/s Ratio Prot					c0.42		0.02	c0.03		0.00	c0.01	
v/s Ratio Perm		0.34		0.18								
v/c Ratio		0.59		0.31	0.72		0.15	0.27		0.03	0.14	
Uniform Delay, d1		9.8		7.9	11.2		28.9	29.4		34.6	34.8	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.6		1.9	4.5		0.2	0.6		0.1	0.8	
Delay (s)		12.4		9.7	15.7		29.2	29.9		34.8	35.6	
Level of Service		B		A	B		C	C		C	D	
Approach Delay (s)		12.4			14.8			29.9			35.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	480	522	2	5	94
Future Volume (Veh/h)	49	480	522	2	5	94
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	522	567	2	5	102
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.86	
vC, conflicting volume	569				1196	568
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	569				1146	568
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	95				97	80
cM capacity (veh/h)	1013				162	517

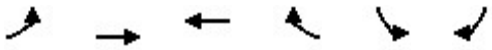
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	575	569	107
Volume Left	53	0	5
Volume Right	0	2	102
cSH	1013	1700	469
Volume to Capacity	0.05	0.33	0.23
Queue Length 95th (m)	1.3	0.0	6.6
Control Delay (s)	1.4	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	1.4	0.0	14.9
Approach LOS			B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	73	3	1	492	318	44
Future Volume (Veh/h)	73	3	1	492	318	44
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)	79	3	1	535	346	48
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	883	346	394			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	883	346	394			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	100	100			
cM capacity (veh/h)	319	702	1176			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	82	536	346	48
Volume Left	79	1	0	0
Volume Right	3	0	0	48
cSH	325	1176	1700	1700
Volume to Capacity	0.25	0.00	0.20	0.03
Queue Length 95th (m)	7.4	0.0	0.0	0.0
Control Delay (s)	19.8	0.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.8	0.0	0.0	
Approach LOS	C			

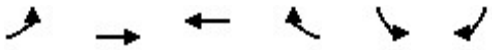
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	70	43	2	7	7
Future Volume (Veh/h)	3	70	43	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	76	47	2	8	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	49				130	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49				130	48
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				99	99
cM capacity (veh/h)	1571				867	1027

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	79	49	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1571	1700	940
Volume to Capacity	0.00	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.3	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	70	658	764	2	2	124
Future Volume (Veh/h)	70	658	764	2	2	124
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	715	830	2	2	135
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.80	
vC, conflicting volume	832				1698	831
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	832				1748	831
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				97	64
cM capacity (veh/h)	801				69	371

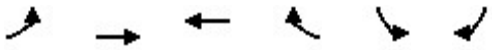
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	791	832	137
Volume Left	76	0	2
Volume Right	0	2	135
cSH	801	1700	349
Volume to Capacity	0.09	0.49	0.39
Queue Length 95th (m)	2.4	0.0	13.8
Control Delay (s)	2.4	0.0	21.8
Lane LOS	A		C
Approach Delay (s)	2.4	0.0	21.8
Approach LOS			C

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	2	1	332	498	89
Future Volume (Veh/h)	57	2	1	332	498	89
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)	62	2	1	361	541	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	904	541	638			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	881	503	604			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	100	100			
cM capacity (veh/h)	303	551	946			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	64	362	541	97
Volume Left	62	1	0	0
Volume Right	2	0	0	97
cSH	307	946	1700	1700
Volume to Capacity	0.21	0.00	0.32	0.06
Queue Length 95th (m)	5.9	0.0	0.0	0.0
Control Delay (s)	19.8	0.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.8	0.0	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		



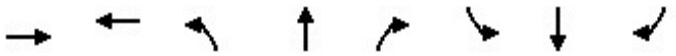
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	52	79	6	4	4
Future Volume (Veh/h)	7	52	79	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	57	86	7	4	4
Pedestrians						
Lane Width (m)						
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	93				162	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	93				162	90
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	100
cM capacity (veh/h)	1514				829	974

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	65	93	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1514	1700	895
Volume to Capacity	0.01	0.05	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.9	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.9	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	153	150	78	59	200	65	83	252	50	96	175
v/c Ratio	0.27	0.17	0.09	0.09	0.22	0.08	0.31	0.64	0.24	0.27	0.40
Control Delay	10.6	9.1	2.9	8.9	9.5	3.1	24.0	27.4	23.1	22.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	9.1	2.9	8.9	9.5	3.1	24.0	27.4	23.1	22.5	6.6
Queue Length 50th (m)	8.7	8.0	0.0	3.0	11.0	0.0	8.4	23.3	4.9	9.6	0.0
Queue Length 95th (m)	23.0	20.2	5.8	9.7	26.4	5.3	18.5	43.3	12.8	20.0	12.5
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	572	889	836	635	889	799	561	788	446	748	729
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.17	0.09	0.09	0.22	0.08	0.15	0.32	0.11	0.13	0.24

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	44	141	1	443	84	32	548	21
v/c Ratio	0.15	0.60	0.00	0.37	0.08	0.07	0.45	0.16
Control Delay	21.6	33.8	6.0	7.9	2.0	6.8	8.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	33.8	6.0	7.9	2.0	6.8	8.9	2.6
Queue Length 50th (m)	4.1	14.8	0.1	24.6	0.0	1.4	33.3	0.0
Queue Length 95th (m)	11.5	31.3	0.6	53.5	5.1	5.6	71.2	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	528	423	525	1211	998	461	1211	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.33	0.00	0.37	0.08	0.07	0.45	0.16

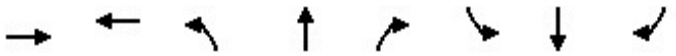
Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	432	97	573	28	212	1	21
v/c Ratio	0.45	0.19	0.57	0.12	0.57	0.01	0.10
Control Delay	9.7	8.5	11.8	24.7	11.4	26.0	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.5	11.8	24.7	11.4	26.0	15.7
Queue Length 50th (m)	17.7	3.3	26.8	2.5	0.6	0.1	0.3
Queue Length 95th (m)	66.7	16.8	98.4	9.9	17.9	1.5	6.4
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	964	511	1003	669	678	333	589
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.19	0.57	0.04	0.31	0.00	0.04

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	239	273	38	35	288	110	68	196	73	114	280
v/c Ratio	0.42	0.28	0.05	0.06	0.30	0.13	0.30	0.57	0.35	0.34	0.55
Control Delay	11.7	8.7	1.5	7.6	9.0	2.4	25.0	26.3	26.7	24.3	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	8.7	1.5	7.6	9.0	2.4	25.0	26.3	26.7	24.3	7.7
Queue Length 50th (m)	13.9	14.3	0.0	1.6	15.3	0.0	6.8	17.6	7.3	11.4	0.0
Queue Length 95th (m)	34.3	31.2	2.4	5.8	33.2	6.1	16.2	34.8	17.4	23.4	16.0
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	564	978	790	561	959	838	547	798	501	822	838
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.28	0.05	0.06	0.30	0.13	0.12	0.25	0.15	0.14	0.33

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	26	118	3	495	61	32	332	10
v/c Ratio	0.12	0.53	0.01	0.41	0.06	0.08	0.29	0.08
Control Delay	24.7	30.0	5.3	7.5	2.0	6.2	6.4	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	30.0	5.3	7.5	2.0	6.2	6.4	1.1
Queue Length 50th (m)	2.8	11.0	0.1	26.0	0.0	1.3	15.5	0.0
Queue Length 95th (m)	8.8	25.5	1.1	55.9	3.9	5.2	34.6	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	459	437	529	1209	947	380	1164	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.27	0.01	0.41	0.06	0.08	0.29	0.08

Intersection Summary

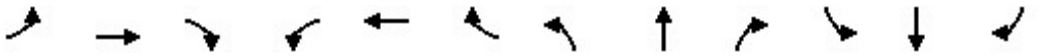
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	574	135	735	33	320	2	30
v/c Ratio	0.56	0.30	0.69	0.14	0.69	0.01	0.15
Control Delay	12.9	11.4	16.3	30.4	13.1	33.5	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	11.4	16.3	30.4	13.1	33.5	19.6
Queue Length 50th (m)	26.2	5.0	38.7	3.5	1.1	0.2	0.7
Queue Length 95th (m)	102.6	26.0	#166.4	12.0	23.8	2.3	8.9
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	1022	456	1069	482	638	482	465
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.30	0.69	0.07	0.50	0.00	0.06

Intersection Summary

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

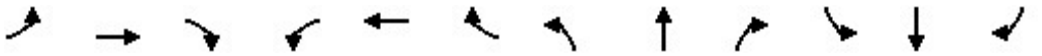
Appendix E

Future (2031) Background Intersection Operation Calculations (Synchro)



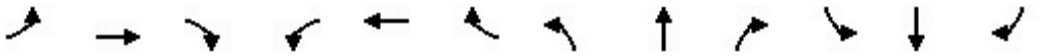
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	152	79	60	203	66	84	171	85	51	97	194
Future Volume (vph)	172	152	79	60	203	66	84	171	85	51	97	194
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1654		1601	1609	1367
Flt Permitted	0.62	1.00	1.00	0.65	1.00	1.00	0.69	1.00		0.52	1.00	1.00
Satd. Flow (perm)	1035	1638	1475	1155	1638	1419	1196	1654		874	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	165	86	65	221	72	91	186	92	55	105	211
RTOR Reduction (vph)	0	0	40	0	0	33	0	27	0	0	0	162
Lane Group Flow (vph)	187	165	46	65	221	39	91	251	0	55	105	49
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.2	35.2	35.2	35.2	35.2	35.2	15.3	15.3		15.3	15.3	15.3
Effective Green, g (s)	35.2	35.2	35.2	35.2	35.2	35.2	15.3	15.3		15.3	15.3	15.3
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53	0.53	0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	876	789	617	876	759	278	384		203	374	317
v/s Ratio Prot		0.10			0.13			c0.15			0.07	
v/s Ratio Perm	c0.18		0.03	0.06		0.03	0.08			0.06		0.04
v/c Ratio	0.34	0.19	0.06	0.11	0.25	0.05	0.33	0.65		0.27	0.28	0.15
Uniform Delay, d1	8.7	7.9	7.3	7.5	8.2	7.3	21.0	22.9		20.7	20.7	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	0.5	0.1	0.3	0.7	0.1	0.7	4.0		0.7	0.4	0.2
Delay (s)	10.3	8.4	7.5	7.9	8.9	7.4	21.7	26.8		21.4	21.1	20.3
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		9.0			8.4			25.6			20.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	15.3
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	18	7	105	18	51	1	450	101	48	557	21
Future Volume (vph)	18	18	7	105	18	51	1	450	101	48	557	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1694			1404		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.79		0.36	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)		1481			1139		637	1735	1393	589	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	20	8	114	20	55	1	489	110	52	605	23
RTOR Reduction (vph)	0	6	0	0	20	0	0	0	43	0	0	23
Lane Group Flow (vph)	0	42	0	0	169	0	1	489	67	52	605	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		16.3			16.3		45.2	45.2	45.2	45.2	45.2	0.0
Effective Green, g (s)		16.3			16.3		45.2	45.2	45.2	45.2	45.2	0.0
Actuated g/C Ratio		0.22			0.22		0.61	0.61	0.61	0.61	0.61	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		324			249		386	1052	845	357	1052	0
v/s Ratio Prot								0.28			c0.35	
v/s Ratio Perm		0.03			c0.15		0.00		0.05	0.09		
v/c Ratio		0.13			0.68		0.00	0.46	0.08	0.15	0.58	0.00
Uniform Delay, d1		23.4			26.7		5.8	8.0	6.1	6.3	8.8	37.2
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			7.4		0.0	1.5	0.2	0.9	2.3	0.0
Delay (s)		23.6			34.2		5.8	9.5	6.2	7.2	11.1	37.2
Level of Service		C			C		A	A	A	A	B	D
Approach Delay (s)		23.6			34.2			8.9			11.7	
Approach LOS		C			C			A			B	

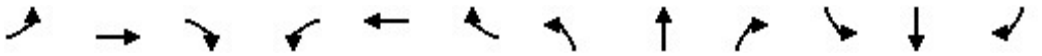
Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	391	51	99	596	1	29	6	208	1	4	18
Future Volume (vph)	12	391	51	99	596	1	29	6	208	1	4	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1599		1541	1638		1681	1395		840	1463	
Flt Permitted		0.98		0.47	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1570		761	1638		1681	1395		840	1463	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	425	55	108	648	1	32	7	226	1	4	20
RTOR Reduction (vph)	0	3	0	0	0	0	0	196	0	0	19	0
Lane Group Flow (vph)	0	490	0	108	649	0	32	37	0	1	5	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		37.0		37.0	37.0		8.9	8.9		2.8	2.8	
Effective Green, g (s)		37.0		37.0	37.0		8.9	8.9		2.8	2.8	
Actuated g/C Ratio		0.55		0.55	0.55		0.13	0.13		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		863		418	900		222	184		34	60	
v/s Ratio Prot					c0.40		0.02	c0.03		0.00	c0.00	
v/s Ratio Perm		0.31		0.14								
v/c Ratio		0.57		0.26	0.72		0.14	0.20		0.03	0.08	
Uniform Delay, d1		9.9		8.0	11.3		25.8	26.0		30.9	31.0	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.7		1.5	5.0		0.2	0.4		0.3	0.4	
Delay (s)		12.6		9.4	16.3		26.0	26.4		31.2	31.4	
Level of Service		B		A	B		C	C		C	C	
Approach Delay (s)		12.6			15.3			26.4			31.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

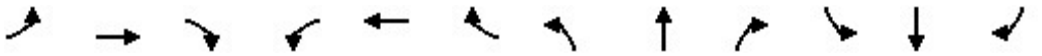
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	243	277	39	35	292	112	69	145	55	74	116	285
Future Volume (vph)	243	277	39	35	292	112	69	145	55	74	116	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1638		1571	1718	1446
Flt Permitted	0.57	1.00	1.00	0.58	1.00	1.00	0.68	1.00		0.62	1.00	1.00
Satd. Flow (perm)	985	1752	1367	981	1718	1414	1129	1638		1028	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	301	42	38	317	122	75	158	60	80	126	310
RTOR Reduction (vph)	0	0	19	0	0	55	0	21	0	0	0	246
Lane Group Flow (vph)	264	301	23	38	317	67	75	197	0	80	126	64
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.1	13.1		13.1	13.1	13.1
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.1	13.1		13.1	13.1	13.1
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	544	968	755	542	949	781	232	337		212	354	298
v/s Ratio Prot		0.17			0.18			c0.12			0.07	
v/s Ratio Perm	c0.27		0.02	0.04		0.05	0.07			0.08		0.04
v/c Ratio	0.49	0.31	0.03	0.07	0.33	0.09	0.32	0.58		0.38	0.36	0.21
Uniform Delay, d1	8.7	7.7	6.5	6.6	7.8	6.7	21.4	22.7		21.7	21.6	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.1	0.8	0.1	0.3	0.9	0.2	0.8	2.6		1.1	0.6	0.4
Delay (s)	11.8	8.5	6.5	6.9	8.7	6.9	22.2	25.3		22.8	22.2	21.3
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		9.8			8.1			24.5			21.8	
Approach LOS		A			A			C			C	

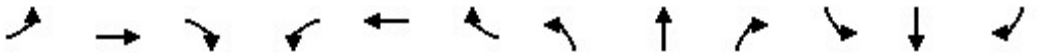
Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	15.3
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1	1	62	22	35	4	502	62	32	337	10
Future Volume (vph)	24	1	1	62	22	35	4	502	62	32	337	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1390		1264	1701	1308	1092	1638	1504
Flt Permitted		0.70			0.82		0.54	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)		1237			1172		723	1701	1308	494	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1	1	67	24	38	4	546	67	35	366	11
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	22	0	0	11
Lane Group Flow (vph)	0	27	0	0	107	0	4	546	45	35	366	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		10.4			10.4		48.2	48.2	48.2	48.2	48.2	0.0
Effective Green, g (s)		10.4			10.4		48.2	48.2	48.2	48.2	48.2	0.0
Actuated g/C Ratio		0.15			0.15		0.67	0.67	0.67	0.67	0.67	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		179			170		486	1145	880	332	1102	0
v/s Ratio Prot								c0.32			0.22	
v/s Ratio Perm		0.02			c0.09		0.01		0.03	0.07		
v/c Ratio		0.15			0.63		0.01	0.48	0.05	0.11	0.33	0.00
Uniform Delay, d1		26.7			28.8		3.8	5.6	4.0	4.1	4.9	35.8
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4			7.1		0.0	1.4	0.1	0.6	0.8	0.0
Delay (s)		27.1			35.8		3.9	7.1	4.1	4.8	5.7	35.8
Level of Service		C			D		A	A	A	A	A	D
Approach Delay (s)		27.1			35.8			6.7			6.5	
Approach LOS		C			D			A			A	

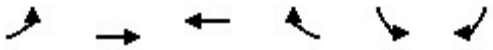
Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	487	84	137	746	0	33	10	314	2	6	23
Future Volume (vph)	12	487	84	137	746	0	33	10	314	2	6	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1680		1647	1735		1681	1456		1681	1562	
Flt Permitted		0.98		0.40	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1650		687	1735		1681	1456		1681	1562	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	529	91	149	811	0	36	11	341	2	7	25
RTOR Reduction (vph)	0	4	0	0	0	0	0	296	0	0	24	0
Lane Group Flow (vph)	0	629	0	149	811	0	36	56	0	2	8	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		43.8		43.8	43.8		9.9	9.9		2.8	2.8	
Effective Green, g (s)		43.8		43.8	43.8		9.9	9.9		2.8	2.8	
Actuated g/C Ratio		0.58		0.58	0.58		0.13	0.13		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		962		400	1011		221	191		62	58	
v/s Ratio Prot					c0.47		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.38		0.22								
v/c Ratio		0.65		0.37	0.80		0.16	0.29		0.03	0.14	
Uniform Delay, d1		10.5		8.3	12.3		28.9	29.4		34.8	35.0	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5		2.6	6.7		0.3	0.6		0.2	0.8	
Delay (s)		14.0		11.0	19.0		29.2	30.1		35.0	35.8	
Level of Service		B		B	B		C	C		C	D	
Approach Delay (s)		14.0			17.7			30.0			35.7	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	546	593	2	6	104
Future Volume (Veh/h)	54	546	593	2	6	104
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	593	645	2	7	113
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.82	
vC, conflicting volume	647				1357	646
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	647				1325	646
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	94				94	76
cM capacity (veh/h)	948				118	466

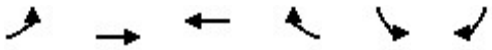
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	652	647	120
Volume Left	59	0	7
Volume Right	0	2	113
cSH	948	1700	398
Volume to Capacity	0.06	0.38	0.30
Queue Length 95th (m)	1.5	0.0	9.5
Control Delay (s)	1.6	0.0	17.9
Lane LOS	A		C
Approach Delay (s)	1.6	0.0	17.9
Approach LOS			C

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	81	3	1	560	367	48
Future Volume (Veh/h)	81	3	1	560	367	48
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)	88	3	1	609	399	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	1010	399	451			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1010	399	451			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	67	100	100			
cM capacity (veh/h)	268	655	1120			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	91	610	399	52
Volume Left	88	1	0	0
Volume Right	3	0	0	52
cSH	273	1120	1700	1700
Volume to Capacity	0.33	0.00	0.23	0.03
Queue Length 95th (m)	10.7	0.0	0.0	0.0
Control Delay (s)	24.6	0.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	24.6	0.0	0.0	
Approach LOS	C			

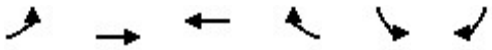
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	77	48	2	7	7
Future Volume (Veh/h)	3	77	48	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	84	52	2	8	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	54				143	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	54				143	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				99	99
cM capacity (veh/h)	1564				853	1020

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	87	54	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1564	1700	929
Volume to Capacity	0.00	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.3	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	727	844	2	2	137
Future Volume (Veh/h)	77	727	844	2	2	137
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	790	917	2	2	149
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.76	
vC, conflicting volume	919				1876	918
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	919				1994	918
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				96	55
cM capacity (veh/h)	743				45	331

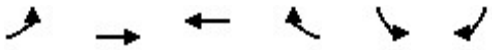
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	874	919	151
Volume Left	84	0	2
Volume Right	0	2	149
cSH	743	1700	305
Volume to Capacity	0.11	0.54	0.49
Queue Length 95th (m)	2.9	0.0	19.7
Control Delay (s)	3.0	0.0	27.8
Lane LOS	A		D
Approach Delay (s)	3.0	0.0	27.8
Approach LOS			D

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	2	1	367	550	98
Future Volume (Veh/h)	63	2	1	367	550	98
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)	68	2	1	399	598	107
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	999	598	705			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	971	547	660			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	100	100			
cM capacity (veh/h)	263	512	888			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	70	400	598	107
Volume Left	68	1	0	0
Volume Right	2	0	0	107
cSH	267	888	1700	1700
Volume to Capacity	0.26	0.00	0.35	0.06
Queue Length 95th (m)	7.8	0.0	0.0	0.0
Control Delay (s)	23.2	0.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.2	0.0	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		



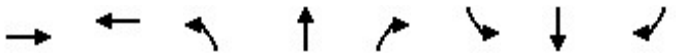
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	57	88	6	4	4
Future Volume (Veh/h)	7	57	88	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	62	96	7	4	4
Pedestrians						
Lane Width (m)						
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	103				178	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	103				178	100
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	100
cM capacity (veh/h)	1502				812	962

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	103	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1502	1700	881
Volume to Capacity	0.01	0.06	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.9	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.9	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	187	165	86	65	221	72	91	278	55	105	211
v/c Ratio	0.34	0.19	0.10	0.11	0.25	0.09	0.33	0.68	0.27	0.28	0.44
Control Delay	12.2	9.8	3.0	9.6	10.3	3.2	23.8	28.6	23.7	22.2	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	9.8	3.0	9.6	10.3	3.2	23.8	28.6	23.7	22.2	6.4
Queue Length 50th (m)	11.6	9.3	0.0	3.5	13.0	0.0	9.2	26.8	5.5	10.5	0.0
Queue Length 95th (m)	30.3	23.3	6.4	11.1	30.7	5.9	20.0	48.1	13.8	21.5	13.3
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	552	875	827	616	875	791	547	775	400	736	740
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.19	0.10	0.11	0.25	0.09	0.17	0.36	0.14	0.14	0.29

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	48	189	1	489	110	52	605	23
v/c Ratio	0.15	0.71	0.00	0.47	0.12	0.15	0.58	0.18
Control Delay	20.5	37.6	8.0	11.0	2.3	9.4	12.9	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	37.6	8.0	11.0	2.3	9.4	12.9	2.9
Queue Length 50th (m)	4.5	21.2	0.1	33.0	0.0	2.7	44.9	0.0
Queue Length 95th (m)	12.2	41.4	0.8	71.4	6.7	9.9	96.8	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	503	400	385	1051	887	356	1051	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.47	0.00	0.47	0.12	0.15	0.58	0.18

Intersection Summary

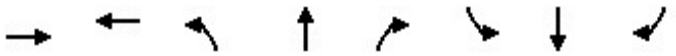
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	493	108	649	32	233	1	24
v/c Ratio	0.54	0.24	0.68	0.14	0.60	0.01	0.12
Control Delay	12.9	11.1	16.9	27.0	12.0	29.0	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	11.1	16.9	27.0	12.0	29.0	16.9
Queue Length 50th (m)	21.5	3.8	32.7	2.9	0.6	0.1	0.4
Queue Length 95th (m)	81.3	19.5	#136.2	10.8	18.6	1.4	6.9
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	916	443	954	644	674	322	573
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.24	0.68	0.05	0.35	0.00	0.04

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	301	42	38	317	122	75	218	80	126	310
v/c Ratio	0.49	0.31	0.05	0.07	0.33	0.15	0.32	0.61	0.38	0.36	0.57
Control Delay	13.4	9.4	1.9	8.1	9.7	2.4	25.1	27.4	26.9	24.3	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	9.4	1.9	8.1	9.7	2.4	25.1	27.4	26.9	24.3	7.5
Queue Length 50th (m)	16.6	16.7	0.0	1.8	17.9	0.0	7.5	20.2	8.1	12.7	0.0
Queue Length 95th (m)	41.3	36.1	2.9	6.5	38.6	6.8	17.5	38.8	18.8	25.4	16.6
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	543	967	781	542	948	835	533	789	487	813	847
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.31	0.05	0.07	0.33	0.15	0.14	0.28	0.16	0.15	0.37

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	28	129	4	546	67	35	366	11
v/c Ratio	0.13	0.56	0.01	0.45	0.07	0.10	0.32	0.08
Control Delay	24.7	31.1	5.8	8.4	2.0	6.8	7.0	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	31.1	5.8	8.4	2.0	6.8	7.0	1.3
Queue Length 50th (m)	3.0	12.4	0.2	31.1	0.0	1.5	18.2	0.0
Queue Length 95th (m)	9.2	27.8	1.3	67.3	4.3	6.0	40.6	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	441	433	509	1201	943	348	1156	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.30	0.01	0.45	0.07	0.10	0.32	0.08

Intersection Summary

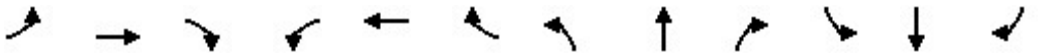
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	633	149	811	36	352	2	32
v/c Ratio	0.62	0.35	0.76	0.15	0.71	0.01	0.16
Control Delay	14.5	12.8	19.3	30.4	13.2	33.5	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.5	12.8	19.3	30.4	13.2	33.5	19.2
Queue Length 50th (m)	30.6	5.8	46.5	3.9	1.2	0.2	0.7
Queue Length 95th (m)	123.3	31.0	#197.6	12.8	25.3	2.3	9.2
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	1019	422	1067	481	659	481	464
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.35	0.76	0.07	0.53	0.00	0.07

Intersection Summary

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

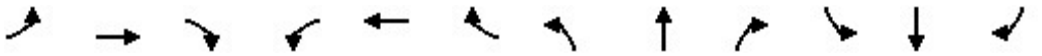
Appendix F

Future (2036) Background Intersection Operation Calculations (Synchro)



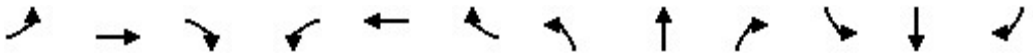
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	186	168	87	66	238	90	93	188	94	56	107	196
Future Volume (vph)	186	168	87	66	238	90	93	188	94	56	107	196
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1653		1601	1609	1367
Flt Permitted	0.60	1.00	1.00	0.64	1.00	1.00	0.68	1.00		0.47	1.00	1.00
Satd. Flow (perm)	1000	1638	1475	1136	1638	1419	1184	1653		794	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	183	95	72	259	98	101	204	102	61	116	213
RTOR Reduction (vph)	0	0	45	0	0	46	0	27	0	0	0	161
Lane Group Flow (vph)	202	183	50	72	259	52	101	279	0	61	116	52
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.2	35.2	35.2	35.2	35.2	35.2	16.4	16.4		16.4	16.4	16.4
Effective Green, g (s)	35.2	35.2	35.2	35.2	35.2	35.2	16.4	16.4		16.4	16.4	16.4
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53	0.53	0.25	0.25		0.25	0.25	0.25
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	526	861	776	597	861	746	290	405		194	394	335
v/s Ratio Prot		0.11			0.16			c0.17			0.07	
v/s Ratio Perm	c0.20		0.03	0.06		0.04	0.09			0.08		0.04
v/c Ratio	0.38	0.21	0.06	0.12	0.30	0.07	0.35	0.69		0.31	0.29	0.16
Uniform Delay, d1	9.4	8.5	7.8	8.0	8.9	7.8	20.8	22.9		20.7	20.5	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.1	0.6	0.2	0.4	0.9	0.2	0.7	4.8		0.9	0.4	0.2
Delay (s)	11.5	9.0	7.9	8.4	9.8	8.0	21.6	27.8		21.6	21.0	20.0
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		9.9			9.2			26.2			20.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	20	8	98	20	39	1	510	111	49	614	23
Future Volume (vph)	20	20	8	98	20	39	1	510	111	49	614	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1694			1441		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.78		0.32	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)		1480			1156		571	1735	1393	532	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	22	9	107	22	42	1	554	121	53	667	25
RTOR Reduction (vph)	0	7	0	0	16	0	0	0	47	0	0	25
Lane Group Flow (vph)	0	46	0	0	155	0	1	554	74	53	667	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.4			15.4		45.2	45.2	45.2	45.2	45.2	0.0
Effective Green, g (s)		15.4			15.4		45.2	45.2	45.2	45.2	45.2	0.0
Actuated g/C Ratio		0.21			0.21		0.61	0.61	0.61	0.61	0.61	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		309			241		350	1065	855	326	1065	0
v/s Ratio Prot								0.32			c0.38	
v/s Ratio Perm		0.03			c0.13		0.00		0.05	0.10		
v/c Ratio		0.15			0.64		0.00	0.52	0.09	0.16	0.63	0.00
Uniform Delay, d1		23.7			26.6		5.5	8.1	5.8	6.1	8.9	36.8
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			5.8		0.0	1.8	0.2	1.1	2.8	0.0
Delay (s)		24.0			32.4		5.5	9.9	6.0	7.2	11.7	36.8
Level of Service		C			C		A	A	A	A	B	D
Approach Delay (s)		24.0			32.4			9.2			12.2	
Approach LOS		C			C			A			B	

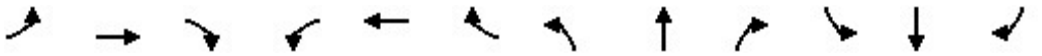
Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	428	57	109	654	1	32	7	230	1	4	20
Future Volume (vph)	13	428	57	109	654	1	32	7	230	1	4	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1599		1541	1638		1681	1395		840	1458	
Flt Permitted		0.98		0.44	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1566		713	1638		1681	1395		840	1458	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	465	62	118	711	1	35	8	250	1	4	22
RTOR Reduction (vph)	0	3	0	0	0	0	0	216	0	0	21	0
Lane Group Flow (vph)	0	538	0	118	712	0	35	42	0	1	5	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		36.5		36.5	36.5		9.1	9.1		2.8	2.8	
Effective Green, g (s)		36.5		36.5	36.5		9.1	9.1		2.8	2.8	
Actuated g/C Ratio		0.54		0.54	0.54		0.14	0.14		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		853		388	892		228	189		35	60	
v/s Ratio Prot					c0.43		0.02	c0.03		0.00	c0.00	
v/s Ratio Perm		0.34		0.17								
v/c Ratio		0.63		0.30	0.80		0.15	0.22		0.03	0.08	
Uniform Delay, d1		10.6		8.3	12.3		25.6	25.8		30.8	30.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5		2.0	7.4		0.2	0.4		0.2	0.4	
Delay (s)		14.1		10.3	19.7		25.8	26.2		31.0	31.3	
Level of Service		B		B	B		C	C		C	C	
Approach Delay (s)		14.1			18.3			26.2			31.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

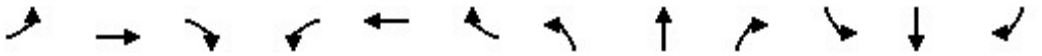
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	306	43	39	323	123	76	160	61	82	128	315
Future Volume (vph)	268	306	43	39	323	123	76	160	61	82	128	315
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1638		1571	1718	1446
Flt Permitted	0.55	1.00	1.00	0.56	1.00	1.00	0.67	1.00		0.59	1.00	1.00
Satd. Flow (perm)	955	1752	1367	953	1718	1414	1116	1638		983	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	291	333	47	42	351	134	83	174	66	89	139	342
RTOR Reduction (vph)	0	0	21	0	0	61	0	21	0	0	0	267
Lane Group Flow (vph)	291	333	26	42	351	73	83	219	0	89	139	75
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.1	14.1		14.1	14.1	14.1
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.1	14.1		14.1	14.1	14.1
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.22	0.22		0.22	0.22	0.22
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	519	953	743	518	934	769	243	358		214	375	316
v/s Ratio Prot		0.19			0.20			c0.13			0.08	
v/s Ratio Perm	c0.30		0.02	0.04		0.05	0.07			0.09		0.05
v/c Ratio	0.56	0.35	0.03	0.08	0.38	0.09	0.34	0.61		0.42	0.37	0.24
Uniform Delay, d1	9.6	8.3	6.8	7.0	8.4	7.1	21.3	22.7		21.7	21.4	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.3	1.0	0.1	0.3	1.2	0.2	0.8	3.1		1.3	0.6	0.4
Delay (s)	14.0	9.3	6.9	7.3	9.6	7.3	22.1	25.8		23.0	22.0	21.2
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		11.2			8.8			24.9			21.7	
Approach LOS		B			A			C			C	

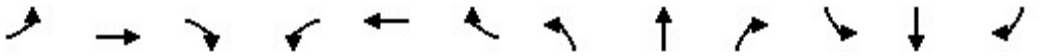
Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	15.3
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	1	1	69	24	39	4	553	69	35	371	11
Future Volume (vph)	27	1	1	69	24	39	4	553	69	35	371	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1390		1264	1701	1308	1092	1638	1504
Flt Permitted		0.73			0.82		0.52	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)		1291			1168		690	1701	1308	435	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1	1	75	26	42	4	601	75	38	403	12
RTOR Reduction (vph)	0	1	0	0	21	0	0	0	27	0	0	12
Lane Group Flow (vph)	0	30	0	0	122	0	4	601	48	38	403	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		13.3			13.3		46.2	46.2	46.2	46.2	46.2	0.0
Effective Green, g (s)		13.3			13.3		46.2	46.2	46.2	46.2	46.2	0.0
Actuated g/C Ratio		0.18			0.18		0.64	0.64	0.64	0.64	0.64	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		236			214		439	1083	833	277	1043	0
v/s Ratio Prot								c0.35			0.25	
v/s Ratio Perm		0.02			c0.10		0.01		0.04	0.09		
v/c Ratio		0.13			0.57		0.01	0.55	0.06	0.14	0.39	0.00
Uniform Delay, d1		24.8			27.0		4.8	7.4	5.0	5.2	6.3	36.2
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			3.4		0.0	2.1	0.1	1.0	1.1	0.0
Delay (s)		25.0			30.4		4.8	9.4	5.1	6.3	7.4	36.2
Level of Service		C			C		A	A	A	A	A	D
Approach Delay (s)		25.0			30.4			8.9			8.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	537	93	151	824	0	36	11	347	3	7	26
Future Volume (vph)	13	537	93	151	824	0	36	11	347	3	7	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1680		1647	1735		1681	1456		1681	1563	
Flt Permitted		0.90		0.36	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1510		621	1735		1681	1456		1681	1563	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	584	101	164	896	0	39	12	377	3	8	28
RTOR Reduction (vph)	0	4	0	0	0	0	0	327	0	0	26	0
Lane Group Flow (vph)	0	695	0	164	896	0	39	62	0	3	10	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		43.7		43.7	43.7		10.2	10.2		4.4	4.4	
Effective Green, g (s)		43.7		43.7	43.7		10.2	10.2		4.4	4.4	
Actuated g/C Ratio		0.57		0.57	0.57		0.13	0.13		0.06	0.06	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		858		352	985		222	193		96	89	
v/s Ratio Prot					c0.52		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.46		0.26								
v/c Ratio		0.81		0.47	0.91		0.18	0.32		0.03	0.11	
Uniform Delay, d1		13.3		9.7	14.8		29.6	30.2		34.2	34.4	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.1		4.4	13.7		0.3	0.7		0.1	0.4	
Delay (s)		21.4		14.1	28.6		29.9	30.9		34.3	34.8	
Level of Service		C		B	C		C	C		C	C	
Approach Delay (s)		21.4			26.3			30.8			34.7	
Approach LOS		C			C			C			C	

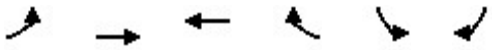
Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	537	93	151	824	0	36	11	347	3	7	26
Future Volume (vph)	13	537	93	151	824	0	36	11	347	3	7	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1680		1647	1735		1681	1456		1681	1563	
Flt Permitted		0.98		0.37	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1645		650	1735		1681	1456		1681	1563	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	584	101	164	896	0	39	12	377	3	8	28
RTOR Reduction (vph)	0	4	0	0	0	0	0	335	0	0	27	0
Lane Group Flow (vph)	0	695	0	164	896	0	39	54	0	3	9	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		62.1		62.1	62.1		10.7	10.7		4.5	4.5	
Effective Green, g (s)		62.1		62.1	62.1		10.7	10.7		4.5	4.5	
Actuated g/C Ratio		0.65		0.65	0.65		0.11	0.11		0.05	0.05	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		1065		420	1123		187	162		78	73	
v/s Ratio Prot					c0.52		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.42		0.25								
v/c Ratio		0.65		0.39	0.80		0.21	0.33		0.04	0.13	
Uniform Delay, d1		10.3		8.0	12.3		38.7	39.3		43.6	43.8	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.1		2.7	5.9		0.4	0.9		0.1	0.6	
Delay (s)		13.4		10.7	18.3		39.2	40.2		43.8	44.4	
Level of Service		B		B	B		D	D		D	D	
Approach Delay (s)		13.4			17.1			40.1			44.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	599	651	2	6	114
Future Volume (Veh/h)	60	599	651	2	6	114
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	651	708	2	7	124
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.78	
vC, conflicting volume	710				1490	709
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	710				1487	709
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	93				92	71
cM capacity (veh/h)	899				88	429

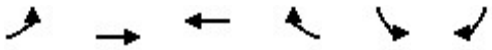
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	716	710	131
Volume Left	65	0	7
Volume Right	0	2	124
cSH	899	1700	356
Volume to Capacity	0.07	0.42	0.37
Queue Length 95th (m)	1.8	0.0	12.5
Control Delay (s)	1.8	0.0	20.9
Lane LOS	A		C
Approach Delay (s)	1.8	0.0	20.9
Approach LOS			C

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	88	3	1	631	388	53
Future Volume (Veh/h)	88	3	1	631	388	53
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)	96	3	1	686	422	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	1110	422	480			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1110	422	480			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	100	100			
cM capacity (veh/h)	234	636	1093			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	99	687	422	58
Volume Left	96	1	0	0
Volume Right	3	0	0	58
cSH	238	1093	1700	1700
Volume to Capacity	0.42	0.00	0.25	0.03
Queue Length 95th (m)	14.6	0.0	0.0	0.0
Control Delay (s)	30.5	0.0	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	30.5	0.0	0.0	
Approach LOS	D			

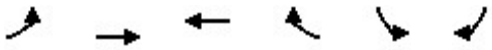
Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	85	52	2	7	7
Future Volume (Veh/h)	3	85	52	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	92	57	2	8	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	59				156	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	59				156	58
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				99	99
cM capacity (veh/h)	1558				838	1014

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	95	59	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1558	1700	918
Volume to Capacity	0.00	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.2	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	84	802	931	2	3	151
Future Volume (Veh/h)	84	802	931	2	3	151
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	91	872	1012	2	3	164
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.70	
vC, conflicting volume	1014				2067	1013
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1014				2306	1013
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				89	44
cM capacity (veh/h)	684				26	291

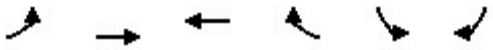
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	963	1014	167
Volume Left	91	0	3
Volume Right	0	2	164
cSH	684	1700	246
Volume to Capacity	0.13	0.60	0.68
Queue Length 95th (m)	3.5	0.0	33.3
Control Delay (s)	3.8	0.0	45.7
Lane LOS	A		E
Approach Delay (s)	3.8	0.0	45.7
Approach LOS			E

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	124.5%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	69	2	1	405	607	107
Future Volume (Veh/h)	69	2	1	405	607	107
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)	75	2	1	440	660	116
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.92	0.92	0.92			
vC, conflicting volume	1102	660	776			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1066	585	711			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	100	100			
cM capacity (veh/h)	224	472	824			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	77	441	660	116
Volume Left	75	1	0	0
Volume Right	2	0	0	116
cSH	227	824	1700	1700
Volume to Capacity	0.34	0.00	0.39	0.07
Queue Length 95th (m)	10.9	0.0	0.0	0.0
Control Delay (s)	28.8	0.0	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	28.8	0.0	0.0	
Approach LOS	D			

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		



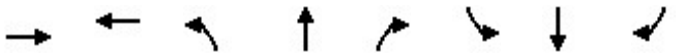
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	63	97	6	4	4
Future Volume (Veh/h)	7	63	97	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	68	105	7	4	4
Pedestrians						
Lane Width (m)						
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	112				192	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112				192	108
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	100
cM capacity (veh/h)	1490				797	951

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	76	112	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1490	1700	867
Volume to Capacity	0.01	0.07	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.8	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.8	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		19.9%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	202	183	95	72	259	98	101	306	61	116	213
v/c Ratio	0.38	0.21	0.12	0.12	0.30	0.12	0.35	0.71	0.31	0.30	0.43
Control Delay	13.7	10.6	3.1	10.4	11.4	3.1	23.8	29.6	24.6	21.9	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	10.6	3.1	10.4	11.4	3.1	23.8	29.6	24.6	21.9	6.1
Queue Length 50th (m)	13.5	11.0	0.0	4.1	16.4	0.0	10.3	30.5	6.2	11.7	0.0
Queue Length 95th (m)	35.4	27.0	7.0	12.7	38.1	7.2	21.7	53.4	15.2	23.2	13.2
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	525	861	820	597	861	792	533	764	357	725	733
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.21	0.12	0.12	0.30	0.12	0.19	0.40	0.17	0.16	0.29

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	53	171	1	554	121	53	667	25
v/c Ratio	0.17	0.67	0.00	0.52	0.13	0.16	0.63	0.19
Control Delay	21.1	36.4	8.0	11.3	2.1	9.2	13.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	36.4	8.0	11.3	2.1	9.2	13.4	3.2
Queue Length 50th (m)	5.0	19.2	0.1	37.3	0.0	2.7	49.6	0.0
Queue Length 95th (m)	13.2	37.9	0.7	81.3	6.7	10.0	108.3	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	510	407	351	1065	902	326	1065	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.42	0.00	0.52	0.13	0.16	0.63	0.19

Intersection Summary

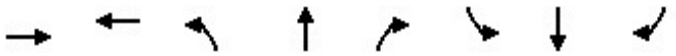
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	541	118	712	35	258	1	26
v/c Ratio	0.60	0.29	0.75	0.15	0.62	0.01	0.13
Control Delay	14.4	12.1	19.9	27.0	12.0	29.0	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	12.1	19.9	27.0	12.0	29.0	16.5
Queue Length 50th (m)	24.8	4.3	38.4	3.1	0.7	0.1	0.4
Queue Length 95th (m)	95.3	22.4	#159.1	11.6	19.7	1.4	7.2
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	908	411	947	649	692	324	576
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.29	0.75	0.05	0.37	0.00	0.05

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	291	333	47	42	351	134	83	240	89	139	342
v/c Ratio	0.56	0.35	0.06	0.08	0.38	0.16	0.34	0.63	0.42	0.37	0.59
Control Delay	16.2	10.5	2.4	8.9	10.8	2.5	24.9	28.0	27.6	24.0	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	10.5	2.4	8.9	10.8	2.5	24.9	28.0	27.6	24.0	7.2
Queue Length 50th (m)	20.2	19.8	0.0	2.1	21.2	0.0	8.4	23.0	9.2	14.2	0.0
Queue Length 95th (m)	52.5	43.5	3.6	7.6	46.7	7.5	18.9	42.4	20.5	27.3	16.9
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	519	952	770	518	934	829	519	778	457	800	856
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.35	0.06	0.08	0.38	0.16	0.16	0.31	0.19	0.17	0.40

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	31	143	4	601	75	38	403	12
v/c Ratio	0.13	0.61	0.01	0.55	0.09	0.14	0.39	0.09
Control Delay	24.3	33.2	6.2	10.6	2.1	8.0	8.4	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	33.2	6.2	10.6	2.1	8.0	8.4	1.4
Queue Length 50th (m)	3.4	14.3	0.2	38.0	0.0	1.7	21.8	0.0
Queue Length 95th (m)	9.7	30.7	1.3	82.3	4.8	6.9	48.4	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	446	420	439	1084	861	277	1044	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.34	0.01	0.55	0.09	0.14	0.39	0.09

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	699	164	896	39	389	3	36
v/c Ratio	0.78	0.45	0.88	0.17	0.74	0.02	0.18
Control Delay	23.0	17.0	28.7	31.7	13.7	34.7	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	17.0	28.7	31.7	13.7	34.7	19.6
Queue Length 50th (m)	77.4	13.5	112.1	5.4	1.6	0.4	1.1
Queue Length 95th (m)	#178.6	38.5	#234.0	13.5	26.5	3.0	9.8
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	891	365	1020	459	672	459	447
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.45	0.88	0.08	0.58	0.01	0.08

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	699	164	896	39	389	3	36
v/c Ratio	0.64	0.38	0.78	0.20	0.78	0.02	0.22
Control Delay	14.8	12.9	19.8	41.4	16.7	44.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	12.9	19.8	41.4	16.7	44.7	24.4
Queue Length 50th (m)	72.1	13.2	112.1	6.9	2.1	0.5	1.4
Queue Length 95th (m)	150.7	36.4	#249.9	16.2	30.8	3.4	11.5
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	1098	432	1155	364	610	364	360
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.38	0.78	0.11	0.64	0.01	0.10

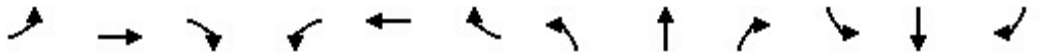
Intersection Summary

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

TRAFFMOBILITY

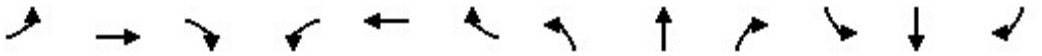
Appendix G

Future (2026) Total Intersection Operation Calculations (Synchro)



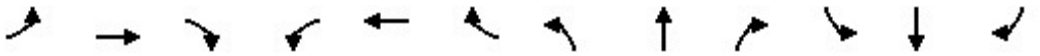
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	138	72	54	184	63	76	156	77	56	91	161
Future Volume (vph)	147	138	72	54	184	63	76	156	77	56	91	161
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1654		1601	1609	1367
Flt Permitted	0.63	1.00	1.00	0.66	1.00	1.00	0.69	1.00		0.57	1.00	1.00
Satd. Flow (perm)	1055	1638	1475	1171	1638	1419	1202	1654		952	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	150	78	59	200	68	83	170	84	61	99	175
RTOR Reduction (vph)	0	0	36	0	0	31	0	27	0	0	0	136
Lane Group Flow (vph)	160	150	42	59	200	37	83	227	0	61	99	39
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.4	14.4		14.4	14.4	14.4
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.4	14.4		14.4	14.4	14.4
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.22	0.22		0.22	0.22	0.22
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	571	887	798	634	887	768	267	367		211	357	303
v/s Ratio Prot		0.09			0.12			c0.14			0.06	
v/s Ratio Perm	c0.15		0.03	0.05		0.03	0.07			0.06		0.03
v/c Ratio	0.28	0.17	0.05	0.09	0.23	0.05	0.31	0.62		0.29	0.28	0.13
Uniform Delay, d1	8.0	7.5	7.0	7.2	7.8	7.0	21.1	22.7		20.9	20.9	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	0.4	0.1	0.3	0.6	0.1	0.7	3.1		0.8	0.4	0.2
Delay (s)	9.2	7.9	7.1	7.5	8.3	7.1	21.7	25.8		21.7	21.3	20.4
Level of Service	A	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		8.3			7.9			24.8			20.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	15.3
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	17	7	81	17	32	1	431	77	29	511	19
Future Volume (vph)	17	17	7	81	17	32	1	431	77	29	511	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1691			1439		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.78		0.42	1.00	1.00	0.48	1.00	1.00
Satd. Flow (perm)		1481			1163		744	1735	1393	637	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	18	8	88	18	35	1	468	84	32	555	21
RTOR Reduction (vph)	0	7	0	0	17	0	0	0	28	0	0	21
Lane Group Flow (vph)	0	37	0	0	124	0	1	468	56	32	555	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		11.2			11.2		48.1	48.1	48.1	48.1	48.1	0.0
Effective Green, g (s)		11.2			11.2		48.1	48.1	48.1	48.1	48.1	0.0
Actuated g/C Ratio		0.15			0.15		0.67	0.67	0.67	0.67	0.67	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		229			180		494	1154	926	423	1154	0
v/s Ratio Prot								0.27			c0.32	
v/s Ratio Perm		0.03			c0.11		0.00		0.04	0.05		
v/c Ratio		0.16			0.69		0.00	0.41	0.06	0.08	0.48	0.00
Uniform Delay, d1		26.5			28.9		4.1	5.5	4.2	4.3	6.0	36.1
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3			10.5		0.0	1.1	0.1	0.3	1.4	0.0
Delay (s)		26.8			39.4		4.1	6.6	4.3	4.6	7.4	36.1
Level of Service		C			D		A	A	A	A	A	D
Approach Delay (s)		26.8			39.4			6.3			8.2	
Approach LOS		C			D			A			A	

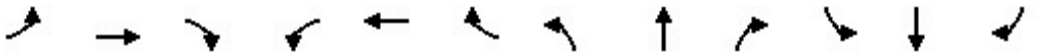
Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	72.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	348	46	92	554	1	26	6	190	1	3	17
Future Volume (vph)	11	348	46	92	554	1	26	6	190	1	3	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1599		1541	1638		1681	1396		840	1455	
Flt Permitted		0.98		0.51	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1572		827	1638		1681	1396		840	1455	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	378	50	100	602	1	28	7	207	1	3	18
RTOR Reduction (vph)	0	3	0	0	0	0	0	179	0	0	18	0
Lane Group Flow (vph)	0	437	0	100	603	0	28	35	0	1	3	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		37.4		37.4	37.4		8.8	8.8		1.3	1.3	
Effective Green, g (s)		37.4		37.4	37.4		8.8	8.8		1.3	1.3	
Actuated g/C Ratio		0.57		0.57	0.57		0.13	0.13		0.02	0.02	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		889		467	926		223	185		16	28	
v/s Ratio Prot					c0.37		0.02	c0.02		0.00	c0.00	
v/s Ratio Perm		0.28		0.12								
v/c Ratio		0.49		0.21	0.65		0.13	0.19		0.06	0.12	
Uniform Delay, d1		8.6		7.1	9.9		25.3	25.5		31.8	31.8	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9		1.0	3.5		0.2	0.4		1.2	1.4	
Delay (s)		10.6		8.1	13.4		25.4	25.8		33.0	33.2	
Level of Service		B		A	B		C	C		C	C	
Approach Delay (s)		10.6			12.7			25.8			33.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

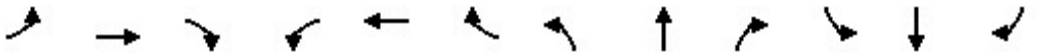
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	241	251	35	32	265	111	63	134	50	73	107	258
Future Volume (vph)	241	251	35	32	265	111	63	134	50	73	107	258
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1640		1571	1718	1446
Flt Permitted	0.58	1.00	1.00	0.59	1.00	1.00	0.68	1.00		0.63	1.00	1.00
Satd. Flow (perm)	1012	1752	1367	1006	1718	1414	1139	1640		1045	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	262	273	38	35	288	121	68	146	54	79	116	280
RTOR Reduction (vph)	0	0	17	0	0	53	0	21	0	0	0	224
Lane Group Flow (vph)	262	273	21	35	288	68	68	179	0	79	116	56
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	12.5	12.5		12.5	12.5	12.5
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	12.5	12.5		12.5	12.5	12.5
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56	0.56	0.20	0.20		0.20	0.20	0.20
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	564	977	762	561	958	789	226	325		207	341	287
v/s Ratio Prot		0.16			0.17			c0.11			0.07	
v/s Ratio Perm	c0.26		0.02	0.03		0.05	0.06			0.08		0.04
v/c Ratio	0.46	0.28	0.03	0.06	0.30	0.09	0.30	0.55		0.38	0.34	0.19
Uniform Delay, d1	8.3	7.3	6.2	6.4	7.4	6.5	21.5	22.7		21.8	21.7	21.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.7	0.1	0.2	0.8	0.2	0.8	2.0		1.2	0.6	0.3
Delay (s)	11.0	8.0	6.3	6.6	8.2	6.7	22.2	24.7		23.0	22.3	21.3
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		9.3			7.6			24.1			21.8	
Approach LOS		A			A			C			C	

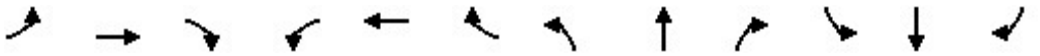
Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	62.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	1	56	20	32	3	468	56	29	328	9
Future Volume (vph)	22	1	1	56	20	32	3	468	56	29	328	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1389		1264	1701	1308	1092	1638	1504
Flt Permitted		0.73			0.82		0.55	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)		1280			1174		729	1701	1308	524	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	1	1	61	22	35	3	509	61	32	357	10
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	20	0	0	10
Lane Group Flow (vph)	0	25	0	0	96	0	3	509	41	32	357	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		9.9			9.9		48.2	48.2	48.2	48.2	48.2	0.0
Effective Green, g (s)		9.9			9.9		48.2	48.2	48.2	48.2	48.2	0.0
Actuated g/C Ratio		0.14			0.14		0.68	0.68	0.68	0.68	0.68	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		178			163		494	1153	886	355	1110	0
v/s Ratio Prot								c0.30			0.22	
v/s Ratio Perm		0.02			c0.08		0.00		0.03	0.06		
v/c Ratio		0.14			0.59		0.01	0.44	0.05	0.09	0.32	0.00
Uniform Delay, d1		26.9			28.7		3.7	5.3	3.8	3.9	4.7	35.5
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4			5.3		0.0	1.2	0.1	0.5	0.8	0.0
Delay (s)		27.2			34.0		3.7	6.5	3.9	4.4	5.5	35.5
Level of Service		C			C		A	A	A	A	A	D
Approach Delay (s)		27.2			34.0			6.2			6.2	
Approach LOS		C			C			A			A	

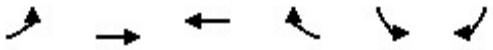
Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	468	76	126	691	0	30	9	288	2	6	21
Future Volume (vph)	11	468	76	126	691	0	30	9	288	2	6	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.89	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1682		1647	1735		1681	1456		1681	1566	
Flt Permitted		0.98		0.40	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1655		697	1735		1681	1456		1681	1566	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	509	83	137	751	0	33	10	313	2	7	23
RTOR Reduction (vph)	0	4	0	0	0	0	0	269	0	0	22	0
Lane Group Flow (vph)	0	600	0	137	751	0	33	54	0	2	8	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		35.7		35.7	35.7		9.4	9.4		2.7	2.7	
Effective Green, g (s)		35.7		35.7	35.7		9.4	9.4		2.7	2.7	
Actuated g/C Ratio		0.54		0.54	0.54		0.14	0.14		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		889		374	932		237	206		68	63	
v/s Ratio Prot					c0.43		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.36		0.20								
v/c Ratio		0.67		0.37	0.81		0.14	0.26		0.03	0.13	
Uniform Delay, d1		11.1		8.8	12.5		25.0	25.4		30.6	30.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.1		2.8	7.4		0.2	0.5		0.1	0.7	
Delay (s)		15.2		11.6	19.9		25.2	25.9		30.7	31.4	
Level of Service		B		B	B		C	C		C	C	
Approach Delay (s)		15.2			18.6			25.8			31.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	66.4	Sum of lost time (s)	18.6
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	52	486	522	2	5	125
Future Volume (Veh/h)	52	486	522	2	5	125
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	528	567	2	5	136
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.85	
vC, conflicting volume	569				1210	568
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	569				1161	568
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	94				97	74
cM capacity (veh/h)	1013				157	517

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	585	569	141
Volume Left	57	0	5
Volume Right	0	2	136
cSH	1013	1700	478
Volume to Capacity	0.06	0.33	0.30
Queue Length 95th (m)	1.4	0.0	9.3
Control Delay (s)	1.5	0.0	15.7
Lane LOS	A		C
Approach Delay (s)	1.5	0.0	15.7
Approach LOS			C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	96	16	11	492	318	51
Future Volume (Veh/h)	96	16	11	492	318	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)	104	17	12	535	346	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)					197	
pX, platoon unblocked						
vC, conflicting volume	905	346	401			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	905	346	401			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	98	99			
cM capacity (veh/h)	306	702	1169			

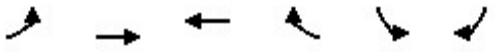
Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	121	547	346	55
Volume Left	104	12	0	0
Volume Right	17	0	0	55
cSH	333	1169	1700	1700
Volume to Capacity	0.36	0.01	0.20	0.03
Queue Length 95th (m)	12.3	0.2	0.0	0.0
Control Delay (s)	21.9	0.3	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	21.9	0.3	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	77	3	17	45	31	36
Future Volume (Veh/h)	77	3	17	45	31	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	3	18	49	34	39
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			87		170	86
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			87		170	86
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	96
cM capacity (veh/h)			1522		815	979

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	87	67	73
Volume Left	0	18	34
Volume Right	3	0	39
cSH	1700	1522	895
Volume to Capacity	0.05	0.01	0.08
Queue Length 95th (m)	0.0	0.3	2.0
Control Delay (s)	0.0	2.1	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	9.4
Approach LOS			A

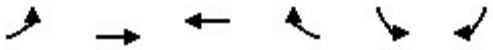
Intersection Summary			
Average Delay		3.6	
Intersection Capacity Utilization		21.2%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	73	74	2	7	7
Future Volume (Veh/h)	3	73	74	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	79	80	2	8	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	82				166	81
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82				166	81
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				99	99
cM capacity (veh/h)	1528				828	985

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	82	82	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1528	1700	899
Volume to Capacity	0.00	0.05	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.3	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		16.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	79	679	764	2	2	141
Future Volume (Veh/h)	79	679	764	2	2	141
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	738	830	2	2	153
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.75	
vC, conflicting volume	832				1741	831
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	832				1819	831
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				97	59
cM capacity (veh/h)	801				58	371

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	824	832	155
Volume Left	86	0	2
Volume Right	0	2	153
cSH	801	1700	347
Volume to Capacity	0.11	0.49	0.45
Queue Length 95th (m)	2.7	0.0	16.9
Control Delay (s)	2.8	0.0	23.5
Lane LOS	A		C
Approach Delay (s)	2.8	0.0	23.5
Approach LOS			C

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	106.9%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	70	10	35	332	498	112
Future Volume (Veh/h)	70	10	35	332	498	112
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)	76	11	38	361	541	122
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	978	541	663			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	956	500	628			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	71	98	96			
cM capacity (veh/h)	261	551	925			

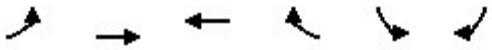
Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	87	399	541	122
Volume Left	76	38	0	0
Volume Right	11	0	0	122
cSH	280	925	1700	1700
Volume to Capacity	0.31	0.04	0.32	0.07
Queue Length 95th (m)	9.8	1.0	0.0	0.0
Control Delay (s)	23.6	1.3	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.6	1.3	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	56	9	57	85	17	21
Future Volume (Veh/h)	56	9	57	85	17	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	61	10	62	92	18	23
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			71		282	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			71		282	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		97	98
cM capacity (veh/h)			1542		684	1003

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	71	154	41
Volume Left	0	62	18
Volume Right	10	0	23
cSH	1700	1542	833
Volume to Capacity	0.04	0.04	0.05
Queue Length 95th (m)	0.0	1.0	1.2
Control Delay (s)	0.0	3.2	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	3.2	9.5
Approach LOS			A

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		



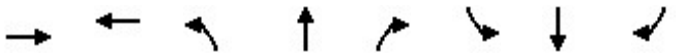
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	61	96	6	4	4
Future Volume (Veh/h)	7	61	96	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	66	104	7	4	4
Pedestrians						
Lane Width (m)						
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	111				190	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	111				190	108
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	100
cM capacity (veh/h)	1492				800	952

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	74	111	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1492	1700	869
Volume to Capacity	0.01	0.07	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.8	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.8	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		19.8%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	160	150	78	59	200	68	83	254	61	99	175
v/c Ratio	0.28	0.17	0.09	0.09	0.23	0.09	0.31	0.65	0.29	0.28	0.40
Control Delay	10.8	9.1	2.9	9.0	9.5	3.1	23.9	27.6	24.3	22.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	9.1	2.9	9.0	9.5	3.1	23.9	27.6	24.3	22.5	6.6
Queue Length 50th (m)	9.2	8.0	0.0	3.0	11.1	0.0	8.4	23.7	6.1	9.9	0.0
Queue Length 95th (m)	24.3	20.4	5.8	9.8	26.6	5.5	18.5	43.8	15.0	20.6	12.4
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	571	887	834	634	887	799	558	786	441	747	728
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.17	0.09	0.09	0.23	0.09	0.15	0.32	0.14	0.13	0.24

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	44	141	1	468	84	32	555	21
v/c Ratio	0.15	0.60	0.00	0.39	0.08	0.07	0.46	0.16
Control Delay	21.6	33.8	6.0	8.1	2.0	6.9	8.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	33.8	6.0	8.1	2.0	6.9	8.9	2.6
Queue Length 50th (m)	4.1	14.8	0.1	26.5	0.0	1.4	33.8	0.0
Queue Length 95th (m)	11.5	31.3	0.6	57.3	5.1	5.7	72.6	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	528	423	518	1211	998	444	1211	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.33	0.00	0.39	0.08	0.07	0.46	0.16

Intersection Summary

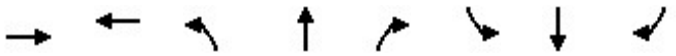
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	440	100	603	28	214	1	21
v/c Ratio	0.46	0.20	0.60	0.12	0.57	0.01	0.10
Control Delay	9.9	8.6	12.7	24.7	11.4	26.0	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.9	8.6	12.7	24.7	11.4	26.0	15.7
Queue Length 50th (m)	18.3	3.5	29.1	2.5	0.6	0.1	0.3
Queue Length 95th (m)	68.5	17.5	#112.4	9.9	17.9	1.4	6.4
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	964	506	1003	669	680	334	589
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.20	0.60	0.04	0.31	0.00	0.04

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	262	273	38	35	288	121	68	200	79	116	280
v/c Ratio	0.47	0.28	0.05	0.06	0.30	0.14	0.30	0.58	0.38	0.34	0.55
Control Delay	12.5	8.8	1.6	7.8	9.0	2.3	24.9	26.7	27.3	24.3	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	8.8	1.6	7.8	9.0	2.3	24.9	26.7	27.3	24.3	7.6
Queue Length 50th (m)	15.8	14.4	0.0	1.6	15.4	0.0	6.8	18.2	8.0	11.7	0.0
Queue Length 95th (m)	38.7	31.5	2.4	5.9	33.5	6.5	16.2	35.7	18.6	23.7	16.0
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	563	976	788	560	957	841	543	796	498	820	837
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.28	0.05	0.06	0.30	0.14	0.13	0.25	0.16	0.14	0.33

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	26	118	3	509	61	32	357	10
v/c Ratio	0.12	0.53	0.01	0.42	0.06	0.09	0.31	0.08
Control Delay	24.7	30.0	5.3	7.7	2.0	6.3	6.6	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	30.0	5.3	7.7	2.0	6.3	6.6	1.1
Queue Length 50th (m)	2.8	11.0	0.1	27.0	0.0	1.3	17.0	0.0
Queue Length 95th (m)	8.8	25.5	1.1	58.2	3.9	5.2	37.8	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	459	437	518	1209	947	372	1164	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.27	0.01	0.42	0.06	0.09	0.31	0.08

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	604	137	751	33	323	2	30
v/c Ratio	0.64	0.35	0.76	0.13	0.67	0.01	0.13
Control Delay	15.8	13.4	20.1	26.5	11.8	29.0	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	13.4	20.1	26.5	11.8	29.0	17.3
Queue Length 50th (m)	28.4	5.2	40.4	3.0	0.9	0.2	0.6
Queue Length 95th (m)	#124.4	27.6	#169.0	10.9	22.1	2.1	8.2
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	947	397	990	657	760	657	626
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.35	0.76	0.05	0.42	0.00	0.05

Intersection Summary

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

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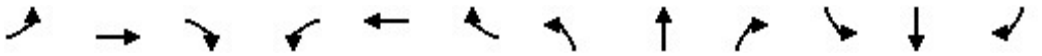
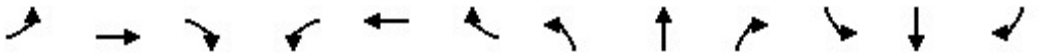
Appendix H

Future (2031) Total Intersection Operation Calculations (Synchro)



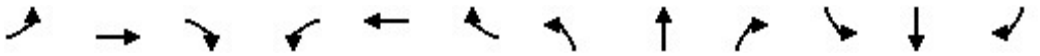
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	152	79	60	203	69	84	172	85	61	100	194
Future Volume (vph)	178	152	79	60	203	69	84	172	85	61	100	194
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1654		1601	1609	1367
Flt Permitted	0.62	1.00	1.00	0.65	1.00	1.00	0.69	1.00		0.52	1.00	1.00
Satd. Flow (perm)	1035	1638	1475	1155	1638	1419	1191	1654		871	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	193	165	86	65	221	75	91	187	92	66	109	211
RTOR Reduction (vph)	0	0	40	0	0	35	0	27	0	0	0	162
Lane Group Flow (vph)	193	165	46	65	221	40	91	252	0	66	109	49
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.2	35.2	35.2	35.2	35.2	35.2	15.3	15.3		15.3	15.3	15.3
Effective Green, g (s)	35.2	35.2	35.2	35.2	35.2	35.2	15.3	15.3		15.3	15.3	15.3
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53	0.53	0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	553	876	789	617	876	759	276	384		202	374	317
v/s Ratio Prot		0.10			0.13			c0.15			0.07	
v/s Ratio Perm	c0.19		0.03	0.06		0.03	0.08			0.08		0.04
v/c Ratio	0.35	0.19	0.06	0.11	0.25	0.05	0.33	0.66		0.33	0.29	0.15
Uniform Delay, d1	8.7	7.9	7.3	7.5	8.2	7.3	21.0	22.9		21.0	20.8	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	0.5	0.1	0.3	0.7	0.1	0.7	4.0		0.9	0.4	0.2
Delay (s)	10.5	8.4	7.5	7.9	8.9	7.5	21.7	26.9		21.9	21.2	20.3
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		9.1			8.4			25.6			20.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	15.3
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	18	7	105	18	51	1	473	101	48	564	21
Future Volume (vph)	18	18	7	105	18	51	1	473	101	48	564	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1694			1404		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.79		0.35	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)		1481			1139		628	1735	1393	565	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	20	8	114	20	55	1	514	110	52	613	23
RTOR Reduction (vph)	0	6	0	0	20	0	0	0	43	0	0	23
Lane Group Flow (vph)	0	42	0	0	169	0	1	514	67	52	613	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		16.3			16.3		45.2	45.2	45.2	45.2	45.2	0.0
Effective Green, g (s)		16.3			16.3		45.2	45.2	45.2	45.2	45.2	0.0
Actuated g/C Ratio		0.22			0.22		0.61	0.61	0.61	0.61	0.61	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		324			249		381	1052	845	342	1052	0
v/s Ratio Prot								0.30			c0.35	
v/s Ratio Perm		0.03			c0.15		0.00		0.05	0.09		
v/c Ratio		0.13			0.68		0.00	0.49	0.08	0.15	0.58	0.00
Uniform Delay, d1		23.4			26.7		5.8	8.2	6.1	6.3	8.9	37.2
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			7.4		0.0	1.6	0.2	0.9	2.4	0.0
Delay (s)		23.6			34.2		5.8	9.8	6.2	7.3	11.3	37.2
Level of Service		C			C		A	A	A	A	B	D
Approach Delay (s)		23.6			34.2			9.2			11.8	
Approach LOS		C			C			A			B	

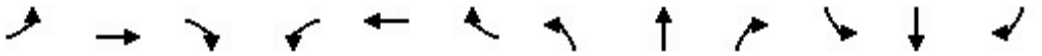
Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	399	51	102	624	1	29	6	209	1	4	18
Future Volume (vph)	12	399	51	102	624	1	29	6	209	1	4	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.99		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1600		1541	1638		1681	1395		840	1463	
Flt Permitted		0.98		0.46	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1569		752	1638		1681	1395		840	1463	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	434	55	111	678	1	32	7	227	1	4	20
RTOR Reduction (vph)	0	3	0	0	0	0	0	197	0	0	19	0
Lane Group Flow (vph)	0	499	0	111	679	0	32	37	0	1	5	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		37.0		37.0	37.0		8.9	8.9		2.8	2.8	
Effective Green, g (s)		37.0		37.0	37.0		8.9	8.9		2.8	2.8	
Actuated g/C Ratio		0.55		0.55	0.55		0.13	0.13		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		862		413	900		222	184		34	60	
v/s Ratio Prot					c0.41		0.02	c0.03		0.00	c0.00	
v/s Ratio Perm		0.32		0.15								
v/c Ratio		0.58		0.27	0.75		0.14	0.20		0.03	0.08	
Uniform Delay, d1		10.0		8.0	11.7		25.8	26.0		30.9	31.0	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.8		1.6	5.8		0.2	0.4		0.3	0.4	
Delay (s)		12.8		9.6	17.5		26.0	26.4		31.2	31.4	
Level of Service		B		A	B		C	C		C	C	
Approach Delay (s)		12.8			16.4			26.4			31.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

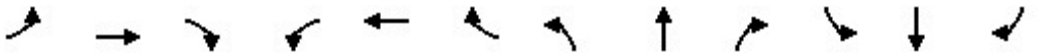
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	277	39	35	292	122	69	148	55	80	118	285
Future Volume (vph)	264	277	39	35	292	122	69	148	55	80	118	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1639		1571	1718	1446
Flt Permitted	0.57	1.00	1.00	0.58	1.00	1.00	0.67	1.00		0.62	1.00	1.00
Satd. Flow (perm)	985	1752	1367	981	1718	1414	1127	1639		1026	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	287	301	42	38	317	133	75	161	60	87	128	310
RTOR Reduction (vph)	0	0	19	0	0	60	0	21	0	0	0	245
Lane Group Flow (vph)	287	301	23	38	317	73	75	200	0	87	128	65
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.3	13.3		13.3	13.3	13.3
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	13.3	13.3		13.3	13.3	13.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	542	965	753	540	946	779	235	342		214	358	301
v/s Ratio Prot		0.17			0.18			c0.12			0.07	
v/s Ratio Perm	c0.29		0.02	0.04		0.05	0.07			0.08		0.04
v/c Ratio	0.53	0.31	0.03	0.07	0.34	0.09	0.32	0.58		0.41	0.36	0.22
Uniform Delay, d1	9.1	7.8	6.5	6.7	7.9	6.8	21.4	22.7		21.8	21.5	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7	0.8	0.1	0.3	1.0	0.2	0.8	2.5		1.3	0.6	0.4
Delay (s)	12.7	8.6	6.6	6.9	8.8	7.0	22.1	25.2		23.0	22.2	21.2
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		10.4			8.2			24.5			21.8	
Approach LOS		B			A			C			C	

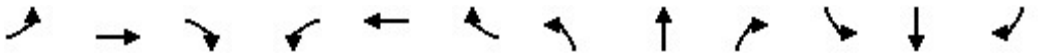
Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	15.3
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1	1	62	22	35	4	515	62	32	360	10
Future Volume (vph)	24	1	1	62	22	35	4	515	62	32	360	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1390		1264	1701	1308	1092	1638	1504
Flt Permitted		0.70			0.82		0.53	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)		1237			1172		706	1701	1308	483	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1	1	67	24	38	4	560	67	35	391	11
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	22	0	0	11
Lane Group Flow (vph)	0	27	0	0	107	0	4	560	45	35	391	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		10.4			10.4		48.2	48.2	48.2	48.2	48.2	0.0
Effective Green, g (s)		10.4			10.4		48.2	48.2	48.2	48.2	48.2	0.0
Actuated g/C Ratio		0.15			0.15		0.67	0.67	0.67	0.67	0.67	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		179			170		475	1145	880	325	1102	0
v/s Ratio Prot								c0.33			0.24	
v/s Ratio Perm		0.02			c0.09		0.01		0.03	0.07		
v/c Ratio		0.15			0.63		0.01	0.49	0.05	0.11	0.35	0.00
Uniform Delay, d1		26.7			28.8		3.8	5.7	4.0	4.1	5.0	35.8
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4			7.1		0.0	1.5	0.1	0.7	0.9	0.0
Delay (s)		27.1			35.8		3.9	7.2	4.1	4.8	5.9	35.8
Level of Service		C			D		A	A	A	A	A	D
Approach Delay (s)		27.1			35.8			6.8			6.6	
Approach LOS		C			D			A			A	

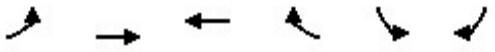
Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	514	84	139	761	0	33	10	317	2	6	23
Future Volume (vph)	12	514	84	139	761	0	33	10	317	2	6	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1682		1647	1735		1681	1456		1681	1562	
Flt Permitted		0.95		0.37	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1600		644	1735		1681	1456		1681	1562	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	559	91	151	827	0	36	11	345	2	7	25
RTOR Reduction (vph)	0	4	0	0	0	0	0	295	0	0	24	0
Lane Group Flow (vph)	0	659	0	151	827	0	36	61	0	2	8	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		35.7		35.7	35.7		9.6	9.6		2.7	2.7	
Effective Green, g (s)		35.7		35.7	35.7		9.6	9.6		2.7	2.7	
Actuated g/C Ratio		0.54		0.54	0.54		0.14	0.14		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		857		345	930		242	209		68	63	
v/s Ratio Prot					c0.48		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.41		0.23								
v/c Ratio		0.77		0.44	0.89		0.15	0.29		0.03	0.13	
Uniform Delay, d1		12.2		9.4	13.7		24.9	25.5		30.7	30.8	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		6.6		4.0	12.4		0.2	0.6		0.1	0.7	
Delay (s)		18.8		13.4	26.1		25.1	26.0		30.8	31.5	
Level of Service		B		B	C		C	C		C	C	
Approach Delay (s)		18.8			24.2			25.9			31.4	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	18.6
Intersection Capacity Utilization	116.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	552	593	2	6	135
Future Volume (Veh/h)	57	552	593	2	6	135
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	600	645	2	7	147
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.81	
vC, conflicting volume	647				1370	646
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	647				1340	646
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	93				94	68
cM capacity (veh/h)	948				114	466

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	662	647	154
Volume Left	62	0	7
Volume Right	0	2	147
cSH	948	1700	409
Volume to Capacity	0.07	0.38	0.38
Queue Length 95th (m)	1.6	0.0	13.1
Control Delay (s)	1.7	0.0	19.0
Lane LOS	A		C
Approach Delay (s)	1.7	0.0	19.0
Approach LOS			C

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	104	16	11	560	367	55
Future Volume (Veh/h)	104	16	11	560	367	55
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)	113	17	12	609	399	60
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	1032	399	459			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032	399	459			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	56	97	99			
cM capacity (veh/h)	257	655	1113			

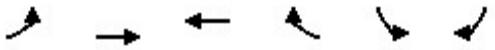
Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	130	621	399	60
Volume Left	113	12	0	0
Volume Right	17	0	0	60
cSH	280	1113	1700	1700
Volume to Capacity	0.47	0.01	0.23	0.04
Queue Length 95th (m)	17.6	0.2	0.0	0.0
Control Delay (s)	28.6	0.3	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	28.6	0.3	0.0	
Approach LOS	D			

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	84	3	17	50	31	36
Future Volume (Veh/h)	84	3	17	50	31	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	91	3	18	54	34	39
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			94		182	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			94		182	92
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	96
cM capacity (veh/h)			1513		802	970

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	94	72	73
Volume Left	0	18	34
Volume Right	3	0	39
cSH	1700	1513	884
Volume to Capacity	0.06	0.01	0.08
Queue Length 95th (m)	0.0	0.3	2.0
Control Delay (s)	0.0	1.9	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	1.9	9.4
Approach LOS			A

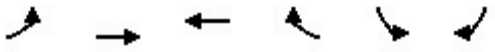
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	80	79	2	7	7
Future Volume (Veh/h)	3	80	79	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	87	86	2	8	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	88				180	87
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	88				180	87
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				99	99
cM capacity (veh/h)	1520				813	977

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	90	88	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1520	1700	887
Volume to Capacity	0.00	0.05	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.3	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	86	748	844	2	2	154
Future Volume (Veh/h)	86	748	844	2	2	154
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	93	813	917	2	2	167
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.71	
vC, conflicting volume	919				1917	918
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	919				2087	918
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				95	49
cM capacity (veh/h)	743				37	331

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	906	919	169
Volume Left	93	0	2
Volume Right	0	2	167
cSH	743	1700	302
Volume to Capacity	0.13	0.54	0.56
Queue Length 95th (m)	3.2	0.0	24.3
Control Delay (s)	3.4	0.0	31.1
Lane LOS	A		D
Approach Delay (s)	3.4	0.0	31.1
Approach LOS			D

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	76	10	35	367	550	121
Future Volume (Veh/h)	76	10	35	367	550	121
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)	83	11	38	399	598	132
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.94	0.94	0.94			
vC, conflicting volume	1073	598	730			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1047	544	684			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	98	96			
cM capacity (veh/h)	226	512	867			

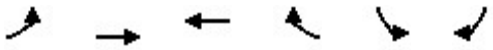
Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	94	437	598	132
Volume Left	83	38	0	0
Volume Right	11	0	0	132
cSH	242	867	1700	1700
Volume to Capacity	0.39	0.04	0.35	0.08
Queue Length 95th (m)	13.3	1.0	0.0	0.0
Control Delay (s)	29.1	1.3	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	29.1	1.3	0.0	
Approach LOS	D			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	61	9	57	94	17	21
Future Volume (Veh/h)	61	9	57	94	17	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	10	62	102	18	23
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			76		297	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			76		297	71
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		97	98
cM capacity (veh/h)			1536		670	997

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	76	164	41
Volume Left	0	62	18
Volume Right	10	0	23
cSH	1700	1536	821
Volume to Capacity	0.04	0.04	0.05
Queue Length 95th (m)	0.0	1.0	1.2
Control Delay (s)	0.0	3.0	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	3.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay		3.2	
Intersection Capacity Utilization		25.5%	ICU Level of Service A
Analysis Period (min)		15	



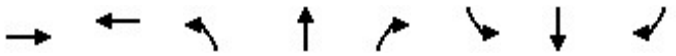
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	66	105	6	4	4
Future Volume (Veh/h)	7	66	105	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	72	114	7	4	4
Pedestrians						
Lane Width (m)						
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	121				206	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	121				206	118
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	100
cM capacity (veh/h)	1479				783	940

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	80	121	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1479	1700	854
Volume to Capacity	0.01	0.07	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.8	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	0.8	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	193	165	86	65	221	75	91	279	66	109	211
v/c Ratio	0.35	0.19	0.10	0.11	0.25	0.09	0.33	0.68	0.33	0.29	0.44
Control Delay	12.3	9.8	3.0	9.6	10.3	3.1	23.8	28.6	25.0	22.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	9.8	3.0	9.6	10.3	3.1	23.8	28.6	25.0	22.3	6.4
Queue Length 50th (m)	12.1	9.3	0.0	3.5	13.0	0.0	9.2	27.0	6.7	10.9	0.0
Queue Length 95th (m)	31.3	23.3	6.4	11.1	30.7	6.0	20.0	48.6	16.1	22.1	13.3
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	552	874	827	616	874	792	545	776	398	736	740
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.19	0.10	0.11	0.25	0.09	0.17	0.36	0.17	0.15	0.29

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	48	189	1	514	110	52	613	23
v/c Ratio	0.15	0.71	0.00	0.49	0.12	0.15	0.58	0.18
Control Delay	20.5	37.6	8.0	11.3	2.3	9.5	13.0	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	37.6	8.0	11.3	2.3	9.5	13.0	2.9
Queue Length 50th (m)	4.5	21.2	0.1	35.3	0.0	2.8	45.9	0.0
Queue Length 95th (m)	12.2	41.4	0.8	76.3	6.7	10.0	98.7	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	503	400	380	1051	887	342	1051	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.47	0.00	0.49	0.12	0.15	0.58	0.18

Intersection Summary

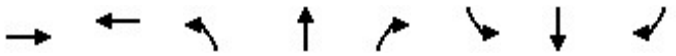
Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	502	111	679	32	234	1	24
v/c Ratio	0.55	0.25	0.71	0.14	0.60	0.01	0.12
Control Delay	13.1	11.2	18.1	27.0	12.0	29.0	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	11.2	18.1	27.0	12.0	29.0	16.9
Queue Length 50th (m)	22.0	4.0	35.3	2.9	0.6	0.1	0.4
Queue Length 95th (m)	83.9	20.3	#146.4	10.8	18.6	1.4	6.9
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	916	438	953	644	674	321	573
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.25	0.71	0.05	0.35	0.00	0.04

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	287	301	42	38	317	133	75	221	87	128	310
v/c Ratio	0.53	0.31	0.05	0.07	0.34	0.16	0.32	0.61	0.41	0.36	0.57
Control Delay	14.5	9.6	1.9	8.3	9.8	2.4	24.9	27.5	27.7	24.2	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.5	9.6	1.9	8.3	9.8	2.4	24.9	27.5	27.7	24.2	7.4
Queue Length 50th (m)	18.9	16.9	0.0	1.8	18.1	0.0	7.5	20.6	8.9	12.9	0.0
Queue Length 95th (m)	46.9	36.4	2.9	6.6	39.0	7.1	17.5	39.2	20.2	25.6	16.5
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	542	964	779	540	946	838	532	787	483	811	846
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.31	0.05	0.07	0.34	0.16	0.14	0.28	0.18	0.16	0.37

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	28	129	4	560	67	35	391	11
v/c Ratio	0.13	0.56	0.01	0.47	0.07	0.10	0.34	0.08
Control Delay	24.7	31.1	5.8	8.5	2.0	6.9	7.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	31.1	5.8	8.5	2.0	6.9	7.2	1.3
Queue Length 50th (m)	3.0	12.4	0.2	32.3	0.0	1.5	19.9	0.0
Queue Length 95th (m)	9.2	27.8	1.3	69.8	4.3	6.0	44.0	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	441	433	498	1201	943	341	1156	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.30	0.01	0.47	0.07	0.10	0.34	0.08

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	663	151	827	36	356	2	32
v/c Ratio	0.73	0.41	0.84	0.14	0.69	0.01	0.14
Control Delay	19.3	15.4	25.0	26.4	11.9	29.5	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	15.4	25.0	26.4	11.9	29.5	17.1
Queue Length 50th (m)	33.9	6.0	48.1	3.2	1.0	0.2	0.6
Queue Length 95th (m)	#151.6	33.0	#197.5	11.7	23.4	2.2	8.4
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	914	366	987	655	778	655	624
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.41	0.84	0.05	0.46	0.00	0.05

Intersection Summary

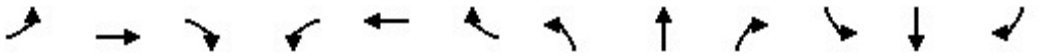
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix I

Future (2036) Total Intersection Operation Calculations (Synchro)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	168	87	66	238	93	93	189	94	66	110	196
Future Volume (vph)	192	168	87	66	238	93	93	189	94	66	110	196
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1586	1638	1475	1681	1638	1419	1648	1654		1601	1609	1367
Flt Permitted	0.60	1.00	1.00	0.64	1.00	1.00	0.68	1.00		0.47	1.00	1.00
Satd. Flow (perm)	1000	1638	1475	1136	1638	1419	1179	1654		790	1609	1367
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	183	95	72	259	101	101	205	102	72	120	213
RTOR Reduction (vph)	0	0	45	0	0	48	0	27	0	0	0	161
Lane Group Flow (vph)	209	183	50	72	259	53	101	280	0	72	120	52
Heavy Vehicles (%)	6%	8%	2%	0%	8%	6%	2%	1%	3%	5%	10%	10%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.2	35.2	35.2	35.2	35.2	35.2	16.4	16.4		16.4	16.4	16.4
Effective Green, g (s)	35.2	35.2	35.2	35.2	35.2	35.2	16.4	16.4		16.4	16.4	16.4
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53	0.53	0.25	0.25		0.25	0.25	0.25
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	526	861	776	597	861	746	289	405		193	394	335
v/s Ratio Prot		0.11			0.16			c0.17			0.07	
v/s Ratio Perm	c0.21		0.03	0.06		0.04	0.09			0.09		0.04
v/c Ratio	0.40	0.21	0.06	0.12	0.30	0.07	0.35	0.69		0.37	0.30	0.16
Uniform Delay, d1	9.5	8.5	7.8	8.0	8.9	7.8	20.8	22.9		21.0	20.6	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.2	0.6	0.2	0.4	0.9	0.2	0.7	5.0		1.2	0.4	0.2
Delay (s)	11.7	9.0	7.9	8.4	9.8	8.0	21.6	28.0		22.2	21.0	20.0
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		10.0			9.2			26.4			20.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



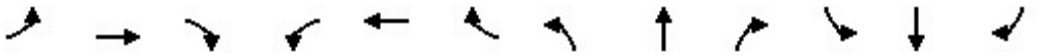
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	20	8	98	20	39	1	533	111	49	621	23
Future Volume (vph)	20	20	8	98	20	39	1	533	111	49	621	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1694			1441		1681	1735	1393	1264	1735	1331
Flt Permitted		0.86			0.78		0.32	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)		1480			1156		562	1735	1393	509	1735	1331
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	22	9	107	22	42	1	579	121	53	675	25
RTOR Reduction (vph)	0	7	0	0	16	0	0	0	47	0	0	25
Lane Group Flow (vph)	0	46	0	0	155	0	1	579	74	53	675	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	54%	0%	2%	8%	33%	2%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.4			15.4		45.2	45.2	45.2	45.2	45.2	0.0
Effective Green, g (s)		15.4			15.4		45.2	45.2	45.2	45.2	45.2	0.0
Actuated g/C Ratio		0.21			0.21		0.61	0.61	0.61	0.61	0.61	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		309			241		345	1065	855	312	1065	0
v/s Ratio Prot								0.33			c0.39	
v/s Ratio Perm		0.03			c0.13		0.00		0.05	0.10		
v/c Ratio		0.15			0.64		0.00	0.54	0.09	0.17	0.63	0.00
Uniform Delay, d1		23.7			26.6		5.5	8.2	5.8	6.1	9.0	36.8
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			5.8		0.0	2.0	0.2	1.2	2.9	0.0
Delay (s)		24.0			32.4		5.5	10.2	6.0	7.3	11.8	36.8
Level of Service		C			C		A	B	A	A	B	D
Approach Delay (s)		24.0			32.4			9.5			12.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	436	57	112	682	1	32	7	231	1	4	20
Future Volume (vph)	13	436	57	112	682	1	32	7	231	1	4	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1599		1541	1638		1681	1395		840	1458	
Flt Permitted		0.98		0.43	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1565		704	1638		1681	1395		840	1458	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	474	62	122	741	1	35	8	251	1	4	22
RTOR Reduction (vph)	0	3	0	0	0	0	0	217	0	0	21	0
Lane Group Flow (vph)	0	547	0	122	742	0	35	42	0	1	5	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	9%	5%	9%	8%	0%	0%	20%	8%	100%	0%	7%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		36.4		36.4	36.4		9.1	9.1		2.8	2.8	
Effective Green, g (s)		36.4		36.4	36.4		9.1	9.1		2.8	2.8	
Actuated g/C Ratio		0.54		0.54	0.54		0.14	0.14		0.04	0.04	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		851		383	891		228	189		35	61	
v/s Ratio Prot					c0.45		0.02	c0.03		0.00	c0.00	
v/s Ratio Perm		0.35		0.17								
v/c Ratio		0.64		0.32	0.83		0.15	0.22		0.03	0.08	
Uniform Delay, d1		10.7		8.4	12.7		25.5	25.7		30.7	30.8	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.7		2.2	9.0		0.2	0.4		0.2	0.4	
Delay (s)		14.4		10.6	21.7		25.7	26.2		31.0	31.2	
Level of Service		B		B	C		C	C		C	C	
Approach Delay (s)		14.4			20.1			26.1			31.2	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

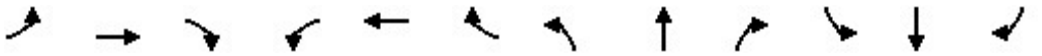
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	289	306	43	39	323	133	76	163	61	88	130	315
Future Volume (vph)	289	306	43	39	323	133	76	163	61	88	130	315
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1647	1752	1367	1616	1718	1414	1586	1639		1571	1718	1446
Flt Permitted	0.55	1.00	1.00	0.56	1.00	1.00	0.67	1.00		0.59	1.00	1.00
Satd. Flow (perm)	955	1752	1367	953	1718	1414	1113	1639		972	1718	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	314	333	47	42	351	145	83	177	66	96	141	342
RTOR Reduction (vph)	0	0	22	0	0	66	0	21	0	0	0	266
Lane Group Flow (vph)	314	333	25	42	351	79	83	222	0	96	141	76
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	2%	1%	10%	4%	3%	5%	6%	3%	5%	7%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.3	14.3		14.3	14.3	14.3
Effective Green, g (s)	35.1	35.1	35.1	35.1	35.1	35.1	14.3	14.3		14.3	14.3	14.3
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.22	0.22		0.22	0.22	0.22
Clearance Time (s)	7.9	7.9	7.9	7.9	7.9	7.9	7.4	7.4		7.4	7.4	7.4
Vehicle Extension (s)	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	518	950	741	517	932	767	245	362		214	379	319
v/s Ratio Prot		0.19			0.20			c0.14			0.08	
v/s Ratio Perm	c0.33		0.02	0.04		0.06	0.07			0.10		0.05
v/c Ratio	0.61	0.35	0.03	0.08	0.38	0.10	0.34	0.61		0.45	0.37	0.24
Uniform Delay, d1	10.1	8.4	6.9	7.1	8.5	7.2	21.2	22.7		21.8	21.4	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.2	1.0	0.1	0.3	1.2	0.3	0.8	3.1		1.5	0.6	0.4
Delay (s)	15.3	9.4	7.0	7.4	9.7	7.4	22.0	25.8		23.3	22.0	21.1
Level of Service	B	A	A	A	A	A	C	C		C	C	C
Approach Delay (s)		11.9			8.9			24.8			21.7	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	15.3
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



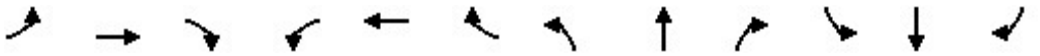
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	1	1	69	24	39	4	566	69	35	394	11
Future Volume (vph)	27	1	1	69	24	39	4	566	69	35	394	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00			0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1683			1390		1264	1701	1308	1092	1638	1504
Flt Permitted		0.73			0.82		0.50	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)		1291			1168		665	1701	1308	425	1638	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1	1	75	26	42	4	615	75	38	428	12
RTOR Reduction (vph)	0	1	0	0	21	0	0	0	27	0	0	12
Lane Group Flow (vph)	0	30	0	0	122	0	4	615	48	38	428	0
Heavy Vehicles (%)	0%	0%	0%	13%	0%	42%	33%	4%	15%	54%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		13.3			13.3		46.2	46.2	46.2	46.2	46.2	0.0
Effective Green, g (s)		13.3			13.3		46.2	46.2	46.2	46.2	46.2	0.0
Actuated g/C Ratio		0.18			0.18		0.64	0.64	0.64	0.64	0.64	0.00
Clearance Time (s)		6.0			6.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		4.5	4.5	4.5	4.5	4.5	
Lane Grp Cap (vph)		236			214		423	1083	833	270	1043	0
v/s Ratio Prot								c0.36			0.26	
v/s Ratio Perm		0.02			c0.10		0.01		0.04	0.09		
v/c Ratio		0.13			0.57		0.01	0.57	0.06	0.14	0.41	0.00
Uniform Delay, d1		24.8			27.0		4.8	7.5	5.0	5.2	6.5	36.2
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2			3.4		0.0	2.2	0.1	1.1	1.2	0.0
Delay (s)		25.0			30.4		4.8	9.6	5.1	6.3	7.7	36.2
Level of Service		C			C		A	A	A	A	A	D
Approach Delay (s)		25.0			30.4			9.1			8.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	564	93	153	839	0	36	11	350	3	7	26
Future Volume (vph)	13	564	93	153	839	0	36	11	350	3	7	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1681		1647	1735		1681	1456		1681	1563	
Flt Permitted		0.87		0.35	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1468		599	1735		1681	1456		1681	1563	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	613	101	166	912	0	39	12	380	3	8	28
RTOR Reduction (vph)	0	4	0	0	0	0	0	330	0	0	26	0
Lane Group Flow (vph)	0	724	0	166	912	0	39	62	0	3	10	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		43.7		43.7	43.7		10.2	10.2		4.4	4.4	
Effective Green, g (s)		43.7		43.7	43.7		10.2	10.2		4.4	4.4	
Actuated g/C Ratio		0.57		0.57	0.57		0.13	0.13		0.06	0.06	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		834		340	985		222	193		96	89	
v/s Ratio Prot					c0.53		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.49		0.28								
v/c Ratio		0.87		0.49	0.93		0.18	0.32		0.03	0.11	
Uniform Delay, d1		14.1		9.9	15.1		29.6	30.2		34.2	34.4	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.8		4.9	15.6		0.3	0.7		0.1	0.4	
Delay (s)		26.0		14.9	30.7		29.9	30.9		34.3	34.8	
Level of Service		C		B	C		C	C		C	C	
Approach Delay (s)		26.0			28.3			30.8			34.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	126.7%	ICU Level of Service	H
Analysis Period (min)	15		

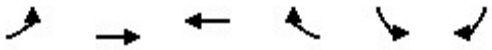
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	564	93	153	839	0	36	11	350	3	7	26
Future Volume (vph)	13	564	93	153	839	0	36	11	350	3	7	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	1.00		1.00	0.85		1.00	0.88	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1681		1647	1735		1681	1456		1681	1563	
Flt Permitted		0.98		0.36	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1648		629	1735		1681	1456		1681	1563	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	613	101	166	912	0	39	12	380	3	8	28
RTOR Reduction (vph)	0	4	0	0	0	0	0	338	0	0	27	0
Lane Group Flow (vph)	0	724	0	166	912	0	39	54	0	3	9	0
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	10%	3%	1%	2%	2%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		62.2		62.2	62.2		10.7	10.7		4.5	4.5	
Effective Green, g (s)		62.2		62.2	62.2		10.7	10.7		4.5	4.5	
Actuated g/C Ratio		0.65		0.65	0.65		0.11	0.11		0.05	0.05	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)		1067		407	1124		187	162		78	73	
v/s Ratio Prot					c0.53		0.02	c0.04		0.00	c0.01	
v/s Ratio Perm		0.44		0.26								
v/c Ratio		0.68		0.41	0.81		0.21	0.34		0.04	0.13	
Uniform Delay, d1		10.6		8.1	12.5		38.8	39.4		43.7	43.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5		3.0	6.4		0.4	0.9		0.1	0.6	
Delay (s)		14.1		11.1	19.0		39.2	40.3		43.8	44.4	
Level of Service		B		B	B		D	D		D	D	
Approach Delay (s)		14.1			17.7			40.2			44.4	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	126.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	605	651	2	6	145
Future Volume (Veh/h)	63	605	651	2	6	145
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	658	708	2	7	158
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.78	
vC, conflicting volume	710				1503	709
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	710				1504	709
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	92				92	63
cM capacity (veh/h)	899				85	429

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	726	710	165
Volume Left	68	0	7
Volume Right	0	2	158
cSH	899	1700	366
Volume to Capacity	0.08	0.42	0.45
Queue Length 95th (m)	1.9	0.0	17.1
Control Delay (s)	1.9	0.0	22.6
Lane LOS	A		C
Approach Delay (s)	1.9	0.0	22.6
Approach LOS			C

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	111	16	11	631	388	60
Future Volume (Veh/h)	111	16	11	631	388	60
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)	121	17	12	686	422	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked						
vC, conflicting volume	1132	422	487			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1132	422	487			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	46	97	99			
cM capacity (veh/h)	224	636	1086			

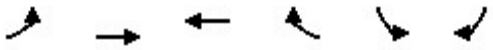
Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	138	698	422	65
Volume Left	121	12	0	0
Volume Right	17	0	0	65
cSH	244	1086	1700	1700
Volume to Capacity	0.57	0.01	0.25	0.04
Queue Length 95th (m)	24.0	0.3	0.0	0.0
Control Delay (s)	37.5	0.3	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	37.5	0.3	0.0	
Approach LOS	E			

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	92	3	17	54	31	36
Future Volume (Veh/h)	92	3	17	54	31	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	3	18	59	34	39
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			103		196	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			103		196	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	96
cM capacity (veh/h)			1502		787	959

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	103	77	73
Volume Left	0	18	34
Volume Right	3	0	39
cSH	1700	1502	871
Volume to Capacity	0.06	0.01	0.08
Queue Length 95th (m)	0.0	0.3	2.1
Control Delay (s)	0.0	1.8	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	1.8	9.5
Approach LOS			A

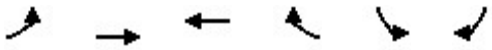
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	88	83	2	7	7
Future Volume (Veh/h)	3	88	83	2	7	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	96	90	2	8	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	92				193	91
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92				193	91
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				99	99
cM capacity (veh/h)	1515				799	972

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	99	92	16
Volume Left	3	0	8
Volume Right	0	2	8
cSH	1515	1700	877
Volume to Capacity	0.00	0.05	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.2	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	9.2
Approach LOS			A

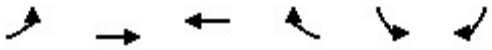
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	72	114	6	4	4
Future Volume (Veh/h)	7	72	114	6	4	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	78	124	7	4	4
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	131				222	128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	131				222	128
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	100
cM capacity (veh/h)	1467				767	928

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	86	131	8
Volume Left	8	0	4
Volume Right	0	7	4
cSH	1467	1700	840
Volume to Capacity	0.01	0.08	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	0.7	0.0	9.3
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	93	823	931	2	3	168
Future Volume (Veh/h)	93	823	931	2	3	168
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	895	1012	2	3	183
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		53				
pX, platoon unblocked					0.68	
vC, conflicting volume	1014				2110	1013
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1014				2397	1013
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				86	37
cM capacity (veh/h)	684				22	291

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	996	1014	186
Volume Left	101	0	3
Volume Right	0	2	183
cSH	684	1700	243
Volume to Capacity	0.15	0.60	0.77
Queue Length 95th (m)	3.9	0.0	42.0
Control Delay (s)	4.3	0.0	56.0
Lane LOS	A		F
Approach Delay (s)	4.3	0.0	56.0
Approach LOS			F

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	127.4%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	82	10	35	405	607	130
Future Volume (Veh/h)	82	10	35	405	607	130
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)	89	11	38	440	660	141
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					197	
pX, platoon unblocked	0.91	0.91	0.91			
vC, conflicting volume	1176	660	801			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1145	580	734			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	53	98	95			
cM capacity (veh/h)	190	473	803			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	100	478	660	141
Volume Left	89	38	0	0
Volume Right	11	0	0	141
cSH	204	803	1700	1700
Volume to Capacity	0.49	0.05	0.39	0.08
Queue Length 95th (m)	18.5	1.1	0.0	0.0
Control Delay (s)	38.7	1.3	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	38.7	1.3	0.0	
Approach LOS	E			

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

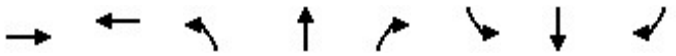
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	67	9	57	103	17	21
Future Volume (Veh/h)	67	9	57	103	17	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	10	62	112	18	23
Pedestrians						
Lane 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			83		314	78
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			83		314	78
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		97	98
cM capacity (veh/h)			1527		655	988

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	83	174	41
Volume Left	0	62	18
Volume Right	10	0	23
cSH	1700	1527	808
Volume to Capacity	0.05	0.04	0.05
Queue Length 95th (m)	0.0	1.0	1.2
Control Delay (s)	0.0	2.9	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	2.9	9.7
Approach LOS			A

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	209	183	95	72	259	101	101	307	72	120	213
v/c Ratio	0.40	0.21	0.12	0.12	0.30	0.13	0.35	0.71	0.37	0.30	0.43
Control Delay	13.9	10.6	3.1	10.4	11.4	3.1	23.8	29.6	26.2	22.1	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	10.6	3.1	10.4	11.4	3.1	23.8	29.6	26.2	22.1	6.1
Queue Length 50th (m)	14.2	11.1	0.0	4.1	16.5	0.0	10.3	30.6	7.4	12.1	0.0
Queue Length 95th (m)	36.6	27.0	7.0	12.7	38.1	7.2	21.7	53.4	17.6	24.0	13.2
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	525	860	819	596	860	793	531	764	355	724	732
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.21	0.12	0.12	0.30	0.13	0.19	0.40	0.20	0.17	0.29

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	53	171	1	579	121	53	675	25
v/c Ratio	0.17	0.67	0.00	0.54	0.13	0.17	0.63	0.19
Control Delay	21.1	36.4	8.0	11.7	2.1	9.4	13.5	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	36.4	8.0	11.7	2.1	9.4	13.5	3.2
Queue Length 50th (m)	5.0	19.2	0.1	39.8	0.0	2.7	50.7	0.0
Queue Length 95th (m)	13.2	37.9	0.7	86.8	6.7	10.1	110.7	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	510	407	345	1065	902	311	1065	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.42	0.00	0.54	0.13	0.17	0.63	0.19

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	550	122	742	35	259	1	26
v/c Ratio	0.61	0.30	0.78	0.15	0.62	0.01	0.13
Control Delay	14.8	12.3	21.6	27.0	12.1	29.0	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	12.3	21.6	27.0	12.1	29.0	16.5
Queue Length 50th (m)	25.4	4.5	41.3	3.1	0.7	0.1	0.4
Queue Length 95th (m)	98.0	23.3	#169.0	11.6	19.9	1.4	7.2
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	907	406	946	649	693	324	577
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.30	0.78	0.05	0.37	0.00	0.05

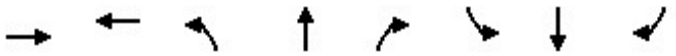
Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	314	333	47	42	351	145	83	243	96	141	342
v/c Ratio	0.61	0.35	0.06	0.08	0.38	0.17	0.34	0.64	0.45	0.37	0.58
Control Delay	17.8	10.5	2.5	9.0	10.9	2.5	24.9	28.1	28.6	24.0	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	10.5	2.5	9.0	10.9	2.5	24.9	28.1	28.6	24.0	7.2
Queue Length 50th (m)	22.7	19.9	0.0	2.1	21.4	0.0	8.4	23.3	10.0	14.4	0.0
Queue Length 95th (m)	#59.9	44.0	3.6	7.7	47.2	7.8	18.8	43.0	22.0	27.6	16.9
Internal Link Dist (m)		761.5			324.0			145.7		41.7	
Turn Bay Length (m)	155.0		120.0	135.0		40.0	100.0		130.0		30.0
Base Capacity (vph)	518	950	768	517	932	833	517	776	452	798	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.35	0.06	0.08	0.38	0.17	0.16	0.31	0.21	0.18	0.40

Intersection Summary

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



Lane Group	EBT	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	31	143	4	615	75	38	428	12
v/c Ratio	0.13	0.61	0.01	0.57	0.09	0.14	0.41	0.09
Control Delay	24.3	33.2	6.2	10.9	2.1	8.0	8.6	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	33.2	6.2	10.9	2.1	8.0	8.6	1.4
Queue Length 50th (m)	3.4	14.3	0.2	39.4	0.0	1.7	23.6	0.0
Queue Length 95th (m)	9.7	30.7	1.3	85.5	4.8	6.9	52.2	0.0
Internal Link Dist (m)	160.4	132.8		173.0			112.3	
Turn Bay Length (m)			90.0		170.0	50.0		15.0
Base Capacity (vph)	446	420	424	1084	861	270	1044	131
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.34	0.01	0.57	0.09	0.14	0.41	0.09

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	728	166	912	39	392	3	36
v/c Ratio	0.84	0.47	0.89	0.17	0.74	0.02	0.18
Control Delay	26.9	17.9	30.2	31.7	13.8	34.7	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	17.9	30.2	31.7	13.8	34.7	19.6
Queue Length 50th (m)	85.9	13.9	116.2	5.4	1.6	0.4	1.1
Queue Length 95th (m)	#193.9	40.5	#240.0	13.5	26.8	3.0	9.8
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	867	351	1020	459	674	459	447
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.47	0.89	0.08	0.58	0.01	0.08

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	728	166	912	39	392	3	36
v/c Ratio	0.66	0.40	0.79	0.20	0.78	0.02	0.22
Control Delay	15.6	13.5	20.6	41.4	16.7	44.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	13.5	20.6	41.4	16.7	44.7	24.4
Queue Length 50th (m)	77.6	13.6	116.2	6.9	2.1	0.5	1.4
Queue Length 95th (m)	163.2	37.9	#258.3	16.2	31.1	3.4	11.5
Internal Link Dist (m)	355.4		29.3		88.1		95.6
Turn Bay Length (m)		40.0		60.0		60.0	
Base Capacity (vph)	1099	418	1154	364	613	364	360
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.40	0.79	0.11	0.64	0.01	0.10

Intersection Summary

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

Appendix J

Signal Warrant Analysis Calculations

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Highway 140 / Chippawa Road

What is the direction of the Main Road street? North-South

When was the data collected?

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 2 or more

b.- Number of lanes on the Minor Road? 2 or more

c.- How many approaches? 3

d.- What is the operating environment? Urban Population >= 10,000 AND Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	11	691	0	128	0	8	0	298	51	0	0	0	0
9:00	11	631	0	111	0	16	0	388	60	0	0	0	0
12:00	0	480	0	83	0	16	0	284	39	0	0	0	0
13:00	35	327	0	80	0	40	0	368	64	0	0	0	0
14:00	53	365	0	84	0	10	0	310	52	0	0	0	0
16:00	18	399	0	97	0	10	0	499	83	0	0	0	0
17:00	35	405	0	82	0	10	0	607	130	0	0	0	0
18:00	35	333	0	71	0	10	0	616	81	0	0	0	0
Total	**198**	**3,631**	**0**	**736**	**0**	**120**	**0**	**3,370**	**560**	**0**	**0**	**0**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate	23%		34%		30%		100%		
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									0

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	0	0	0	0	0	0	0	0	
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	23%		34%		30%		100%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Highway 140 / Chippawa Road Count Date:

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00		
1A	480	720	600	900	1,187	1,217	902	914	874	1,106	1,269	1,146		
	COMPLIANCE %				100	100	100	100	97	100	100	100	797	100
1B	180	255	180	255	136	127	99	120	94	107	92	81		
	COMPLIANCE %				53	50	39	47	37	42	36	32	336	42

Restricted Flow Signal Justification 1:

Both 1A and 1B 100% Fullfilled each of 8 hours — Yes ☐ No ☑

Lesser of 1A or 1B at least 80% fulfilled each of 8 hours — Yes ☐ No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00		
2A	480	720	600	900	1,051	1,090	803	794	780	999	1,177	1,065		
	COMPLIANCE %				100	100	89	88	87	100	100	100	764	96
2B	50	75	50	75	128	111	83	80	84	97	82	71		
	COMPLIANCE %				100	100	100	100	100	100	100	95	795	99

Restricted Flow Signal Justification 2:

Both 2A and 2B 100% Fullfilled each of 8 hours — Yes ☐ No ☑

Lesser of 2A or 2B at least 80% fulfilled each of 8 hours — Yes ☑ No ☐

Justification 3: Combination

Combination Justification 1 and 2

	Justification Satisfied 80% or More			Two Justifications Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume	YE ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YE ☑	NO ☐		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value Y (warrant threshold)	Average % Compliance	Overall % Compliance
Justification 4	8:00	1,051	136	177	77 %	66 %
	9:00	1,090	127	165	77 %	
	17:00	1,177	92	142	65 %	
	18:00	1,065	81	173	47 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Highway 140 / Chippawa Road

Count Date:

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440	Not Justified				
	1440 - 2600					
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

Intersection: Highway 140 / Chippawa Road Count Date:

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100	%	☐	☑
	B	Crossing Volume	42	%		
2. Delay to Cross Traffic	A	Main Road	96	%	☐	☑
	B	Crossing Road	99	%		
3. Combination	A	Justificaton 1	42	%	☐	☑
	B	Justification 2	96	%		
4. 4-Hr Volume			66	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision | GO TO Justification:

What are the intersecting roadways? Main Street / Chippawa Road

What is the direction of the Main Road street? East-West

When was the data collected?

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 2 or more

b.- Number of lanes on the Minor Road? 2 or more

c.- How many approaches? 3

d.- What is the operating environment? Urban Population >= 10,000 AND Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Eastbound Approach			Minor Northbound Approach			Main Westbound Approach			Minor Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	59	607	0	0	0	0	0	546	6	2	0	107	
9:00	63	605	0	0	0	0	0	651	2	6	0	145	
11:00	45	639	0	0	0	0	0	721	4	0	0	69	
12:00	91	701	0	0	0	0	0	716	0	2	0	161	
13:00	136	743	0	0	0	0	0	718	2	3	0	95	
15:00	61	917	0	0	0	0	0	799	2	3	0	153	
17:00	93	823	0	0	0	0	0	931	2	3	0	168	
18:00	95	823	0	0	0	0	0	850	1	2	0	176	
Total	**643**	**5,858**	**0**	**0**	**0**	**0**	**0**	**5,932**	**19**	**21**	**0**	**1,074**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate	23%		34%		30%		100%		
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									0

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	0	0	0	0	0	0	0	0	
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	23%		34%		30%		100%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Main Street / Chippawa Road Count Date:

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	11:00	12:00	13:00	15:00	17:00	18:00		
1A	480	720	600	900	1,327	1,472	1,478	1,671	1,697	1,935	2,020	1,947		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	180	255	180	255	109	151	69	163	98	156	171	178		
	COMPLIANCE %				43	59	27	64	38	61	67	70	429	54
Restricted Flow Signal Justification 1:					**Both 1A and 1B 100% Fullfilled each of 8 hours**					**Yes** ☐		**No** ☑		
					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours					**Yes** ☐		**No** ☑		

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☑	8:00	9:00	11:00	12:00	13:00	15:00	17:00	18:00		
2A	480	720	600	900	1,218	1,321	1,409	1,508	1,599	1,779	1,849	1,769		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	2	6	0	2	71	3	3	2		
	COMPLIANCE %				3	8	0	3	95	4	4	3	119	15
Restricted Flow Signal Justification 2:					**Both 2A and 2B 100% Fullfilled each of 8 hours**					**Yes** ☐		**No** ☑		
					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours					**Yes** ☐		**No** ☑		

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume	YE ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YE ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value Y (warrant threshold)	Average % Compliance	Overall % Compliance
Justification 4	13:00	1,599	98	115	85 %	96 %
	15:00	1,779	156	115	100 %	
	17:00	1,849	171	115	100 %	
	18:00	1,769	178	115	100 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Main Street / Chippawa Road

Count Date:

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440	Not Justified				
	1440 - 2600					
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

Intersection: Main Street / Chippawa Road Count Date:

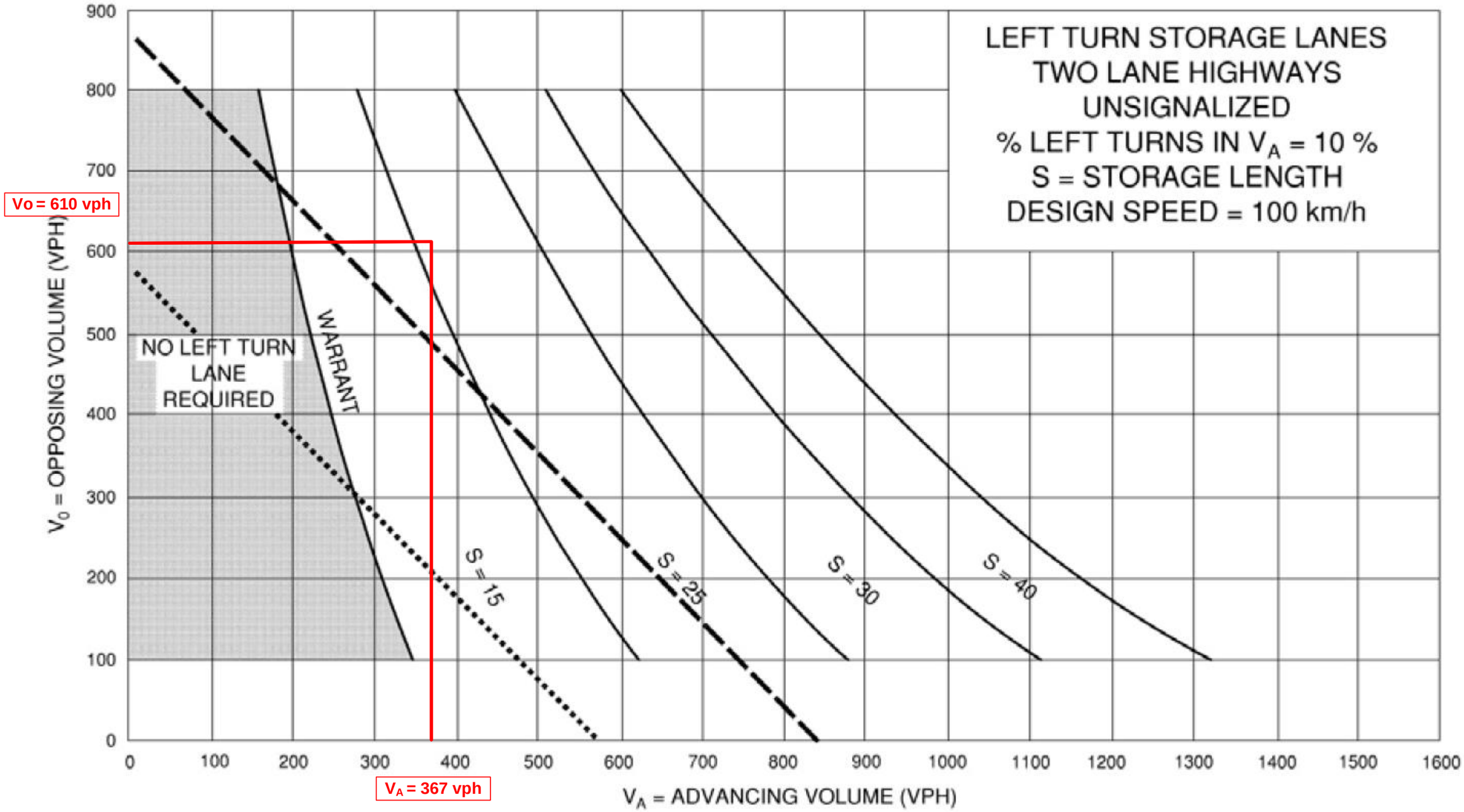
Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100	%	☐	☑
	B	Crossing Volume	54	%		
2. Delay to Cross Traffic	A	Main Road	100	%	☐	☑
	B	Crossing Road	15	%		
3. Combination	A	Justificaton 1	54	%	☐	☑
	B	Justification 2	15	%		
4. 4-Hr Volume			96	%	☐	☑
5. Collision Experience			0	%	☐	☑
6. Pedestrians	A	Volume	Justification not met		☐	☑
	B	Delay	Justification not met			

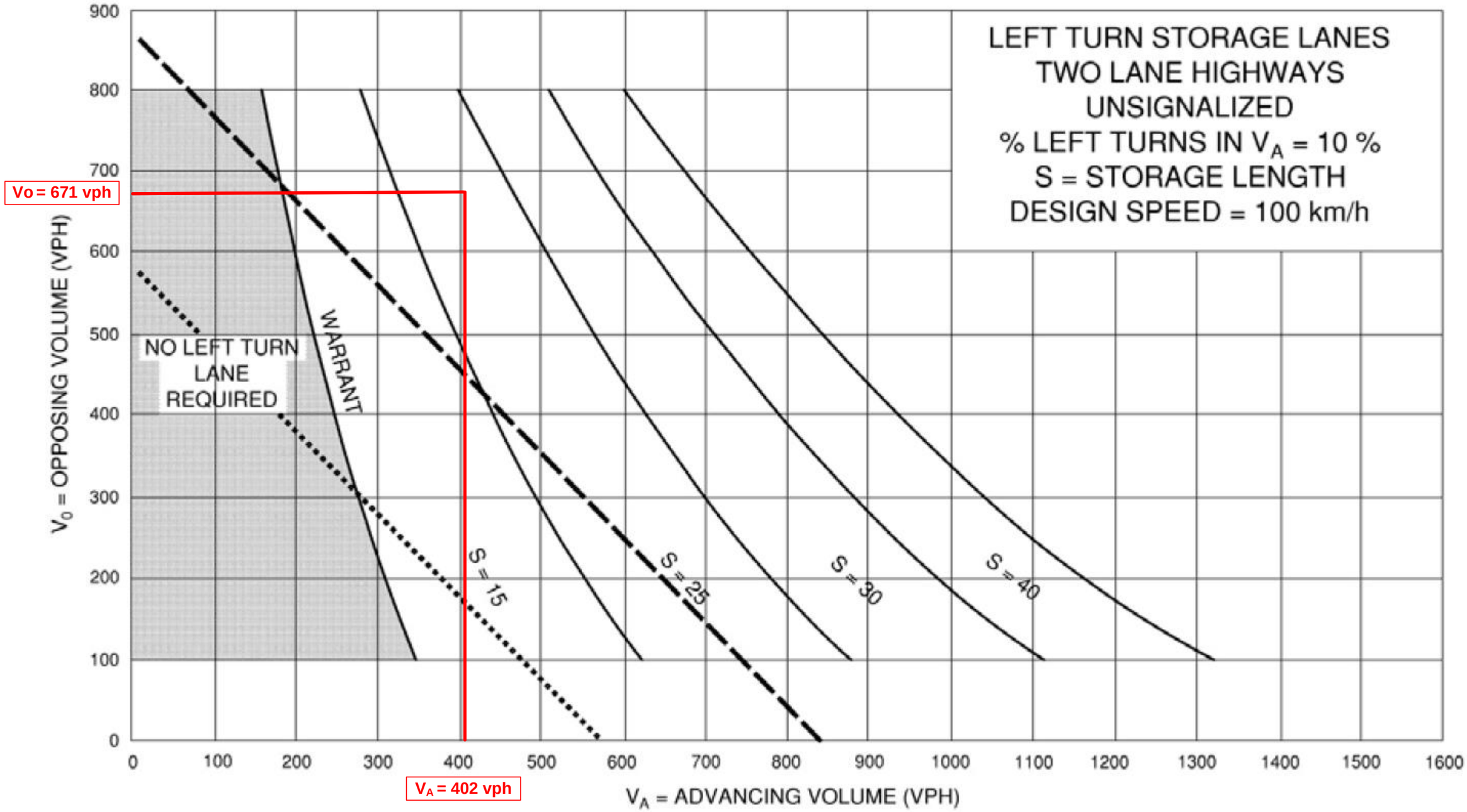
Appendix K

Left Turn Warrant Analysis Calculations

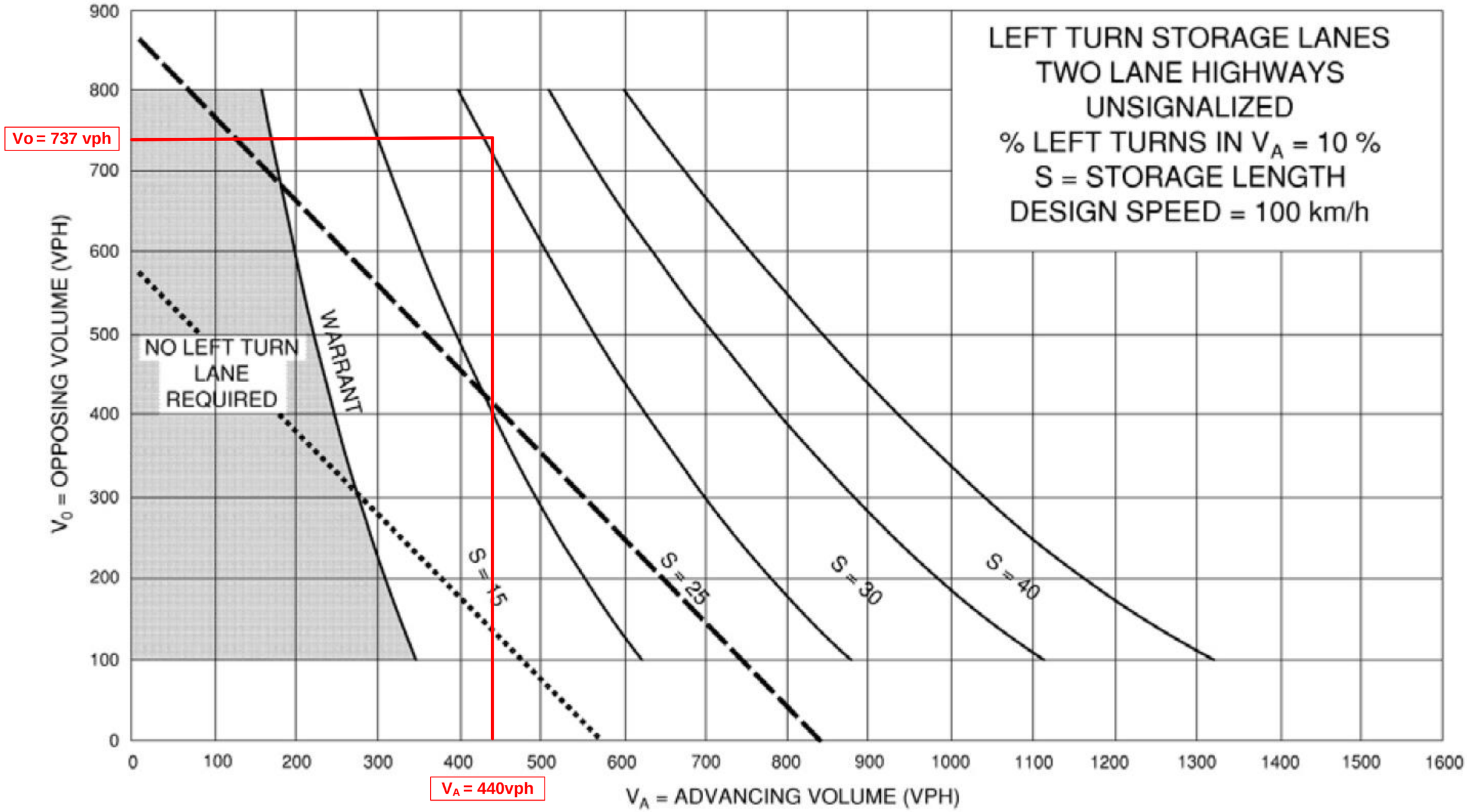
Future (2026) Total Conditions



Future (2031) Total Conditions



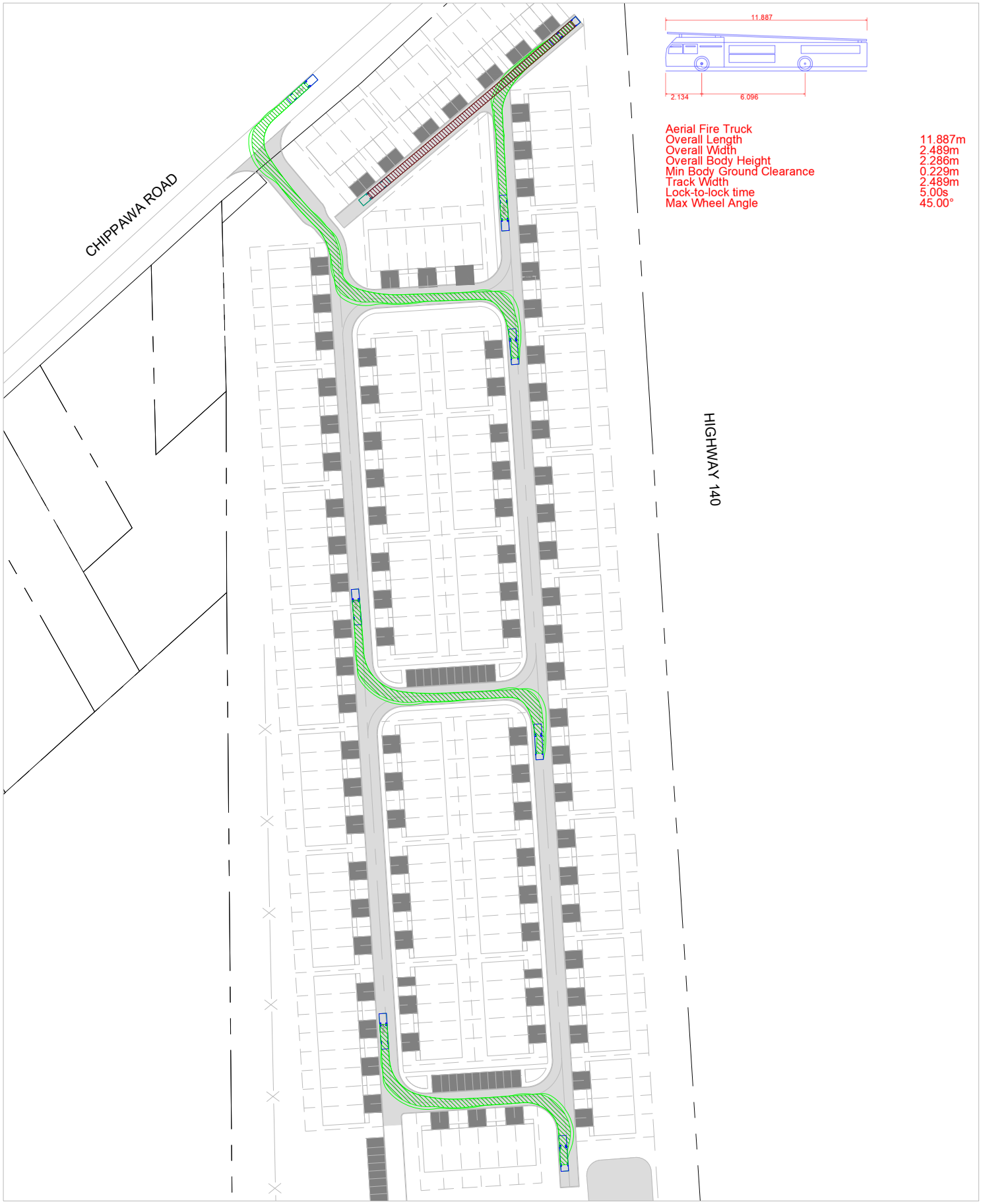
Future (2036) Total Conditions



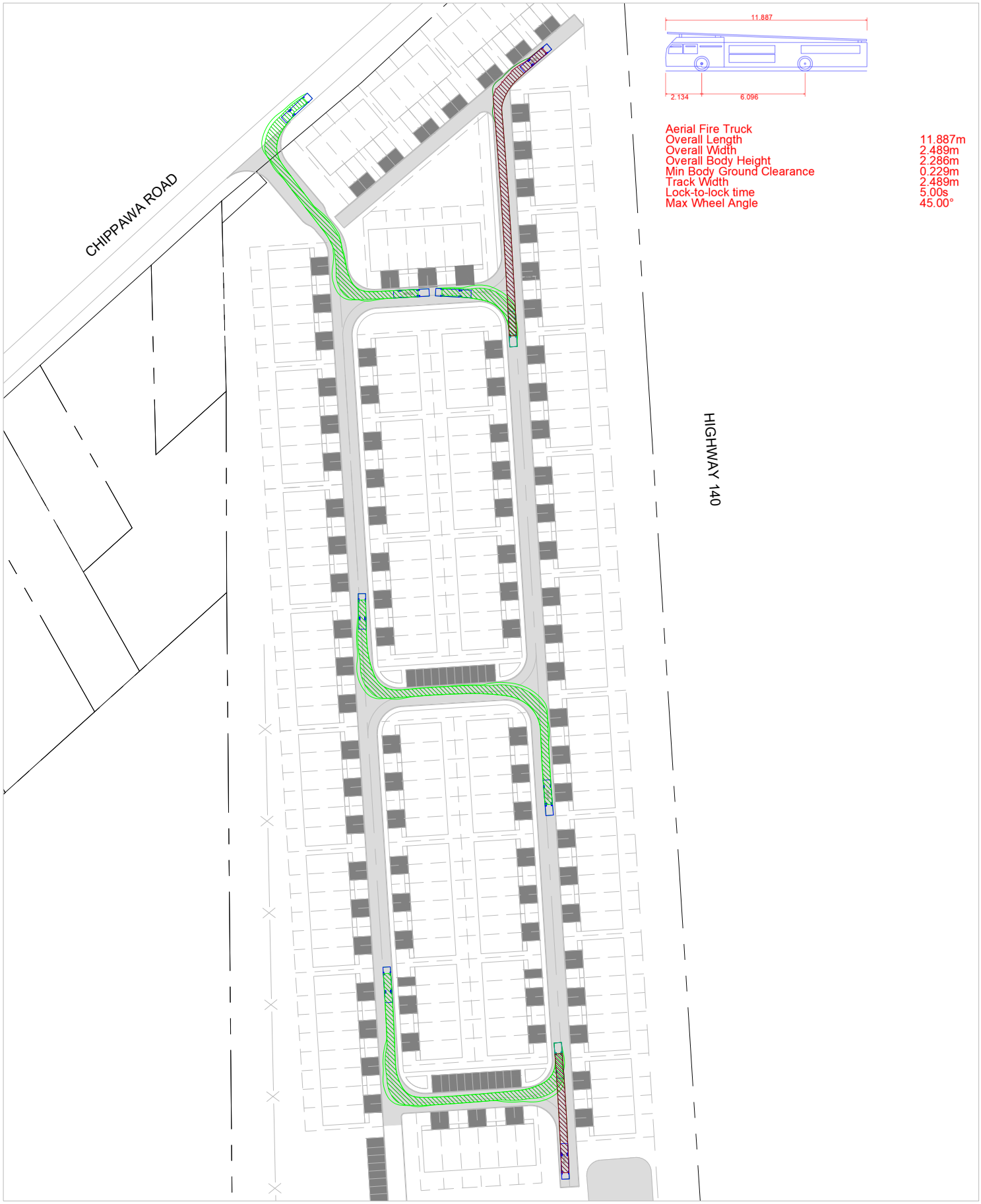
Appendix L

Swept Path Analysis

Fire Truck In



Fire Truck Out



Garbage Truck In

Garbage Truck Out

Passenger Car in

Passenger Car Out