

201-02725-00

555 CANAL BANK DEVELOPMENTS GP INC.

DAIN WEST DRAFT PLAN OF SUBDIVISION TRAFFIC IMPACT STUDY

JULY 2020





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555 CANAL BANK DEVELOPMENTS GP INC.

TRANSPORTATION IMPACT STUDY

PROJECT NO.: 201-02725-00
DATE: JULY 2020

WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

WSP.COM



July 21, 2020

Jeffrey Swartz, P.Eng.
555 Canal Bank Developments GP Inc.
125 Villarboit Crescent, Vaughan, ON
L4K 4K2

Subject: Dain West (555 Canal Bank Street) Draft Plan of Subdivision – Traffic Impact Study

Dear Mr. Swartz,

WSP is pleased to submit this Traffic Impact Study (TIS) in support of the Dain West Draft Plan of Subdivision, proposed within the City of Welland.

The Dain West and Dain East subdivisions are two separate projects divided by a rail corridor. Dain West is proposed to be accessible via Canal Bank Street, while Dain East is proposed to be accessible via Forks Road.

Findings from the TIS show that traffic generated by the proposed Draft Plan of Subdivision is projected to be accommodated by the existing boundary road network when considering applied recommendations and planned improvements. Please refer to the following section for an executive summary of the study findings, which precedes the detailed analysis.

Should you have any questions about the contents of this report, please do not hesitate to us.

Regards,

WSP

NK/DL
WSP ref.: 201-02725-00

SIGNATURES

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EXECUTIVE SUMMARY

WSP is pleased to submit this Traffic Impact Study (TIS) in support of the Dain West Draft Plan of Subdivision, proposed within the City of Welland.

The Dain West and Dain East subdivisions are two separate projects divided by a rail corridor. Dain East is proposed to consist of residential developments, accessible via two full-moves accesses to Forks Road. Dain West is proposed to consist of residential, institutional and mixed-use developments, accessible via two full-moves accesses to Canal Bank Street. The analysis completed as part of this study is based on the most recent site statistics received June 29th, 2020. The developments are planned to be phased in, with densities detailed below.

As part of this study, WSP completed a review of the proposed development impacts to the study area intersections for the two following scenarios:

- Scenario 1 – assumed the Forks Road Bridge as open, providing a second access point to the study area.
- Scenario 2 – assumed the Forks Road Bridge as closed, reducing connectivity to the study area to one intersection.

The horizon years assessed as part of this study consist of 2020 existing conditions, as well as 2027, 2032 and 2037 future conditions. Based on the analysis findings for both scenarios, WSP derived the appropriate development phasing plan and associated improvements recommended to accommodate site generated traffic, as detailed below:

Scenario 1: Forks Bridge Open

Horizon Year	Overall Recommended Density Per Use for Each Horizon Year (non-cumulative)									Recommended Roadway Network Improvements
	Dain East		Dain West							
	Single Detached Units	Townhouse /Semi-Detached Units	Single Detached Units	Townhouse /Semi-Detached Units	Apartments Units	Retail GFA (sq.ft)	Commercial GFA (sq.ft)	Office GFA (sq.ft)	Elementary School (pupils)	
2027	889	311	0	0	0	0	0	0	0	Figure 5-35
2032	889	311	583	192	241	0	0	0	500	Figure 5-36
2037	889	311	583	192	375	75,000	138,000	67,000	500	Figure 5-38
2037 with Planned Roadway Improvements	1013	316	583	192	375	75,000	138,000	67,000	500	Figure 5-39
Total	1013	316	583	192	375	75,000	138,000	67,000	500	-

WSP recommends that the proposed development be phased per the above table under scenario 1. The Dain West development is projected to be accommodated by the existing road network with applied recommendations, as well as the majority of the Dain East development. Only a portion of the Dain East development should be reviewed once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

Scenario 2: Forks Bridge Closed

Horizon Year	Overall Recommended Density Per Use for Each Horizon Year (non-cumulative)									Recommended Roadway Network Improvements
	Dain East		Dain West							
	Single Detached Units	Townhouse /Semi-Detached Units	Single Detached Units	Townhouse /Semi-Detached Units	Apartments Units	Retail GFA (sq.ft)	Commercial GFA (sq.ft)	Office GFA (sq.ft)	Elementary School (pupils)	
2027	889	311	0	0	0	0	0	0	0	Figure 5-35
2032	1013	316	583	192	241	0	0	0	500	Figure 5-37
2037	1013	316	583	192	375	75,000	138,000	67,000	500	Figure 5-40
Total	1013	316	583	192	375	75,000	138,000	67,000	500	-

WSP recommends that the proposed development be phased per the above table under scenario 2. The Dain East and Dain West developments are projected to be accommodated by the existing road network with applied recommendations.

Overall, the development is projected to be accommodated by the existing road network with applied recommendations under both scenarios. Only under scenario 1 does WSP recommend that the implementation of 124 single detached units and 5 Townhouse/Semi-Detached Units from Dain East be implemented at a later time once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

1 INTRODUCTION

WSP has been retained to complete a Traffic Impact Study (TIS) in support of the Dain West Draft Plan of Subdivision, proposed within the City of Welland. The Dain West subdivision is bounded by Canal Bank Street to the west, the rail corridor to the east, St. Clair Drive to the south and a rail corridor to the north.

It is WSP's understanding that a Traffic Impact Study for the proposed Dain East Subdivision was prepared by Paradigm Transportation Solutions Limited (referred to as Paradigm hereafter) in June of 2019. The study was based on 787 proposed dwelling units and did not account for the Forks Road Bridge closure (on November 2, 2018), which has impacted the flow of traffic within the study area. Since the submission of the study, the density proposed for Dain East has increased, and a Dain West subdivision is now proposed. Accordingly, a new TIS is required to assess any potential impacts from the overall proposed subdivision, in addition to consideration for the bridge closure.

The scope of work of this study was established through correspondence with the City of Welland and the Ministry of Transportation of Ontario (MTO). This report includes:

- assessment of the existing traffic conditions at the study area intersections;
- assessment of the future background conditions and transportation improvements in the study area;
- estimation of the site generated traffic from the proposed developments;
- assessment of the impacts of the site-generated traffic on the operations of the study intersections under the future total traffic conditions; and

Information used in this study includes:

- the draft plan of subdivision and statistics provided by Armstrong Planning on June 29th, 2020;
- turning movement counts at boundary roadway intersections commissioned by WSP and completed on March 12th, 2020, as well as historical counts at the study intersections completed by Paradigm in 2017;
- the Niagara Region intersection signal timing plans for signalized study intersections;
- MTO Traffic Impact Study Guidelines;
- City of Welland Official Plan Schedule E and F;
- Geometric Design Standards for Ontario Highways;
- Ontario Traffic Manual Book 12; and
- Transport Canada, Rail Safety, Oversight and Expertise "Applicant Guide for Crossing Closures, Grade Crossing Closure Program".

Intersection capacity analyses were completed using Synchro 10.0 software and vehicular movements were simulated using AutoTURN 10.2 software.

2 SUBJECT LANDS

2.1 CURRENT LAND USE

The subject lands for Dain West are bounded by Canal Bank Street to the west, St. Clair Drive to the south and rail corridors to the north and east. The Dain East subdivision is separated from Dain West by a rail corridor and will be included in the analysis.

Dain East is currently vacant. Dain West currently contains a vacant industrial facility that has been out of commission since 2009. Please refer to **Figure 2-1** for the site location.

2.2 PROPOSED LAND USE

2.2.1 PROPOSED DEVELOPMENT COMPONENTS

The proposed densities for Dain East and Dain West are based on statistics provided by Armstrong Planning on June 29th, 2020. The developments are proposed to be phased, as detailed in the below table.

Table 2-1 Proposed Development Density

Phase	Overall Density Per Use for Each Horizon Year (non-cumulative)								
	Dain East		Dain West						
	Single Detached Units	Townhouse /Semi-Detached Units	Single Detached Units	Townhouse /Semi-Detached Units	Apartments Units	Retail GFA (sq.ft)	Commercial GFA (sq.ft)	Office GFA (sq.ft)	Elementary School (pupils)
1	889	311	0	0	0	0	0	0	0
2	1013	316	583	192	241	0	0	0	500
3	1013	316	583	192	375	75,000	138,000	67,000	500
Total	1013	316	583	192	375	75,000	138,000	67,000	500

As part of this study, WSP associated each phase with a study horizon year, detailed in Section 4.0.

2.2.2 PROPOSED DEVELOPMENT ACCESS

Dain East is proposed with two full-moves accesses to Forks Road, while the Dain West development is proposed with two full-moves accesses to Canal Bank Street.

Figure 2-1 Site Location



Source : Google Earth

3 EXISTING CONDITIONS

3.1 BOUNDARY ROAD NETWORK

The study intersections assessed within this report include the following roadways:

- **Forks Road** is an east-west roadway with a two-lane cross-section consisting of one lane in each direction. West of Highway 58, Forks Road is under the jurisdiction of the Niagara Region (Regional Road 23) and is classified as an arterial road with a posted speed limit of 80km/h. East of Highway 58, Forks Road is under the jurisdiction of the City of Welland and is classified as a collector road with a posted speed limit of 50km/h. No sidewalks are located along the roadway within the study area.
- **Huron Street** is an east-west roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as a local road with an assumed speed limit of 50km/h per municipal regulation. No sidewalks are located along the roadway within the study area.
- **Erie Street** is an east-west roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as a local road with an assumed speed limit of 50km/h per municipal regulation. No sidewalks are located along the roadway within the study area.
- **Nugent Road** is a north-south roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as a local road with an assumed speed limit of 50km/h per municipal regulation. No sidewalks are located along the roadway within the study area.
- **Canal Bank Street/Kingsway** is a north-south roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as arterial road north of Forks Road and collector road south of Forks Road. Near its intersection with Forks Road, Canal Bank Street/Kingsway has a posted speed limit of 50kmh, and a posted speed limit of 60km/h near its intersection with Townline Tunnel Road. No sidewalks are located along the roadway within the study area.
- **Townline Tunnel Road/Highway 58A/Humberstone Road** is an east-west roadway with a two-lane cross-section consisting of one lane in each direction. West of Highway 58, Humberstone Road is under the jurisdiction of the Niagara Region (Regional Road 33) and is classified as local road with a posted speed limit of 50km/h. Between Highway 58 and south of Reaker Road, Highway 58A is under the jurisdiction of the MTO and is classified as an expressway with a posted speed limit of 80km/h. East of Highway 58A (south of Reaker Road), Townline Tunnel Road is under the jurisdiction of the City of Welland and is classified as an arterial road with a posted speed limit of 80km/h. No sidewalks are located along the roadway within the study area.
- **Highway 58/Prince Charles Drive** is a north-south roadway with a two-lane cross-section consisting of one lane in each direction. South of Highway 58A, Highway 58 is under the jurisdiction of the MTO and is classified as an expressway with a posted speed limit of 80km/h. North of Highway 58A, Prince Charles Drive is under the jurisdiction of the Niagara Region (Regional Road 54) and is classified as an arterial road with a posted speed limit of 60km/h.
- **Netherby Road** is an east-west roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as a local road with a posted speed limit of 50km/h. No sidewalks are located along the roadway within the study area.
- **Reaker Road** is a north-south roadway with a two-lane cross-section consisting of one lane in each direction. It is under the jurisdiction of the City of Welland and is classified as a local road with a posted speed limit of 50km/h. No sidewalks are located along the roadway within the study area.

Please refer to **Figure 3-1** for the existing lane configurations of the study intersections.

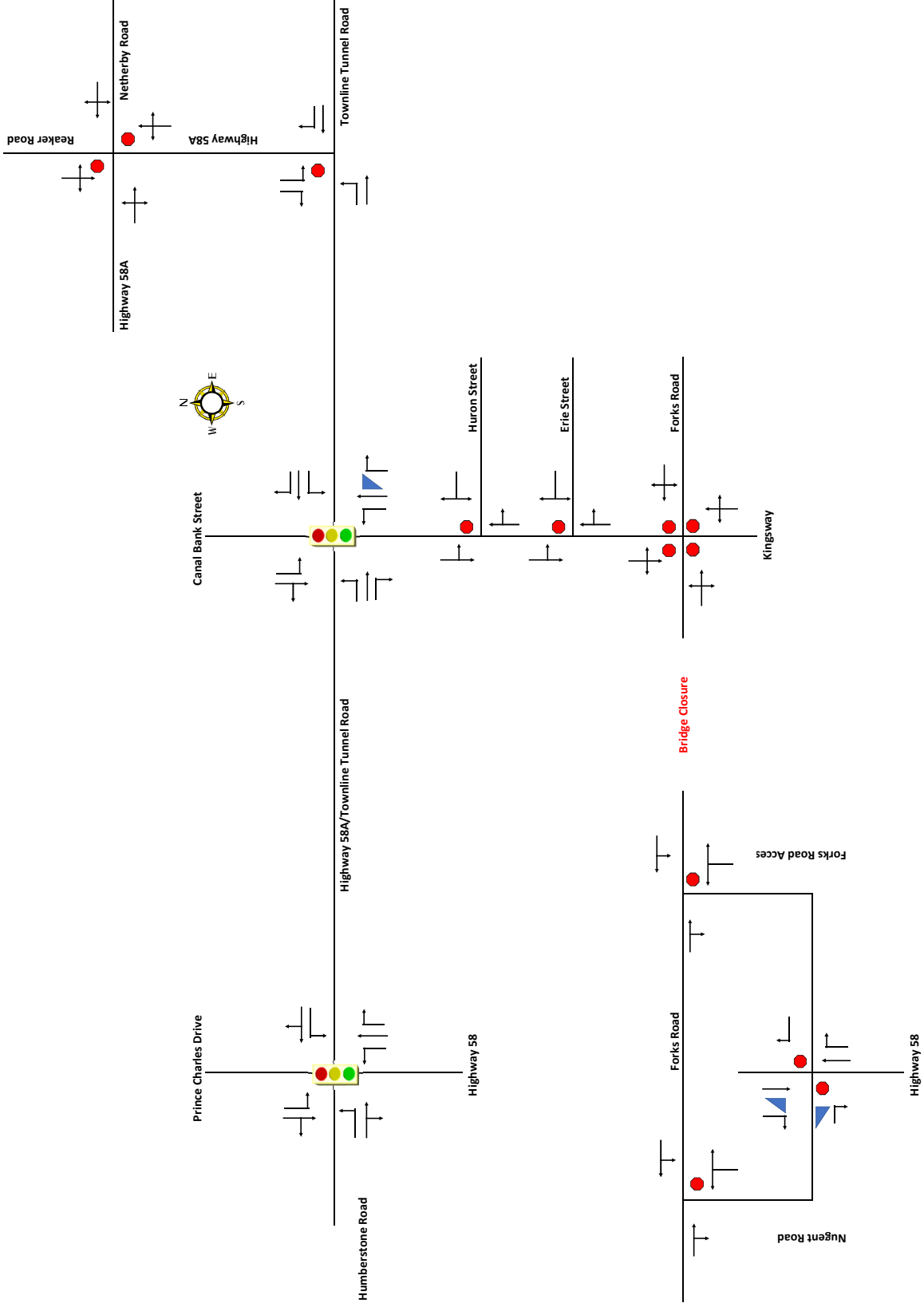
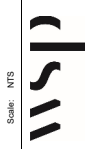


Figure 3-1
 Existing Lane Configuration
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study



3.2 EXISTING TRANSIT SERVICES

The study network is serviced by the following Welland Transit route:

- **Port Colborne Link** - operates Monday to Saturday and provides service between the Welland Downtown Terminal and the Port Colborne City Hall. The route operates with a headway of 1h at all times. Within the study area, the route has a stop along the north approach of the intersection of Canal Bank Street at Highway 58A.

3.3 EXISTING CYCLING FACILITIES

The Greater Niagara Cycling Route is located along Canal Bank Street north of Highway 58A, as well as along Colborne Street west of the Recreational Canal near Forks Road. There are no other cycling facilities located within near the study area intersections.

3.4 TRAFFIC DATA

WSP assessed traffic operations within the study area under the weekday AM and PM peak hours. Per the Terms of Reference correspondence between WSP, the City of Welland and the MTO, City staff requested that WSP assess traffic operations under two scenarios, as detailed below.

3.4.1 SCENARIO 1 - FORKS ROAD BRIDGE OPEN

As part of scenario 1, City staff requested that existing conditions as well as all future conditions be assessed assuming the Forks Road Bridge as operational (as it closed in November of 2018). City staff informed WSP that the bridge is planned to reopen before the 2027 horizon year, subject to federal funding, and accordingly would be assessed as opened under the future conditions. Therefore, City staff required that existing conditions be assessed assuming the bridge in operation to provide a comparative baseline to future conditions.

The intersections assessed within this study are listed below:

1. Nugent Road at Forks Round
2. Highway 58 at Nugent Road/Forks Road accesses
3. Forks Road at Highway 58 access
4. Canal Bank Street/Kingsway at Forks Road
5. Highway 58 at Townline Tunnel Road
6. Townline Tunnel Road at Canal Bank Street
7. Townline Tunnel Road at Highway 58A (Reaker Road)
8. Reaker Road at Netherby Road
9. Kingsway at Huron Street
10. Kingsway at Erie Street

Based on the above, traffic data for intersections 1 to 8 was obtained from the *Dain City Development Transportation Study* prepared by Paradigm in 2019, provided by City staff. The counts were completed in November and December of 2017 prior to the bridge closure. Considering counts were not available at the intersections of the Kingsway at Huron Street and at Erie Street, traffic volumes to and from the Huron and Erie Streets were derived using the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition) Land Use Code for Single Detached Dwellings and the conservative

estimation of 50 dwellings serviced by each street. Traffic was distributed assuming 60% to/from the north and 40% to/from the south along Kingsway. Traffic volumes along Canal Bank Street/Kingsway were balanced to account for the addition of traffic.

Table 3-1 details the date and hours of the study intersections surveys, as well as the weekday AM and PM peak hours of traffic. The 2017 survey data has been included in **Appendix A**.

Table 3-1 Intersection Turning Movement Count Sources - 2017

Intersection	Survey Date and Time	Peak Hours
Nugent Road at Forks Round	December 5 th , 2017 6-9AM & 4-7PM	7:15-8:15AM 4:00-5:00PM
Highway 58 at Nugent Road/Forks Road accesses	December 5 th , 2017 6-9AM & 4-7PM	7:30-8:30AM 4:15-5:15PM
Forks Road at Highway 58 access	December 5 th , 2017 6-9AM & 4-7PM	7:15-8:15AM 4:00-5:00PM
Canal Bank Street/Kingsway at Forks Road	November 15 th , 2017 6-9AM & 4-7PM	7:30-8:30AM 4:00-5:00PM
Highway 58 at Townline Tunnel Road	December 5 th , 2017 6-9AM & 4-7PM	7:30-8:30AM 4:15-5:15PM
Townline Tunnel Road at Canal Bank Street	November 15 th , 2017 6-9AM & 4-7PM	7:30-8:30AM 4:15-5:15PM
Townline Tunnel Road at Highway 58A (Reaker Road)	December 5 th , 2017 6-9AM & 4-7PM	7:15-8:15AM 4:30-5:30PM
Reaker Road at Netherby Road	December 5 th , 2017 6-9AM & 4-7PM	7:30-8:30AM 4:00-5:00PM
Kingsway at Huron Street	N/A	N/A
Kingsway at Erie Street	N/A	N/A

Based on the proposed density for the Dain East and Dain West subdivisions, it is anticipated that the intersections of Canal Bank Street at Townline Tunnel Road and Forks Road at Kingsway will see a significant increase in traffic, which would reduce the available capacity. Accordingly, it is WSP’s opinion that in future non-local traffic (i.e. traffic not travelling to the developments located between Forks Road and Canal Bank Street east of the canal) would no longer use Canal Bank Street but rather use Highway 58 to travel north. As such this traffic would be redistributed within the network as part of future total conditions. As such, for the purpose of continuity within this analysis, WSP redistributed the non-local traffic under existing conditions (as opposed to solely under future total conditions) in order to be able to complete a more accurate comparative analysis of existing, future background and future total conditions and quantify the impacts of the site onto the road network. The redistribution of non-local traffic has been detailed in **Appendix A**.

Following the redistribution of non-local traffic, the 2017 data was then grown to 2020 by applying a 2% annual growth rate to all turning movements along roadways providing connectivity to the study area, which is supported by AADT data along the provincial highways (see **Appendix A**). Turning movements to/from the following approaches were not grown from 2017 data as they do not provide access to non-local traffic:

- Turning movements at the intersection of Forks Road at Kingsway;
- Turning movements to/from the south approach of Canal Bank Street at Townline Tunnel Road;
- Turning movements to/from the north approach of the Reaker Road/Highway 58A at Netherby Road intersection; and
- Turning movements to/from the west approach of the Highway 58 at Townline Tunnel Road intersection.

The 2020 existing traffic volumes for scenario 1 have been illustrated in **Figure 3-2** and **Figure 3-3** for the AM and PM peak hours, respectively.

3.4.2 SCENARIO 2 – FORKS ROAD BRIDGE CLOSED

As part of scenario 2, City and MTO staff requested that the study network be assessed assuming the Forks Road Bridge closed (as it has been since November of 2018) under existing conditions and future conditions.

The periods of analysis included in this study are the weekday AM and PM peak hours. Turning movement count surveys at the study intersections were commissioned by WSP and completed by Horizon Data Services Ltd. (HDSL) on Thursday March 12th, 2020. Unfortunately, due to vandalism of surveying equipment, traffic data at the intersection of Townline Tunnel Road at Canal Bank Street could not be collected.

TMC data was re-surveyed at the intersection of Townline Tunnel Road at Canal Bank Street on Tuesday March 17th, 2020. WSP understands that March 17th falls within the March break week. In order to account for the school closures and derive more general traffic data at the study intersection, WSP completed a comparative review of traffic volumes along Townline Tunnel Road for the segments directly east of Highway 58 (collected March 12th) and directly west of Canal Bank Street (collected March 17th). Review of the data shows that traffic along the roadway east of Highway 58 is higher by 34%. Therefore, as a conservative measure a 34% growth was applied to all turning movements at the intersection of Townline Tunnel Road at Canal Bank Street in order to derive traffic data to use under existing conditions. This methodology was discussed with the City of Welland and the MTO. In addition to the above, WSP included the intersection of Kingsway at Huron Street and at Erie Street with the same methodology as under Scenario 1. Traffic volumes along Canal Bank Street/Kingsway were balanced to account for the addition of traffic.

Table 3-2 details the date and hours of the study intersections surveys, as well as the weekday AM and PM peak hours of traffic. The 2020 TMC data has been included in Appendix A.

Table 3-2 Intersection Turning Movement Count Sources – 2020

Intersection	Survey Date and Time	Peak Hours
Nugent Road at Forks Round	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:30-8:30 AM 5:00-6:00 PM
Highway 58 at Nugent Road/Forks Road accesses	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:45-8:45 AM 4:00-5:00 PM
Forks Road at Highway 58 access	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:30-8:30 AM 4:45-5:45 PM
Canal Bank Street/Kingsway at Forks Road	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:15-8:15 AM 5:00-6:00 PM
Highway 58 at Townline Tunnel Road	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:45-8:45 AM 4:15-5:15 PM
Townline Tunnel Road at Canal Bank Street	Tuesday March 17 th , 2020 7-9AM & 4-6PM	7:00-8:00 AM 4:30-5:30 PM
Townline Tunnel Road at Highway 58A (Reaker Road)	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:30-8:30 AM 4:15-5:15 PM
Reaker Road at Netherby Road	Thursday March 12 th , 2020 7-9AM & 4-6PM	7:30-8:30 AM 4:00-5:00 PM
Kingsway at Huron Street	N/A	N/A
Kingsway at Erie Street	N/A	N/A

The 2020 existing traffic volumes for Scenario 2 have been illustrated in Figure 3-4 and Figure 3-5 for the AM and PM peak hours, respectively.

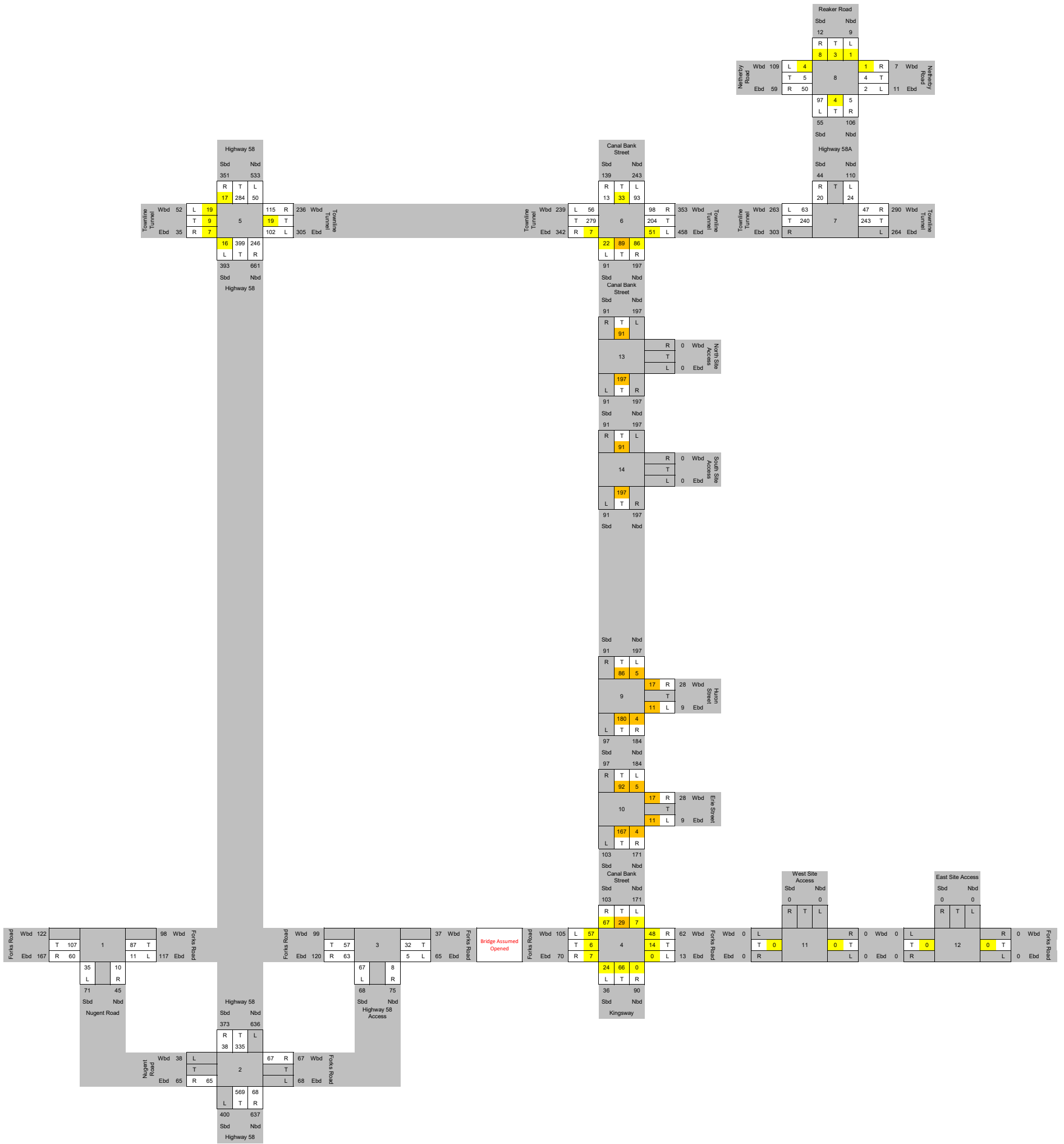


Figure 3-2
 Derived 2020 Existing Traffic Volumes Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Balanced Volumes to Account for Traffic at Erie St and Huron St
 No growth rate applied to these turning movements as they are not assumed to provide access to non-local traffic.

Scale: NTS



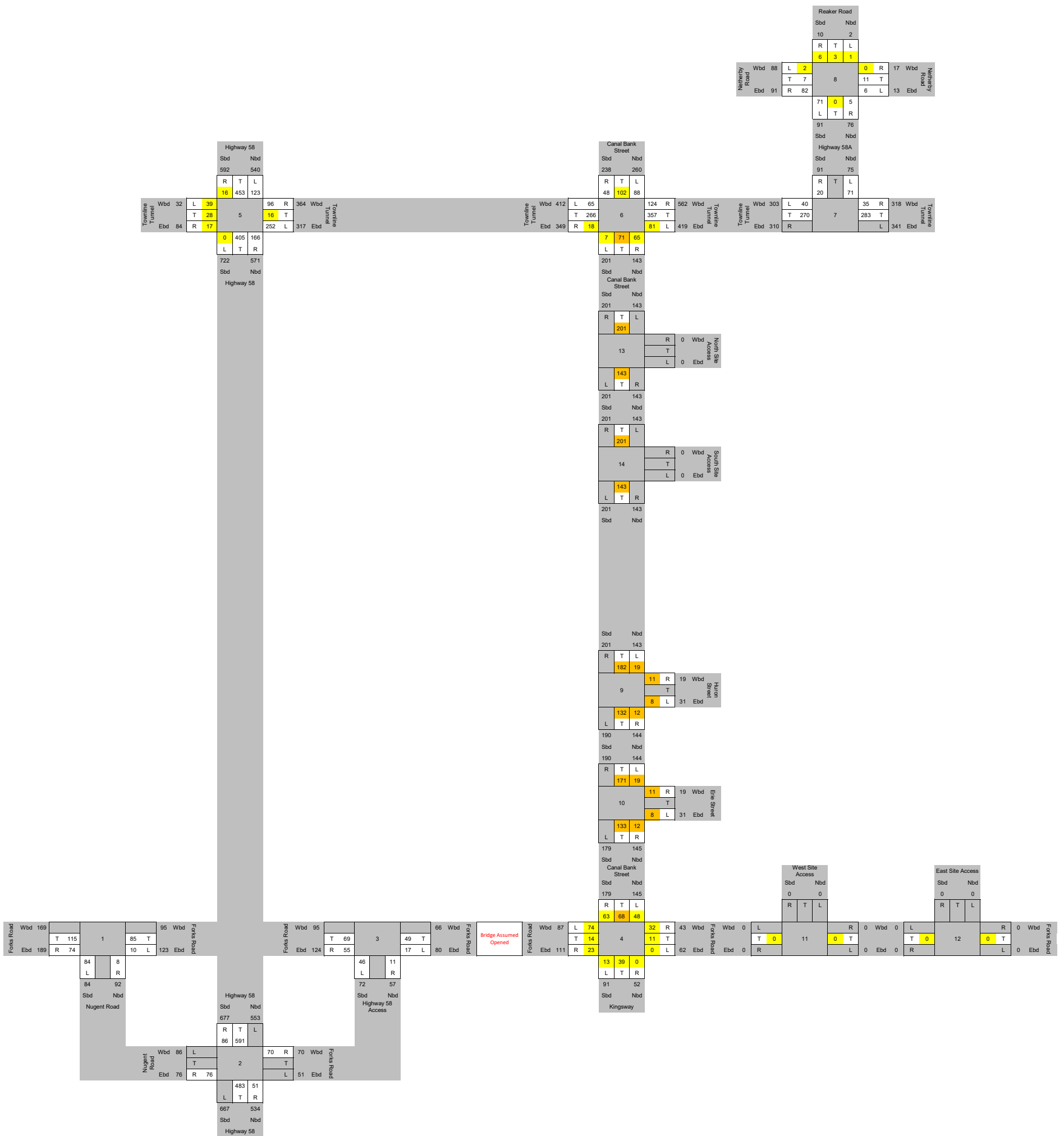


Figure 3-3
 Derived 2020 Existing Traffic Volumes Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Balanced Volumes to Account for Traffic at Erie St and Huron St
 No growth rate applied to these turning movements as they are not assumed to provide access to non-local traffic.

Scale: NTS



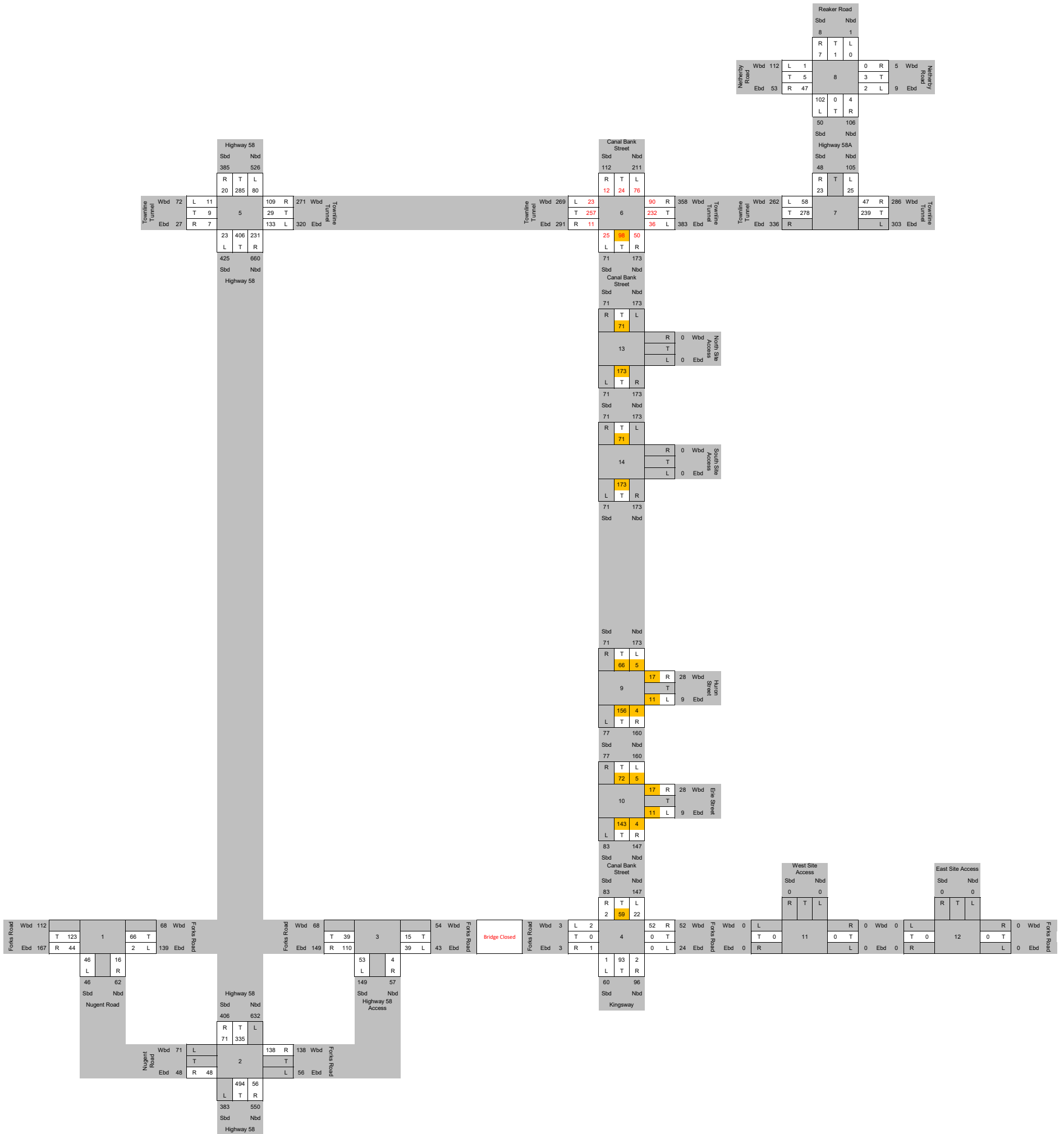


Figure 3-4
 Derived 2020 Existing Traffic Volumes Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Volumes Adjusted to account for different survey dates
 Balanced Volumes to Account for Traffic at Erie St and Huron St and traffic readjustment at the intersection of Canal Bank Street at Townline Tunnel Road

Scale: NTS



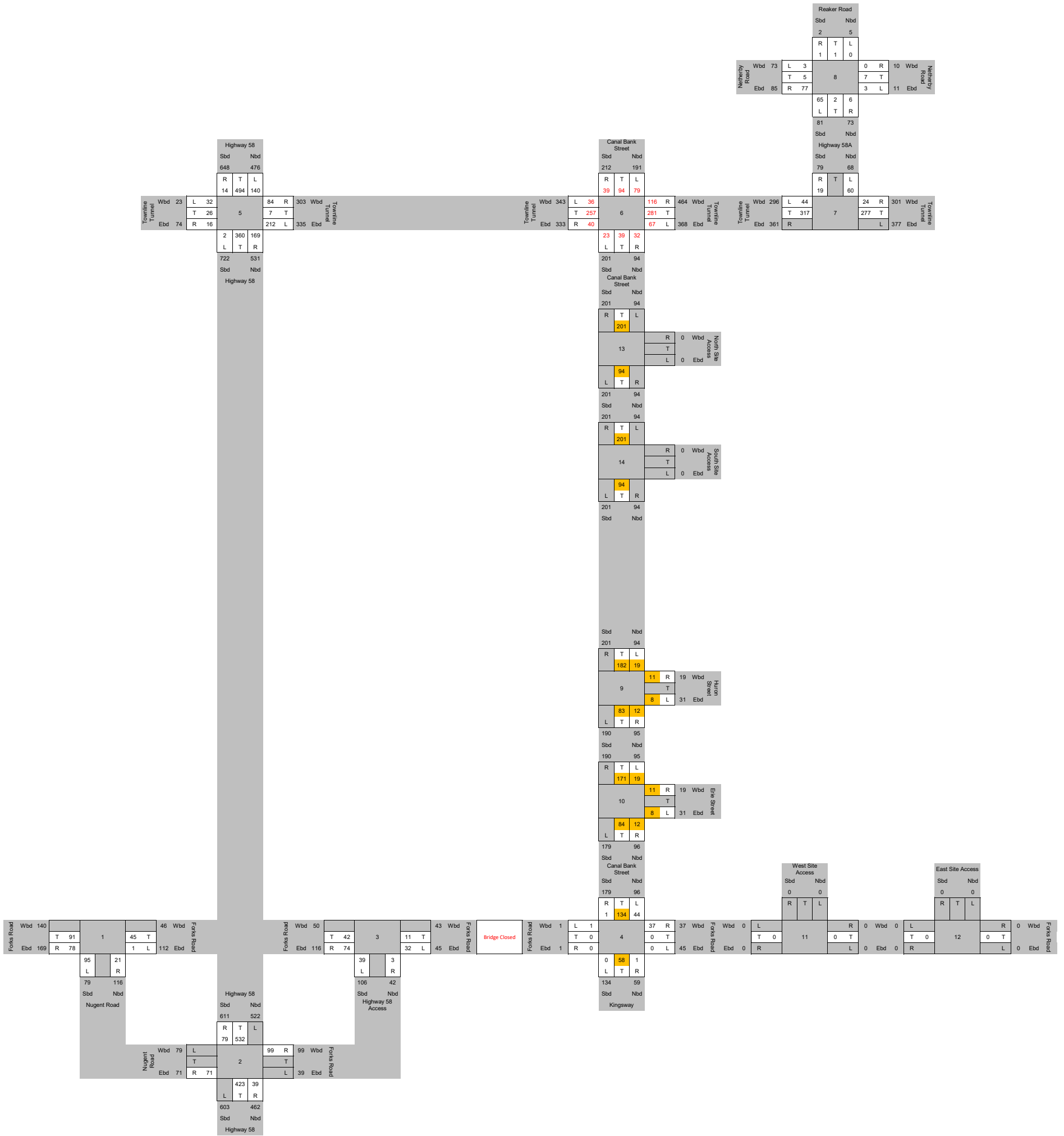


Figure 3-5
 2020 Existing Traffic Volumes Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Volumes Adjusted to account for different survey dates
 Balanced Volumes to Account for Traffic at Erie St and Huron St and traffic readjustment at the intersection of Canal Bank Street at Townline Tunnel Road

Scale: NTS



3.5 EXISTING TRAFFIC ANALYSIS

The operation of the study intersections was analyzed using the Highway Capacity Manual (HCM) methodology, and Synchro 10.0. The heavy vehicle percentages, bicycle and pedestrian counts were derived from the TMC data. The peak hour factors (PHF) and ideal saturation flow rate were applied to the model as per the Niagara Region TIS Guidelines. Signal timing plans were provided by the Niagara Region and included in **Appendix A**.

Table 3-3 provides a summary of intersection Level of Service (LOS) under existing conditions for scenario 1, and **Table 3-4** provides a summary for scenario 2. LOS definitions are provided in **Appendix B** and intersection capacity analysis reports are provided in **Appendix C**. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

Table 3-3 Existing Traffic Conditions - Scenario 1

Intersection Movement	Control Type	AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Nugent Road at Forks Road Northbound Left+Right	Stop- Controlled	0.07	10	B	0.14	11	B
Highway 58 at Forks Road Access Eastbound Right Westbound Right	Stop- Controlled	0.11 0.15	11 14	B B	0.17 0.14	14 13	B B
Highway 58 Access at Forks Road Northbound Left+Right	Stop- Controlled	0.10	10	A	0.08	10	A
Kingsway at Forks Road Eastbound Left+Through+Right Westbound Left+Through+Right Northbound Left+Through+Right Southbound Left+Through+Right	Stop- Controlled	0.30 0.10 0.08 0.12 0.13	8 8 7 8 8	A A A A A	0.35 0.15 0.05 0.07 0.23	8 8 7 8 9	A A A A A
Highway 58 at Townline Tunnel Road Westbound Left	Signalized	0.42 -	14 -	B -	0.60 0.89	22 62	C E
Townline Tunnel Road at Canal Bank Street	Signalized	0.32	11	B	0.38	14	B
Townline Tunnel Road at Reaker Road Southbound Left Southbound Right	Stop- Controlled	0.06 0.03	14 10	B A	0.19 0.03	16 10	C B
Reaker Road at Netherby Road Northbound Left+Through+Right Southbound Left+Through+Right	Stop- Controlled	0.12 0.01	9 9	A A	0.09 0.01	10 9	A A

Intersection Movement	Control Type	AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Kingsway at Huron Street Westbound Left+Right	Stop- Controlled	0.04	10	A	0.03	10	A
Kingsway at Erie Street Westbound Left+Right	Stop- Controlled	0.04	10	A	0.03	10	A

Based on the above table, the intersections currently operate with good LOS C or better during the study periods with the Forks Bridge open. Only the westbound left-turn movement at the intersection of Highway 58 at Townline Tunnel Road operates under critical conditions during the PM peak hour, but no movements operate over capacity which is acceptable.

Table 3-4 Existing Traffic Conditions - Scenario 2

Intersection Movement	Control Type	AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Nugent Road at Forks Road Northbound Left+Right	Stop- Controlled	0.09	10	B	0.16	10	B
Highway 58 at Forks Road Access Eastbound Right Westbound Right	Stop- Controlled	0.08 0.28	11 14	B B	0.15 0.18	13 12	B B
Highway 58 Access at Forks Road Northbound Left+Right	Stop- Controlled	0.08	10	B	0.06	10	A
Kingsway at Forks Road Eastbound Left+Through+Right Westbound Left+Through+Right Northbound Left+Through+Right Southbound Left+Through+Right	Stop- Controlled	0.22 0.00 0.06 0.12 0.11	8 8 7 8 8	A A A A A	0.27 0.00 0.04 0.07 0.22	8 7 7 8 8	A A A A A
Highway 58 at Townline Tunnel Road	Signalized	0.46	15	B	0.59	18	B
Townline Tunnel Road at Canal Bank Street	Signalized	0.27	13	B	0.30	13	B
Townline Tunnel Road at Reaker Road Southbound Left Southbound Right	Stop- Controlled	0.07 0.03	15 10	C A	0.18 0.03	17 10	C A
Reaker Road at Netherby Road Northbound Left+Through+Right Southbound Left+Through+Right	Stop- Controlled	0.12 0.01	9 9	A A	0.09 0.00	9 9	A A

Intersection	Control Type	AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Kingsway at Huron Street	Stop-Controlled						
Westbound Left+Right		0.04	10	A	0.03	10	A
Kingsway at Erie Street	Stop-Controlled						
Westbound Left+Right		0.04	10	A	0.03	10	A

Based on the above table, the intersections currently operate with good LOS C or better during the study periods with the Forks Bridge closed. No turning movements currently operate under critical conditions

In addition to the traffic operations review at the study intersections, WSP completed a review of the queueing along Canal Bank Street/Kingsway at the rail crossing located adjacent to St. Clair Drive based on the scenario 1 volumes (as requested by City staff). Based on correspondence with Trillium Railway, WSP understands that the tracks are open between 7AM and 7PM and that one train crossing per hour can be expected on a busy day with a crossing time of approximately 5-minutes. Using the hourly traffic volumes along the roadway, WSP derived the estimated number of vehicles that would be in queue during the 5-min interval. Assuming each vehicle would take up to 7m of length (which includes front and back bumper buffers), the estimated queues are detailed in **Table 3-5**.

Table 3-5 Existing Traffic Conditions - Canal Bank Street Rail Crossing Queueing (Scenario 1)

Intersection	Available Storage (m) ¹	Queue Length (m)	
		AM	PM
Kingsway/Canal Bank Street at Rail Crossing			
Northbound	50	115	83
Southbound	90	53	117

Note: ¹Distance to the nearest intersection/access. Northbound stop bar is approximately 250m north of the intersection at Forks Road.

Based on the above table, the northbound queue during the AM and PM peak hours encroaches onto the adjacent intersection at Huron Street and residential accesses. Similarly, the southbound queue encroaches onto the commercial access during the PM peak hour.

Both queues are contained within the free-flow segments of Kingsway/Canal Bank Street and do not extend to near-by intersections where the roadway is under control (e.g. Kingsway at Forks Road), which is acceptable. When the crossing is activated, the queue is projected to block movements from Huron Street onto Kingsway, as well as from select private accesses. However, it should be noted that the crossing is estimated to be activated only once an hour on very busy days. As such, these queues do not occur regularly and are only expected to last a short while when they do.

4 FUTURE BACKGROUND CONDITIONS

4.1 STUDY HORIZON YEARS

As established through correspondence with the City of Welland and the MTO, the following three horizon years were selected to assess future traffic conditions:

- 2027 – assumed as Phase 1 of the development
 - 2032 – assumed as Phase 2 of the development
 - 2037 – assumed as Phase 3 of the development
-

4.2 PLANNED ROADWAY IMPROVEMENTS

The Forks Road Bridge is planned to be reopened before the 2027 horizon year, subject to federal funding.

Additionally, both Forks Road (from Kingsway eastward) and Canal Bank Street (between Forks Road and Townline Tunnel Road) are planned to be reconstructed by the first future horizon year assessed within this study (2027) as the reconstruction is driven by the development of the proposed subdivision. The planned reconstruction of Canal Bank Street consists of a realignment of the roadway to accommodate a proposed park on the west side of the roadway and maintaining a two-lane cross-section as under existing conditions. The planned reconstruction of Forks Road consists of an urbanization of the roadway and maintaining a two-lane cross-section as under existing conditions. Finally, both roadways are planned to be widened with no set date of improvement, as per the City of Welland Official Plan Schedule F.

4.3 LOCAL BACKGROUND DEVELOPMENTS

Traffic associated with the following background development was considered as part of future background conditions:

- The Fusion Homes Residential Subdivision - proposed to consist of 291 dwelling units, located south of Forks Road bounded by Welland Canal to the east. The subdivision is proposed to be accessed via Kingsway and Forks Road.

Traffic generated by the above development was assigned to the study roadways based on the Transportation Impact Study report completed for the development by the IBI Group in November of 2010.

4.4 BACKGROUND TRAFFIC GROWTH

A 2% annual traffic growth rate was applied to the applicable turning movements in order to derive a baseline traffic volume for future conditions, as confirmed with City staff and supported by AADT data along the provincial highways. As when deriving existing conditions, traffic growth was not applied to the turning movements to/from the following approaches as they would not provide access to non-local traffic:

- Turning movements at the intersection of Forks Road at Kingsway;
- Turning movements to/from the south approach of Canal Bank Street at Townline Tunnel Road;
- Turning movements to/from the north approach of the Reaker Road/Highway 58A at Netherby Road intersection; and
- Turning movements to/from the west approach of the Highway 58 at Townline Tunnel Road intersection.

4.5 BACKGROUND TRAFFIC VOLUMES

The Future Background traffic volumes were calculated by applying the annual growth rate to the existing traffic volumes, as well as traffic generated by the adjacent development.

For the 2027 horizon year, the future background traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 4-1** and **Figure 4-2**, respectively. The future background traffic volumes for scenario 2 are illustrated in **Figure 4-3** and **Figure 4-4**.

For the 2032 horizon year, the future background traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 4-5** and **Figure 4-6**, respectively. The future background traffic volumes for scenario 2 are illustrated in **Figure 4-7** and **Figure 4-8**.

For the 2037 horizon year, the future background traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 4-9** and **Figure 4-10**, respectively. The future background traffic volumes for scenario 2 are illustrated in **Figure 4-11** and **Figure 4-12**.

4.6 ALL-WAY STOP-CONTROL WARRANTS

WSP completed an All-Way Stop-Control (AWSC) warrant analysis for the intersections of Kingsway at Erie Street and at Huron Street under the future background conditions. The AWSC warrant analyses have been included in **Appendix D**. The analysis has been summarized in **Table 4-1**.

The 6-hour non-peak traffic forecast was estimated using the following equation for average hourly volumes from the Ontario Traffic Manual Book 12:

$$(AM\ Peak\ Hour\ Volumes + PM\ Peak\ Hour\ Volumes) / 4$$

Additionally, an assumption of 20 pedestrians crossing Kingsway was assigned during the peak hours, with 10 pedestrians during non-peak hours, for the purpose of conservative analysis.

Considering no background growth was applied along Kingsway, Erie Street or Huron Street due to the lack of non-local traffic, the projected traffic volumes at the study intersections are projected to be similar under all horizon years for each of the scenarios.

Table 4-1 AWSC Warrant Analyses Results Traffic Conditions

Horizon Year	Intersection	AWSC Warranted?	
		Scenario 1	Scenario 2
2027/2032/2037	Kingsway at Huron Street	NO	NO
Future Background	Kingsway at Erie Street	NO	NO

The study intersections were assessed according to the above results, which shows that an AWSC is not warranted at the two intersections.

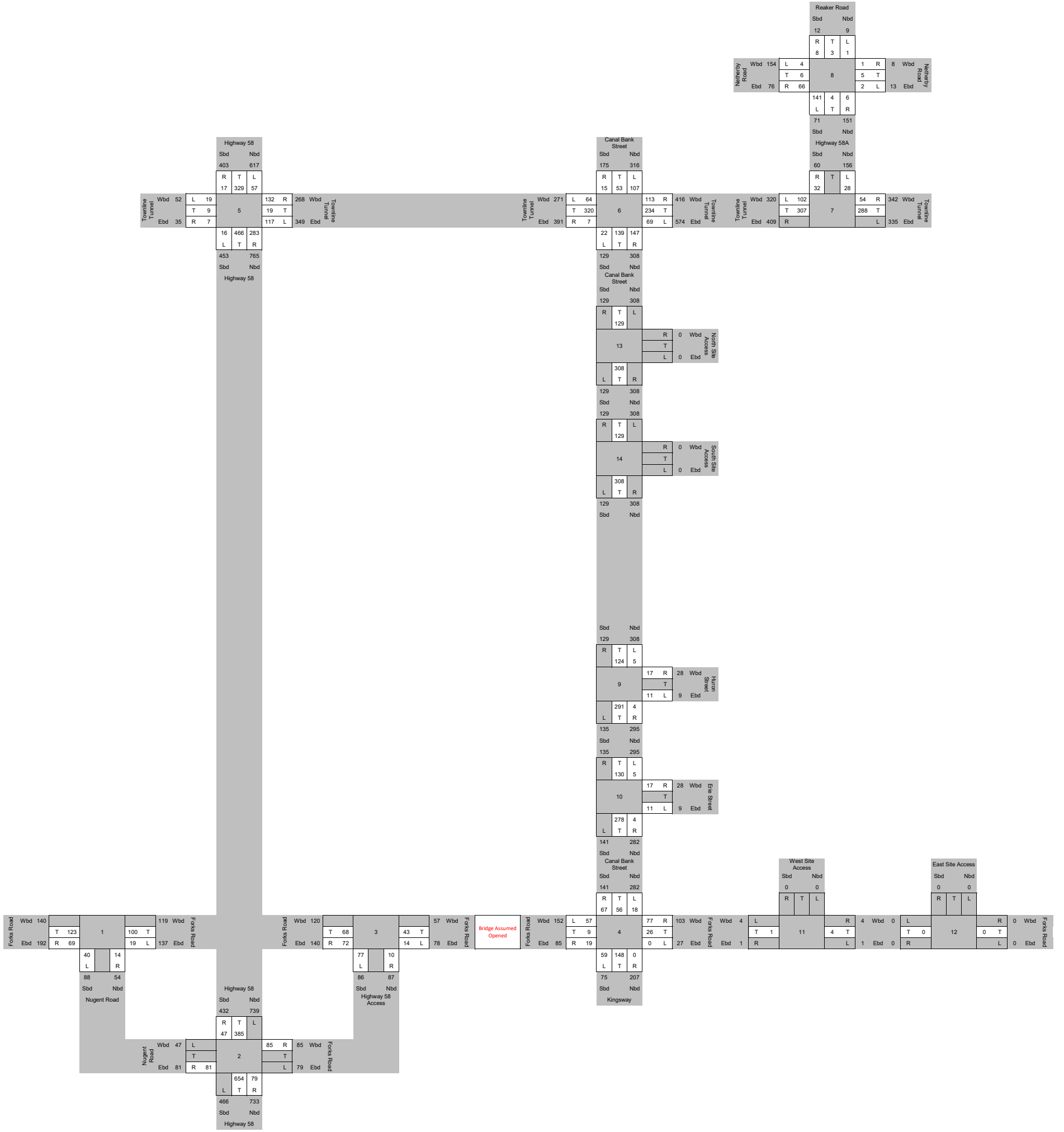


Figure 4-1
 2027 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



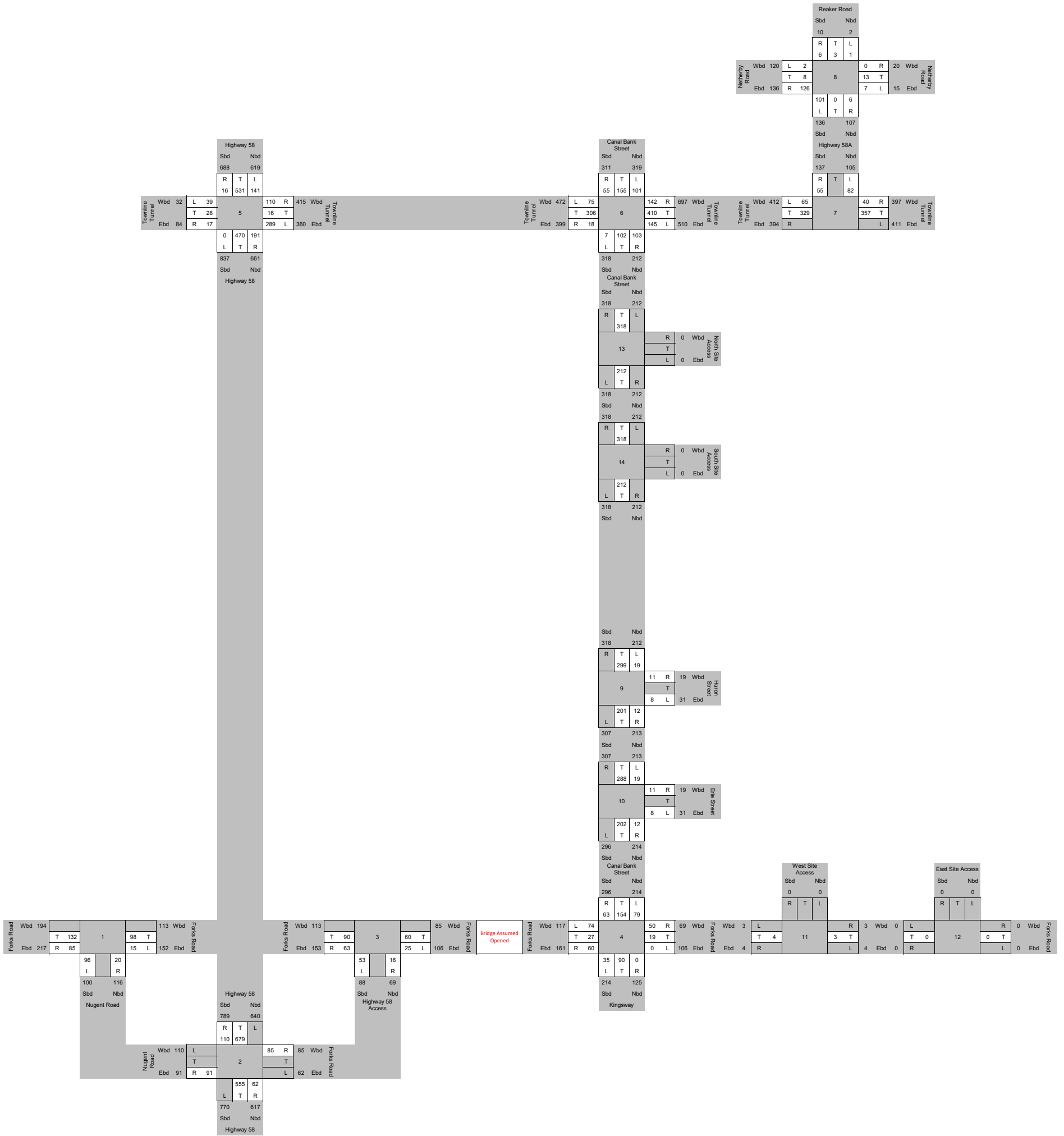


Figure 4-2
 2027 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



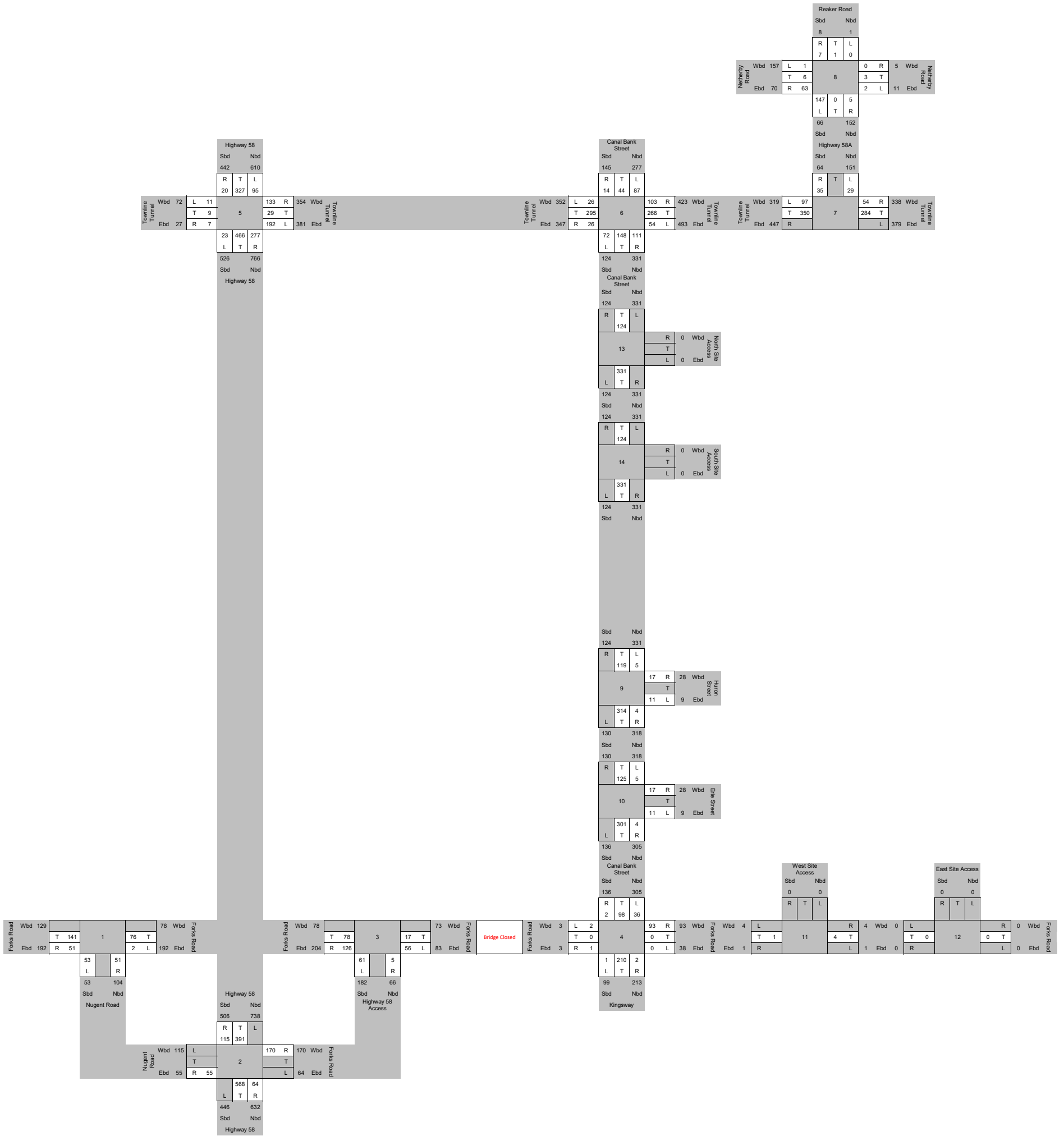


Figure 4-3
 2027 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



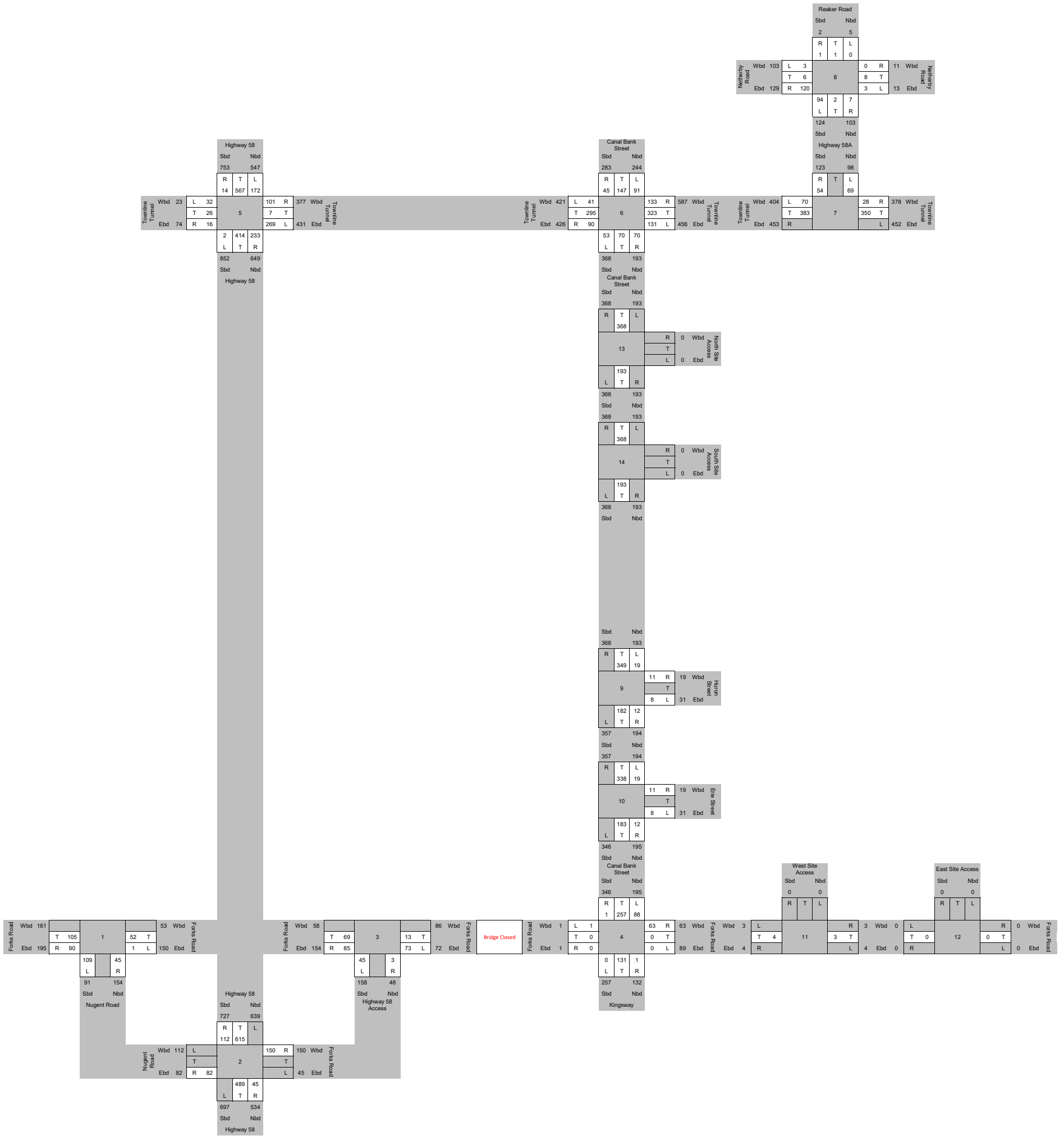


Figure 4-4
 2027 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



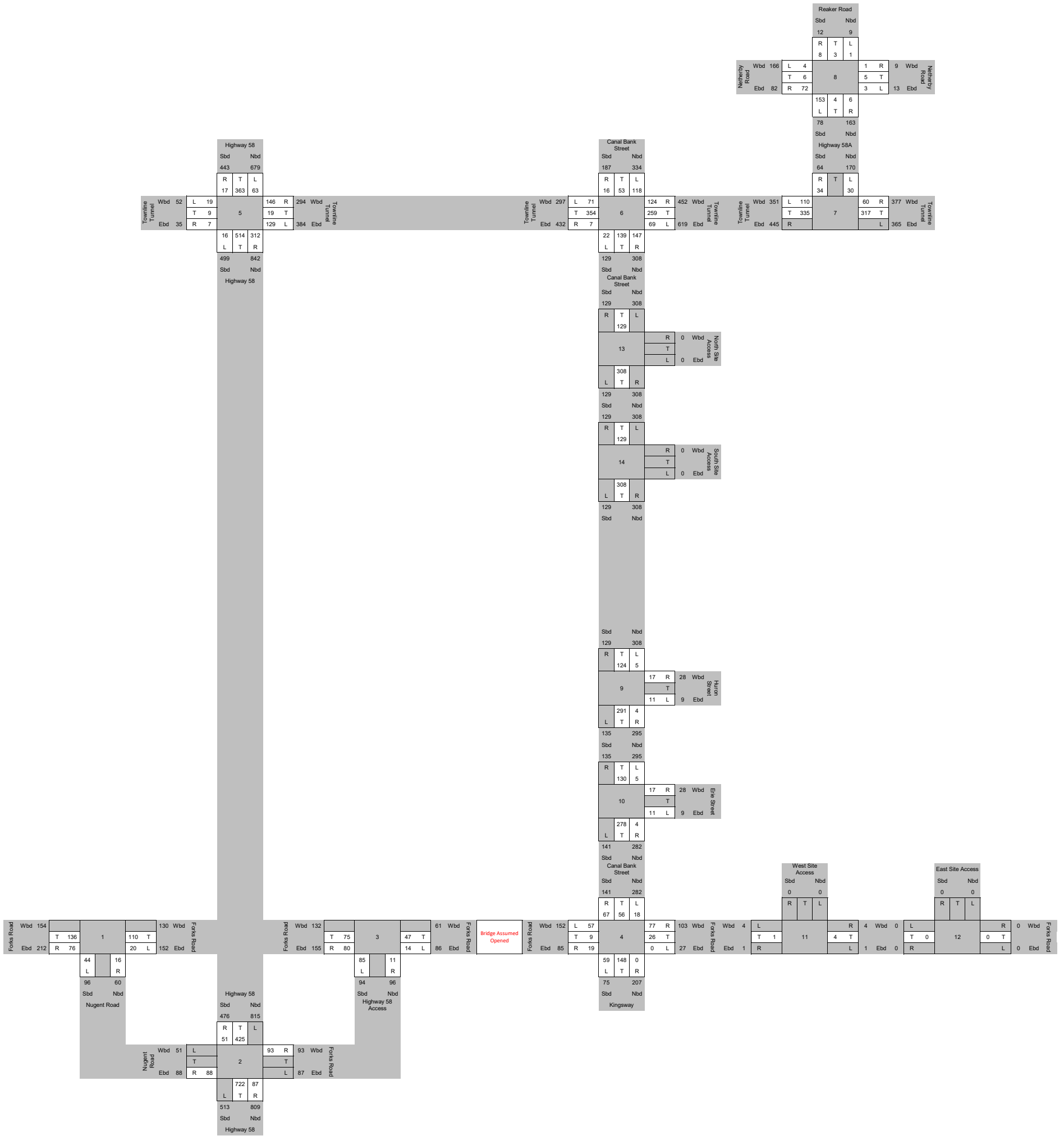


Figure 4-5
 2032 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



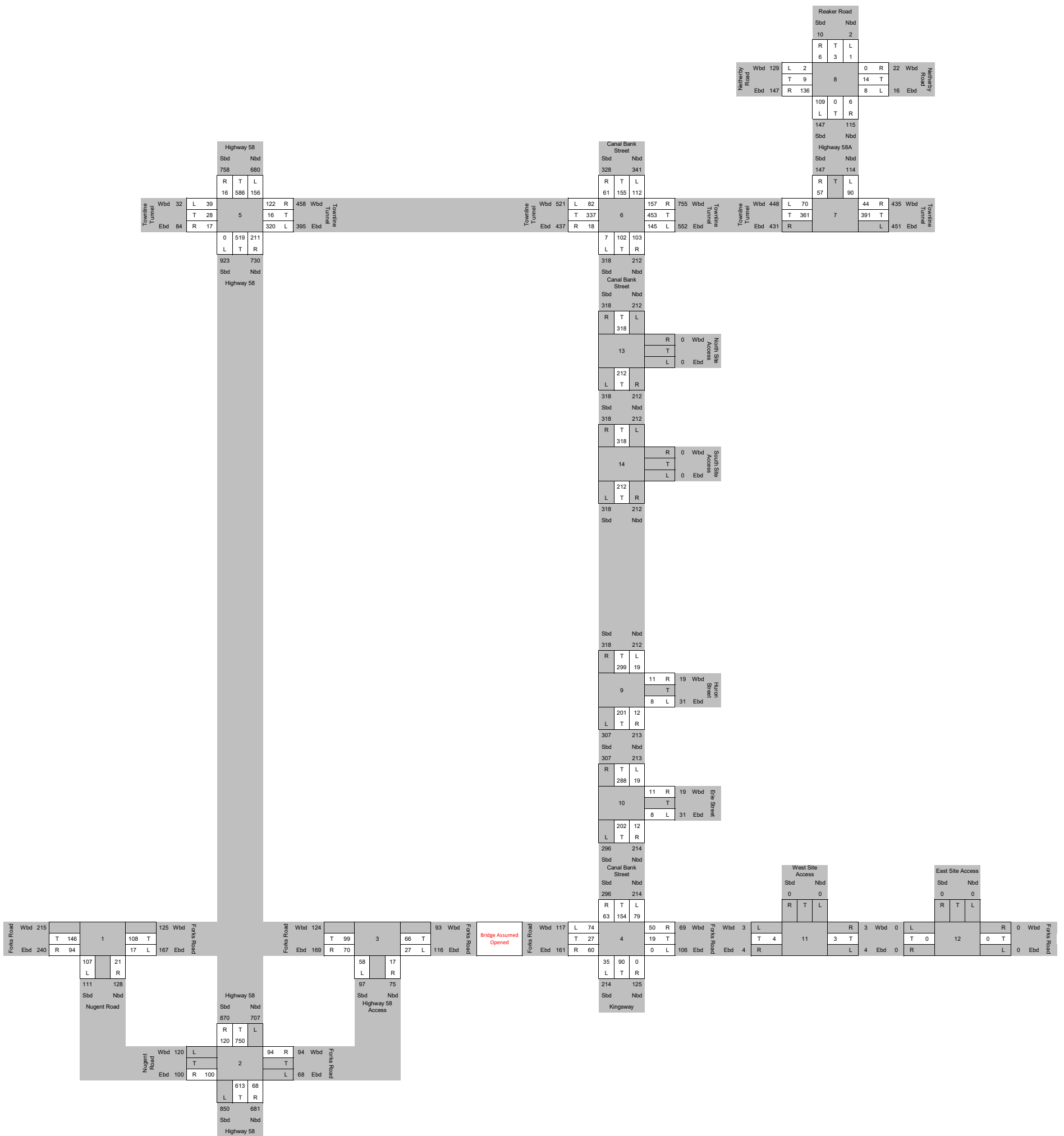


Figure 4-6
 2032 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



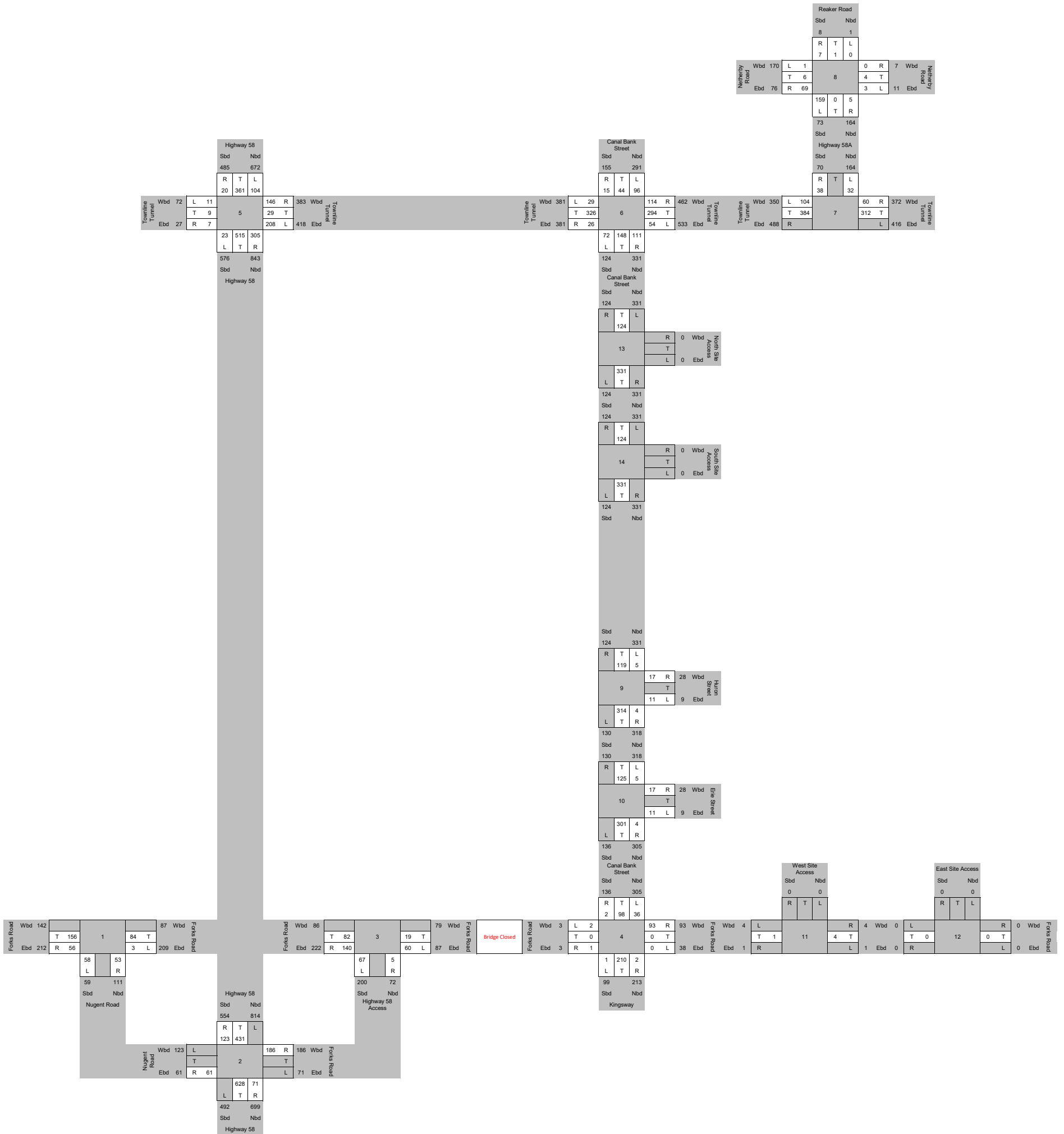


Figure 4-7
 2032 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



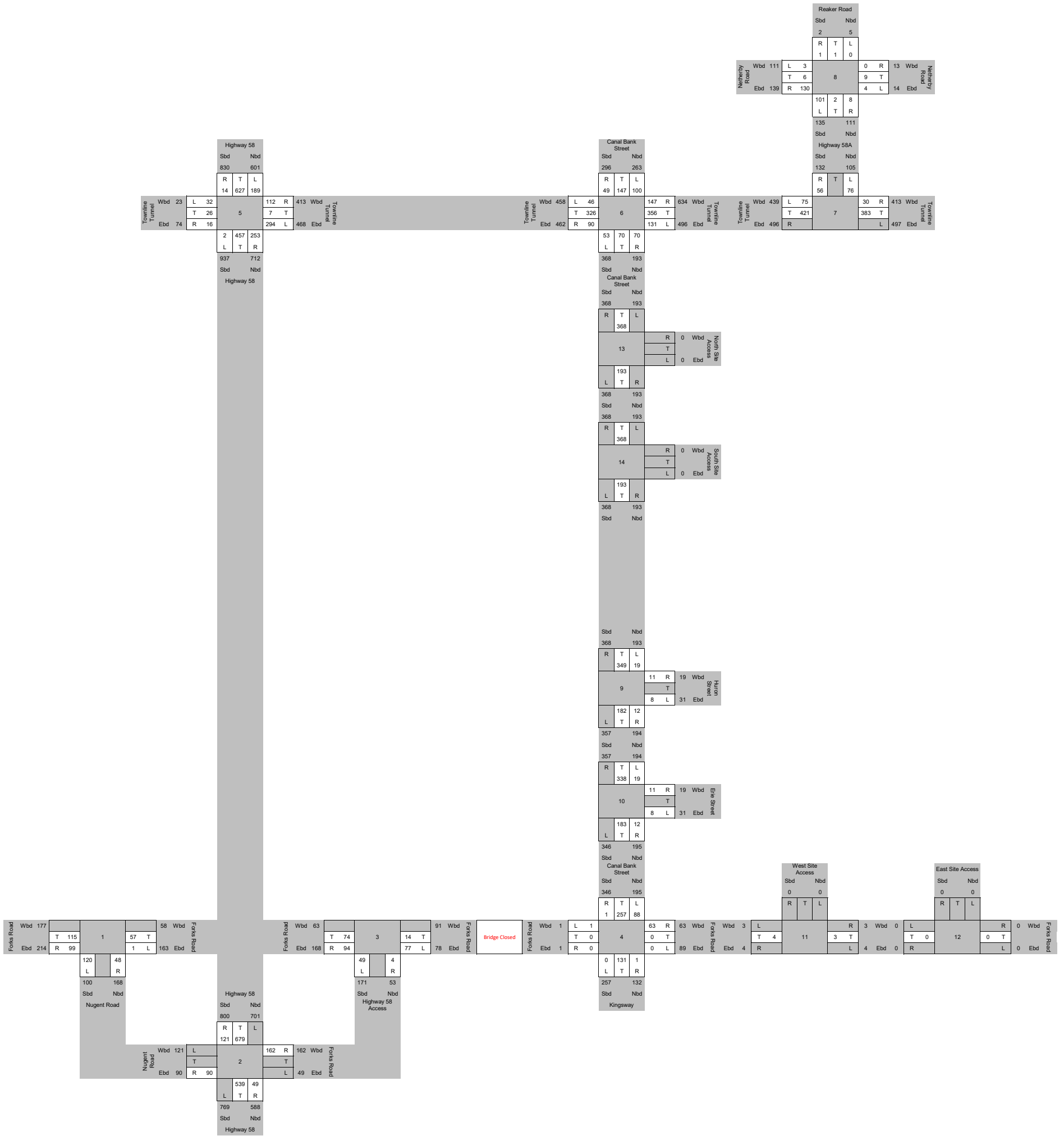


Figure 4-8
 2032 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



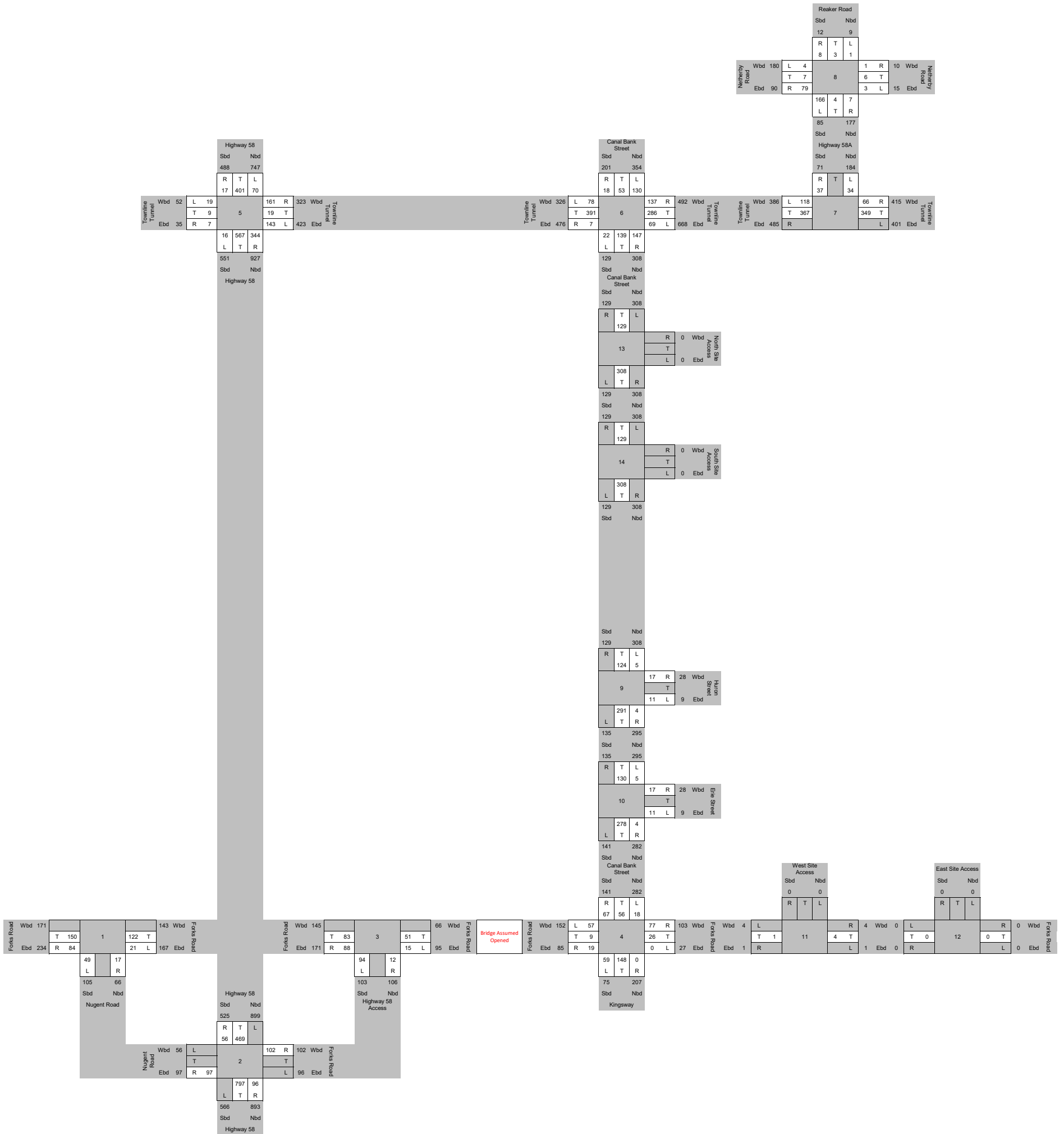


Figure 4-9
 2037 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



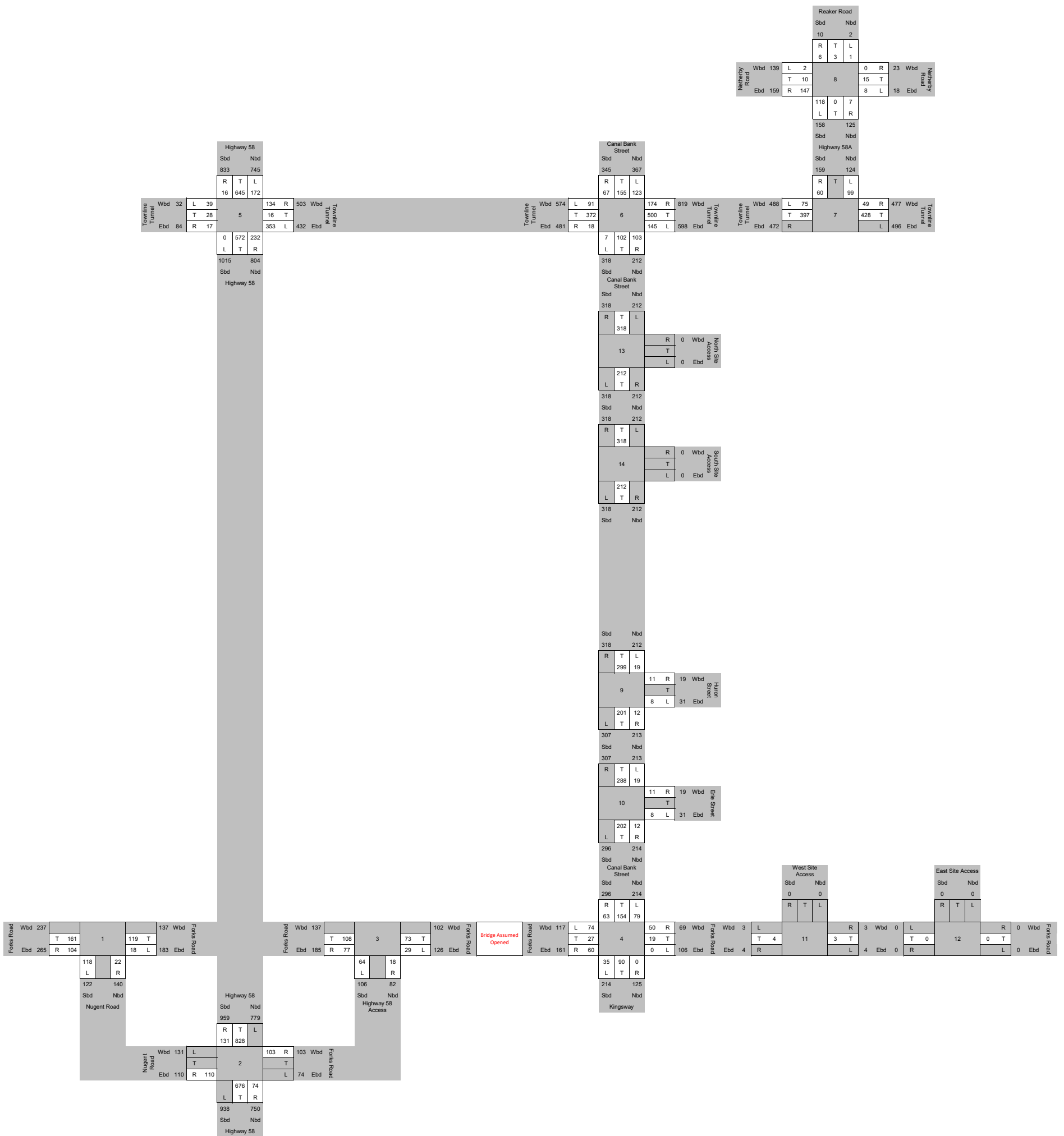


Figure 4-10
 2037 Future Background Traffic Volumes Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



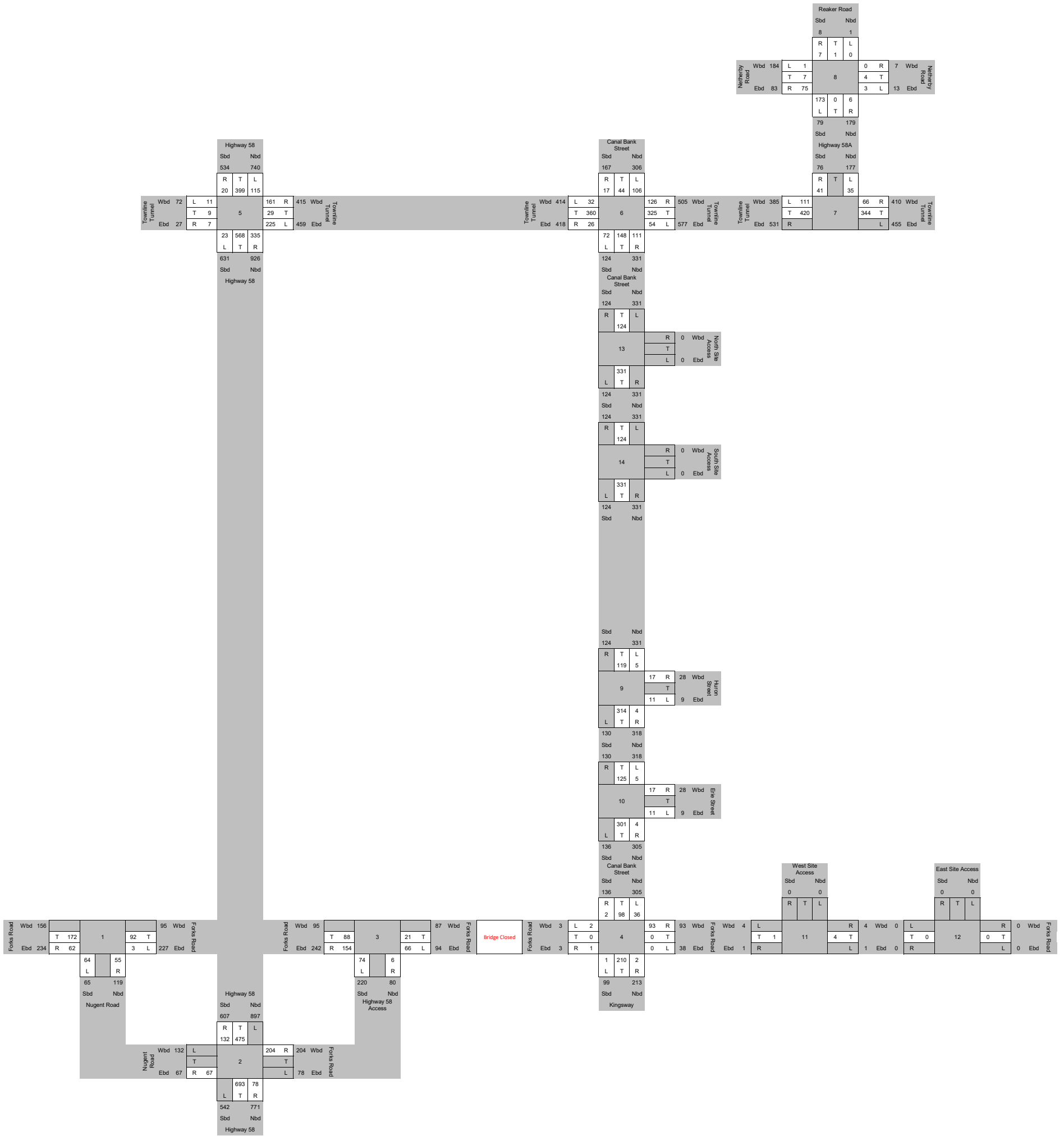


Figure 4-11
 2037 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



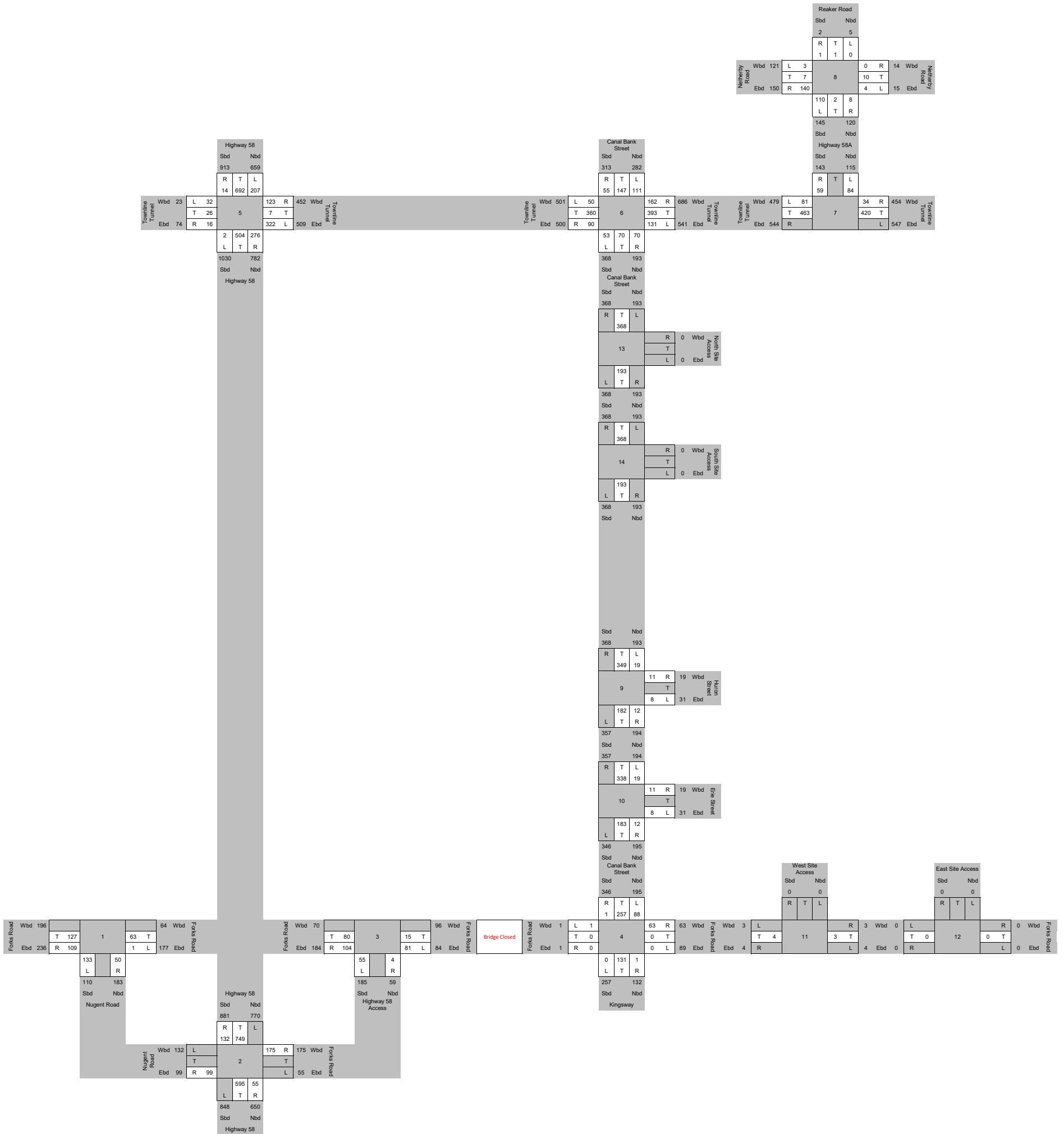


Figure 4-12
 2037 Future Background Traffic Volumes Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study
 201-02725-00_Dain City Traffic Model_20200629.xlsx

Scale: NTS



4.7 FUTURE BACKGROUND TRAFFIC CONDITIONS

4.7.1 SCENARIO 1

Table 4-2 further below provides a summary of intersection Level of Service (LOS) for the intersections analyzed in the study area under future background traffic conditions for scenario 1. The Synchro results have been included in **Appendix C**. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

In order to accommodate future traffic volumes, the following improvements were applied to the roadway network:

- Under the 2027 future background conditions
 - Townline Tunnel Road at Highway 58
 - Optimize splits during the under the PM peak hour

Table 4-2 Future Background Traffic Conditions – Scenario 1

Intersection	Control Type	2027 Future Background						2032 Future Background						2037 Future Background					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Nugent Road at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.08	11	B	0.18	11	B	0.10	11	B	0.21	12	B	0.11	11	B	0.24	13	B
Highway 58 at Forks Road Access	Stop-Controlled																		
Eastbound Right		0.14	12	B	0.24	16	C	0.16	12	B	0.29	18	C	0.19	13	B	0.35	21	C
Westbound Right		0.21	16	C	0.19	14	B	0.26	17	C	0.22	15	C	0.31	20	C	0.27	17	C
Highway 58 Access at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.12	10	B	0.10	10	B	0.13	10	B	0.11	11	B	0.15	11	B	0.13	11	B
Kingsway at Forks Road	Stop-Controlled																		
Eastbound Left+Through+Right		0.41	9	A	0.47	10	B	0.41	9	A	0.47	10	B	0.41	9	A	0.47	10	B
Westbound Left+Through+Right		0.13	9	A	0.24	10	A	0.13	9	A	0.24	10	A	0.13	9	A	0.24	10	A
Northbound Left+Through+Right		0.14	8	A	0.10	8	A	0.14	8	A	0.10	8	A	0.14	8	A	0.10	8	A
Southbound Left+Through+Right		0.29	10	A	0.19	9	A	0.29	10	A	0.19	9	A	0.29	10	A	0.19	9	A
Southbound Left+Through+Right		0.19	9	A	0.42	11	B	0.19	9	A	0.42	11	B	0.19	9	A	0.42	11	B
Highway 58 at Townline Tunnel Road	Signalized																		
Westbound Left		0.48	15	B	0.70	21	C	0.53	15	B	0.77	24	C	0.58	16	B	0.92	36	D
Townline Tunnel Road at Canal Bank Street	Signalized	-	-	-	-	-	-	-	-	-	0.86	46	D	-	-	-	0.96	68	E
Townline Tunnel Road at Reaker Road	Stop-Controlled																		
Southbound Left		0.37	13	B	0.46	15	B	0.40	14	B	0.50	15	B	0.44	14	B	0.53	16	B
Southbound Right		0.10	19	C	0.30	22	C	0.13	21	C	0.37	27	D	0.16	24	C	0.47	34	D
Reaker Road at Netherby Road	Stop-Controlled																		
Northbound Left+Through+Right		0.05	10	B	0.09	11	B	0.05	11	B	0.10	11	B	0.06	11	B	0.11	12	B
Southbound Left+Through+Right		0.18	10	A	0.14	10	A	0.20	10	A	0.15	10	B	0.21	10	B	0.16	10	B
Kingsway at Huron Street	Stop-Controlled																		
Westbound Left+Right		0.01	9	A	0.01	9	A	0.01	9	A	0.01	9	A	0.01	9	A	0.01	9	A
Kingsway at Erie Street	Stop-Controlled																		
Westbound Left+Right		0.05	11	B	0.03	11	B	0.05	11	B	0.03	11	B	0.05	11	B	0.03	11	B
Westbound Left+Right	Stop-Controlled																		
Westbound Left+Right		0.05	11	B	0.03	11	B	0.05	11	B	0.03	11	B	0.05	11	B	0.03	11	B

As under existing conditions, the majority of intersections are projected to operate with good LOS C or better during the study periods with the Forks Bridge open. The intersection of Townline Tunnel Road at Highway 58 is projected to operate with its westbound left-turn movement under critical conditions during the PM peak hour for the 2032 and 2037 future background conditions, but all turning movements are projected to remain below capacity.

As under existing conditions, WSP assessed the projected queues along Canal Bank Street/Kingsway at the rail crossing located adjacent to St. Clair Drive based on the scenario 1 volumes. The analysis findings have been detailed in **Table 4-3**. As previously stated, per the redistribution of non-local traffic away from Canal bank Street, no background growth was applied to the roadway. As such, volumes are projected to be similar under all future background horizon years.

Table 4-3 Future Background - Canal Bank Street Rail Crossing Queueing (Scenario 1)

Intersection	Available Storage (m) ¹	Queue Length (m)	
		2027/2032/2037 Future Background	
Movement		AM	PM
Kingsway/Canal Bank Street at Rail Crossing			
Northbound	50	180	124
Southbound	90	75	186

Note: ¹Distance to the nearest intersection/access. Northbound stop bar is approximately 250m north of the intersection at Forks Road.

As under existing conditions, these queues are projected to encroach onto the intersections of Kingsway at Huron Street and Erie Street but are not projected to reach Forks Road (located approximately 250m south of the rail crossing). As such the queue is not projected to block traffic flow at the intersection, which is acceptable. It should be noted that the crossing is estimated to be activated only once an hour on very busy days. As such, these queues do not occur regularly and are only expected to last a short while when they do.

4.7.2 SCENARIO 2

Table 4-4 provides a summary of intersection Level of Service (LOS) for the intersections analyzed in the study area under future background traffic conditions for scenario 2. The Synchro results have been included in **Appendix C**. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

In order to accommodate future traffic volumes, signal timing plans were optimized at the following intersections:

- Under the 2027 future background conditions
 - Townline Tunnel Road at Highway 58 under the PM peak hour
- Under the 2037 future background conditions
 - Townline Tunnel Road at Canal Bank Street under the AM peak hour
 - Townline Tunnel Road at Highway 58 under the AM peak hour

As under existing conditions, the intersections are projected to operate with good LOS C or better during the study periods with the Forks Bridge closed. Only the southbound left-turn movement at the intersection of Townline Tunnel Road at Reaker Road is projected to operate at LOS D during the PM peak hour under 2032 conditions, and LOS D and E during the AM and PM peak hours under 2037 conditions, respectively. The turning movement is projected to operate at LOS E during the PM peak hour with a delay of 36 seconds and below capacity, which is acceptable. WSP completed a traffic signal warrant for the intersection of Townline Tunnel Road at Reaker Road under scenario 2 (detailed in **Appendix E**), which shows that a signal is not warranted at the study intersection.

Table 4-4 Future Background Traffic Conditions – Scenario 2

Intersection	Control Type	2027 Future Background						2032 Future Background						2037 Future Background					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Nugent Road at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.15	11	B	0.21	11	B	0.16	11	B	0.24	11	B	0.18	11	B	0.27	12	B
Highway 58 at Forks Road Access	Stop-Controlled																		
Eastbound Right		0.10	12	B	0.20	15	B	0.11	12	B	0.24	16	C	0.13	13	B	0.29	18	C
Westbound Right		0.38	17	C	0.30	14	B	0.45	20	C	0.34	16	C	0.55	24	C	0.40	18	C
Highway 58 Access at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.11	11	B	0.08	11	B	0.12	11	B	0.09	11	B	0.14	12	B	0.10	11	B
Kingsway at Forks Road	Stop-Controlled																		
Eastbound Left+Through+Right		0.37	9	A	0.42	10	A	0.37	9	A	0.42	10	A	0.37	9	A	0.42	10	A
Westbound Left+Through+Right		0.00	8	A	0.00	8	A	0.01	8	A	0.00	8	A	0.01	8	A	0.00	8	A
Northbound Left+Through+Right		0.12	8	A	0.09	8	A	0.12	8	A	0.09	8	A	0.12	8	A	0.09	8	A
Southbound Left+Through+Right		0.28	9	A	0.18	8	A	0.28	9	A	0.18	8	A	0.28	9	A	0.18	8	A
Southbound Left+Through+Right		0.19	9	A	0.45	11	B	0.19	9	A	0.45	11	B	0.19	9	A	0.45	11	B
Highway 58 at Townline Tunnel Road	Signalized																		
Highway 58 at Townline Tunnel Road		0.57	18	B	0.71	21	C	0.62	19	B	0.77	24	C	0.67	19	B	0.85	29	C
Townline Tunnel Road at Canal Bank Street	Signalized																		
Townline Tunnel Road at Canal Bank Street		0.34	13	B	0.39	14	B	0.37	13	B	0.42	14	B	0.40	14	B	0.46	15	B
Townline Tunnel Road at Reaker Road	Stop-Controlled																		
Southbound Left		0.12	20	C	0.28	23	C	0.14	22	C	0.35	28	D	0.18	26	D	0.44	36	E
Southbound Right		0.05	10	B	0.09	11	B	0.06	10	B	0.10	11	B	0.07	11	B	0.11	12	B
Reaker Road at Netherby Road	Stop-Controlled																		
Northbound Left+Through+Right		0.18	10	A	0.13	10	A	0.19	10	A	0.14	10	A	0.21	10	A	0.15	10	A
Southbound Left+Through+Right		0.01	9	A	0.00	9	A	0.01	9	A	0.00	9	A	0.01	9	A	0.00	9	A
Kingsway at Huron Street	Stop-Controlled																		
Westbound Left+Right		0.05	11	B	0.04	11	B	0.05	12	B	0.04	12	B	0.05	12	B	0.04	12	B
Kingsway at Erie Street	Stop-Controlled																		
Westbound Left+Right		0.05	11	B	0.04	11	B	0.05	11	B	0.04	12	B	0.05	12	B	0.04	12	B

5 FUTURE TOTAL CONDITIONS

5.1 TRIP GENERATION

The trip generation for the proposed development was based on the Institute of Transportation Engineers (ITE) Trip General Manual (10th Edition). WSP used the Land Use Code (LUC) 210 (Single-Family Detached Housing), LUC 220 (Multifamily Housing Low-Rise) and LUC 221 (Multifamily Housing Mid-Rise) for the proposed residential dwelling units. WSP used LUC 820 (Shopping Centre) for the proposed retail and commercial developments, LUC 710 (General Office) for the proposed office development, and LUC 520 (Elementary School) for the proposed elementary school.

Trip generation was completed separately for Dain East and Dain West. For Dain West, which includes residential and mixed uses, WSP applied an internal trip capture rate.

A summary of the trip generation for the proposed development is detailed below for each Phase.

5.1.1 PHASE 1 (2027) TRIP GENERATION

Under Phase 1 (2027), only a portion of the Dain East development is proposed. The trip generation is detailed in **Table 5-1**.

Table 5-1 Phase 1 Site Trip Generation

Site Component	Source	Number of Dwelling units	Item	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
DAIN EAST									
Single Detached Housing	ITE LUC 210	889	Directional Distribution Trip Rate Trips	25% 164	75% T=0.74X 494	100% 658	63% 555	37% T=0.99X 326	100% 881
Townhouses/ Semi-Detached	ITE LUC 220	311	Directional Distribution Trip Rate Trips	23% 33	77% T=0.46X 111	100% 144	63% 110	37% T=0.56X 65	100% 175
Total Site Generated Trips – Dain East				197	605	802	665	391	1056

5.1.2 PHASE 2 (2032) TRIP GENERATION

Under Phase 2 (2032), the totality of Dain East is proposed, as well as a portion of the Dain West development. The trip generation is detailed in **Table 5-2**.

Table 5-2 Phase 2 Site Trip Generation

Site Component	Source	Number of Dwelling units/ GFA (sq.ft)/ Students	Item	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
DAIN EAST									
Single Detached Housing	ITE LUC 210	1,013	Directional Distribution Trip Rate Trips	25% 187	75% T=0.74X 563	100% 750	63% 632	37% T=0.99X 371	100% 1003
Townhouses/ Semi-Detached	ITE LUC 220	316	Directional Distribution Trip Rate Trips	23% 34	77% T=0.46X 112	100% 146	63% 112	37% T=0.56X 65	100% 177
Total Site Generated Trips – Dain East				221	675	896	744	436	1180
DAIN WEST									
Single Detached Housing	ITE LUC 210	583	Directional Distribution Trip Rate Trips	25% 108	75% T=0.74X 324	100% 432	63% 364	37% T=0.99X 214	100% 578
Townhouses/ Semi-Detached	ITE LUC 220	192	Directional Distribution Trip Rate Trips	23% 20	77% T=0.46X 69	100% 89	63% 68	37% T=0.56X 40	100% 108
Apartments (Texas Wrap)	ITE LUC 221	241	Directional Distribution Trip Rate Trips	26% 23	74% T=0.36X 64	100% 87	61% 65	39% T=0.44X 42	100% 107
Total Residential – Dain West			Trips	151	457	608	497	296	793
			Internal Trip Reduction	0	0	0	0	0	0
			Trips Adjusted	151	457	608	497	296	793
Elementary School	ITE LUC 520	500	Directional Distribution Trip Rate Trips	54% 181	46% T=0.67X 154	100% 335	48% 41	52% T=0.17X 44	100% 85
Total Non-Residential – Dain West				181	154	335	41	44	85
Total Site Generated Trips – Dain West				332	611	943	538	340	878
OVERALL PHASE 2 DEVELOPMENT									
Total Site Generated Trips – Dain East & West				553	1286	1839	1282	776	2058

5.1.3 PHASE 3 (2037) TRIP GENERATION

Under Phase 3 (2037), the totality of Dain East and Dain West are proposed. The trip generation is detailed in **Table 5-3**.

Table 5-3 Phase 3 Site Trip Generation

Site Component	Source	Number of Dwelling units/ GFA (sq.ft)/ Students	Item	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
DAIN EAST									
Single Detached Housing	ITE LUC 210	1,013	Directional Distribution Trip Rate Trips	25% 187	75% T=0.74X 563	100% 750	63% 632	37% T=0.99X 371	100% 1003
Townhouses/ Semi-Detached	ITE LUC 220	316	Directional Distribution Trip Rate Trips	23% 34	77% T=0.46X 112	100% 146	63% 112	37% T=0.56X 65	100% 177
Total Site Generated Trips – Dain East				221	675	896	744	436	1180
DAIN WEST									
Single Detached Housing	ITE LUC 210	583	Directional Distribution Trip Rate Trips	25% 108	75% T=0.74X 324	100% 432	63% 364	37% T=0.99X 214	100% 578
Townhouses/ Semi-Detached	ITE LUC 220	192	Directional Distribution Trip Rate Trips	23% 20	77% T=0.46X 69	100% 89	63% 68	37% T=0.56X 40	100% 108
Apartments (Texas Wrap)	ITE LUC 221	375	Directional Distribution Trip Rate Trips	26% 35	74% T=0.36X 100	100% 135	61% 101	39% T=0.44X 64	100% 165
Total Residential				163	493	656	533	318	851
				-3	-7	-10	-111	-42	-153
				160	486	646	422	276	698
Retail & Commercial	ITE LUC 820	213,000	Directional Distribution Trip Rate Trips Internal Trip Reduction Pass-By Trips Trips Adjusted	62% 125 -8 0 117	38% T=0.94X 76 -6 0 70	100% 201 -14 0 187	48% 390 -48 -111 231	52% T=3.81X 422 -113 -111 198	100% 812 -161 -222 429

Site Component	Source	Number of Dwelling units/ GFA (sq.ft)/ Students	Item	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Office	ITE LUC 710	67,000	Directional Distribution	86%	14%	100%	16%	84%	100%
			Trip Rate		T=1.16X			T=1.15X	
			Trips	67	11	78	12	66	78
			Internal Trip Reduction	-5	-3	-8	-11	-13	-24
			Trips Adjusted	62	8	70	1	53	54
Elementary School	ITE LUC 520	500	Directional Distribution	54%	46%	100%	48%	52%	100%
			Trip Rate		T=0.67X			T=0.17X	
			Trips	181	154	335	41	44	85
Total Non-Residential – Dain West				360	232	592	274	294	568
Total Site Generated Trips – Dain West				520	718	1238	696	570	1266
OVERALL DPHASE 3 DEVELOPMENT									
Total Site Generated Trips – Dain East & West				741	1393	2134	1440	1006	2446

5.2 TRIP DISTRIBUTION AND ASSIGNMENT

Site generated trip distribution was derived based on existing traffic patterns using an average of both data sets (i.e. with bridge open and bridge closed). The proposed site generated trip distribution is included in **Table 5-4** below.

Table 5-4 Site Trip Distribution

DIRECTION TO/FROM	DISTRIBUTION
North	42%
South	28%
East	20%
West	10%

The site generated trips have been assigned for Dain East and Dain West based on the study scenarios and land use. Please refer to **Figure 5-1** to **Figure 5-22** for the site generated trips per horizon year.

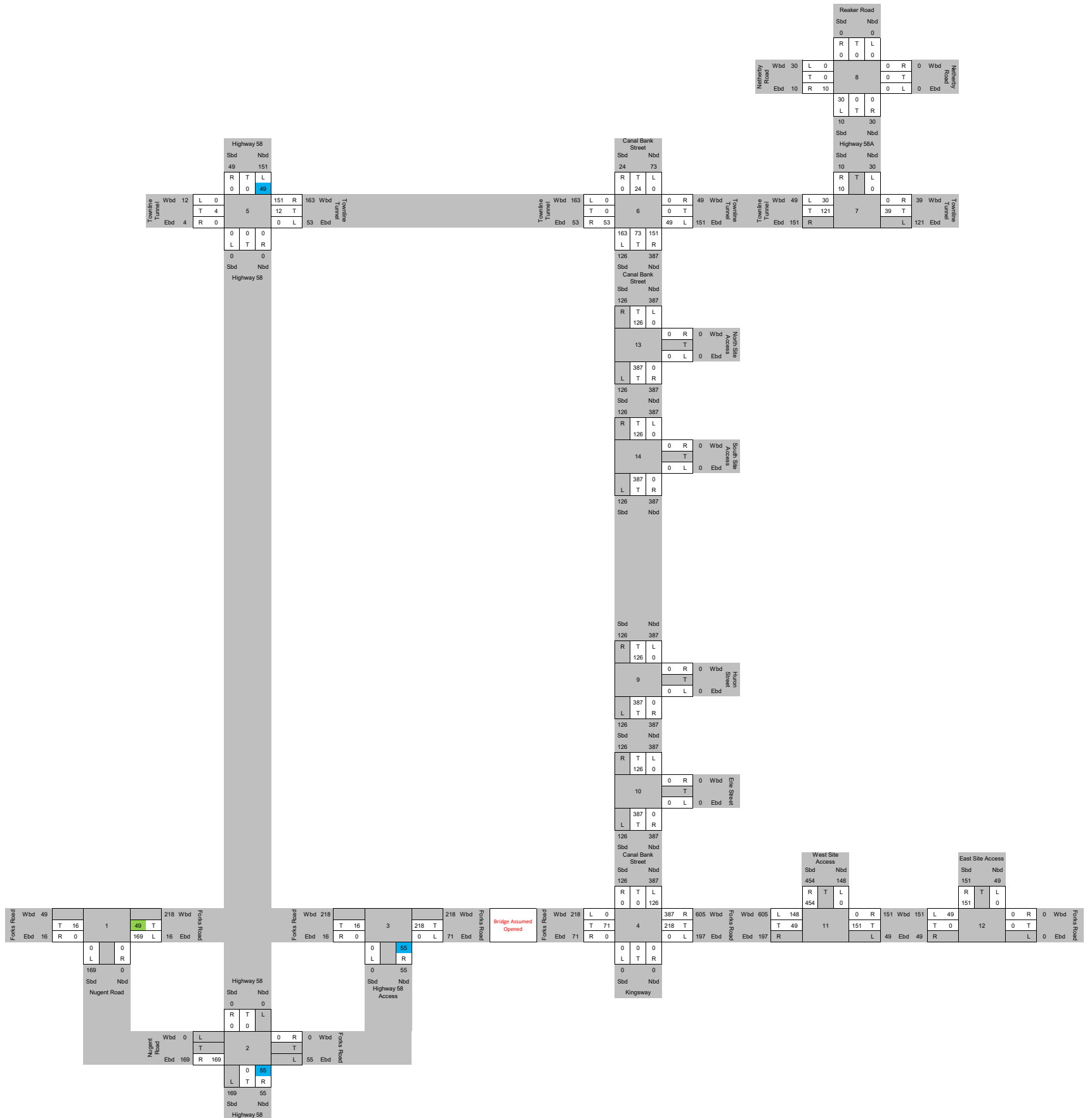


Figure 5-1
 Phase 1 (2027) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

2014/07/09, 09:01 AM, City of Welland, Welland, Ontario

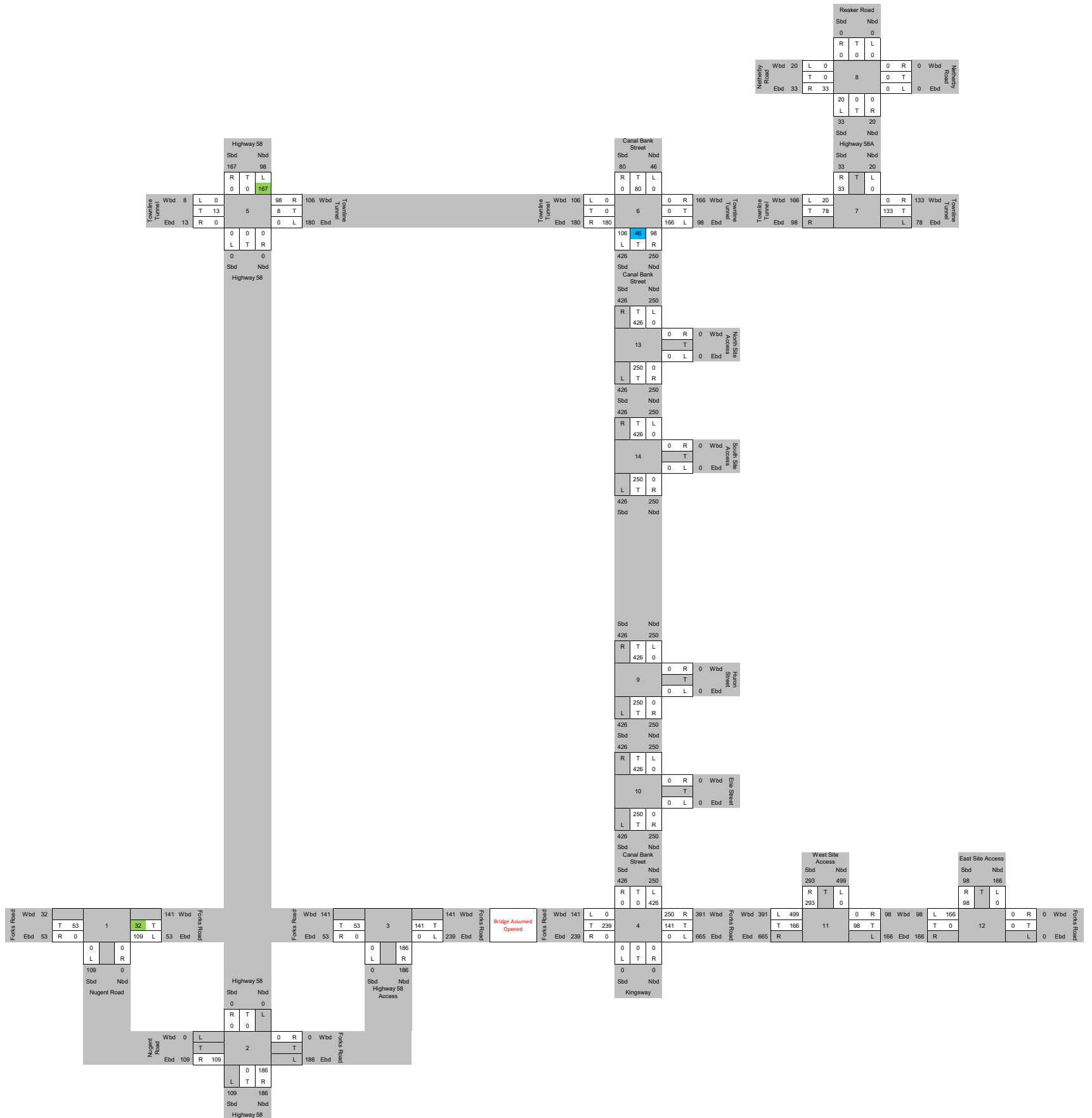


Figure 5-2
Phase 1 (2027) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded up

Scale: NTS



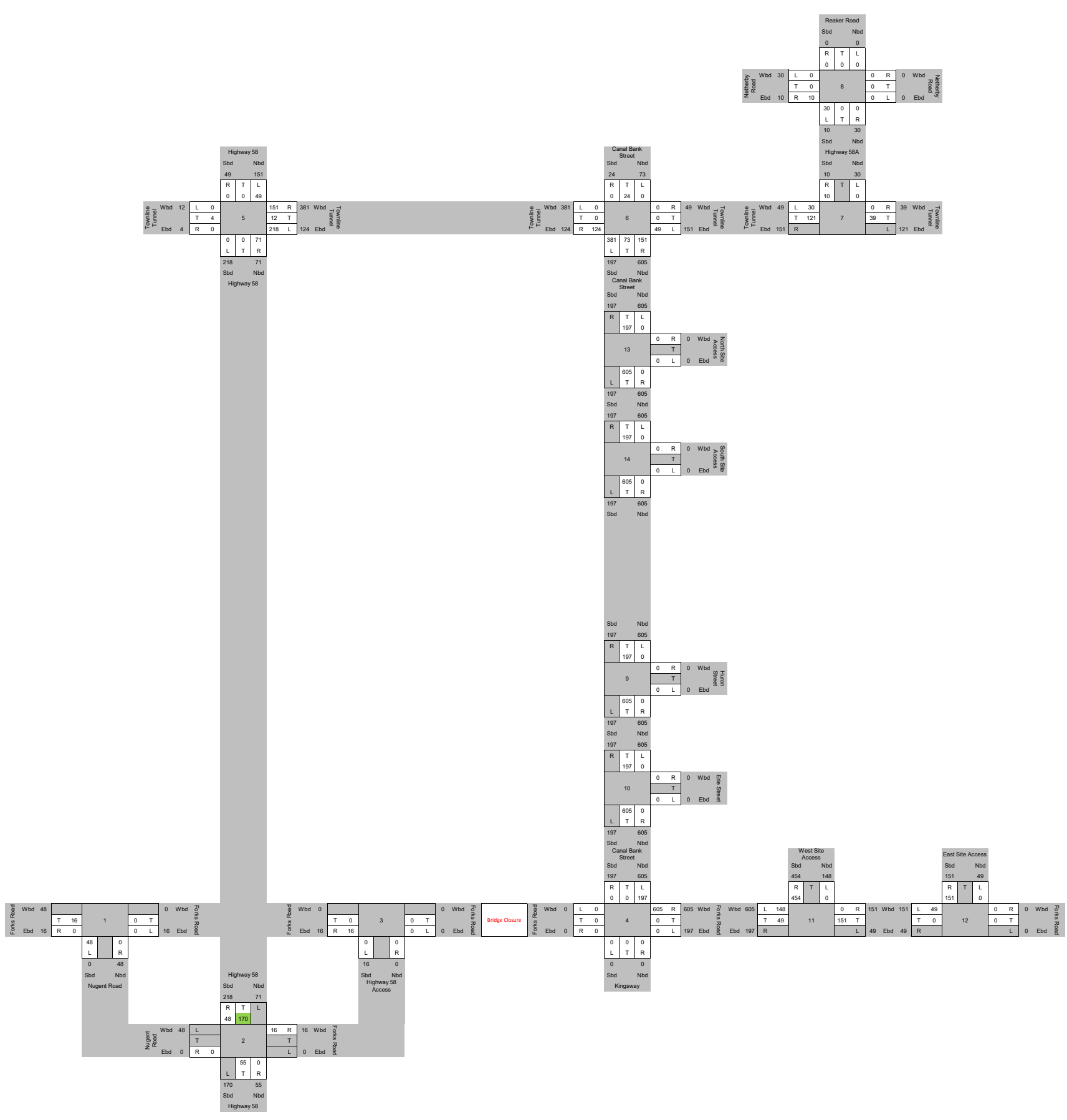


Figure 5-3
Phase 1 (2027) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

■ Rounded Down
■ Rounded up

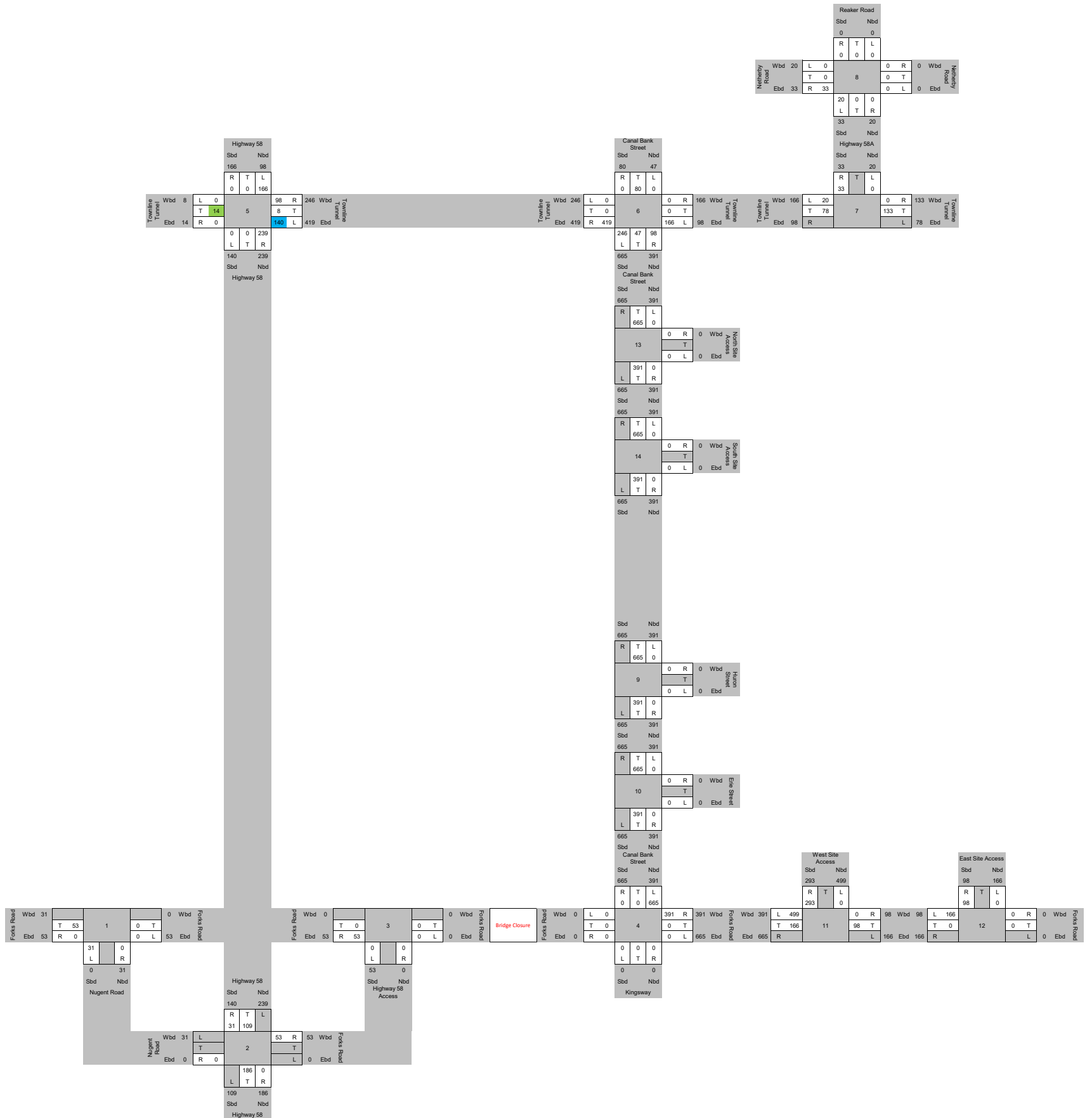


Figure 5-4
Phase 1 (2027) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

Scale: NTS



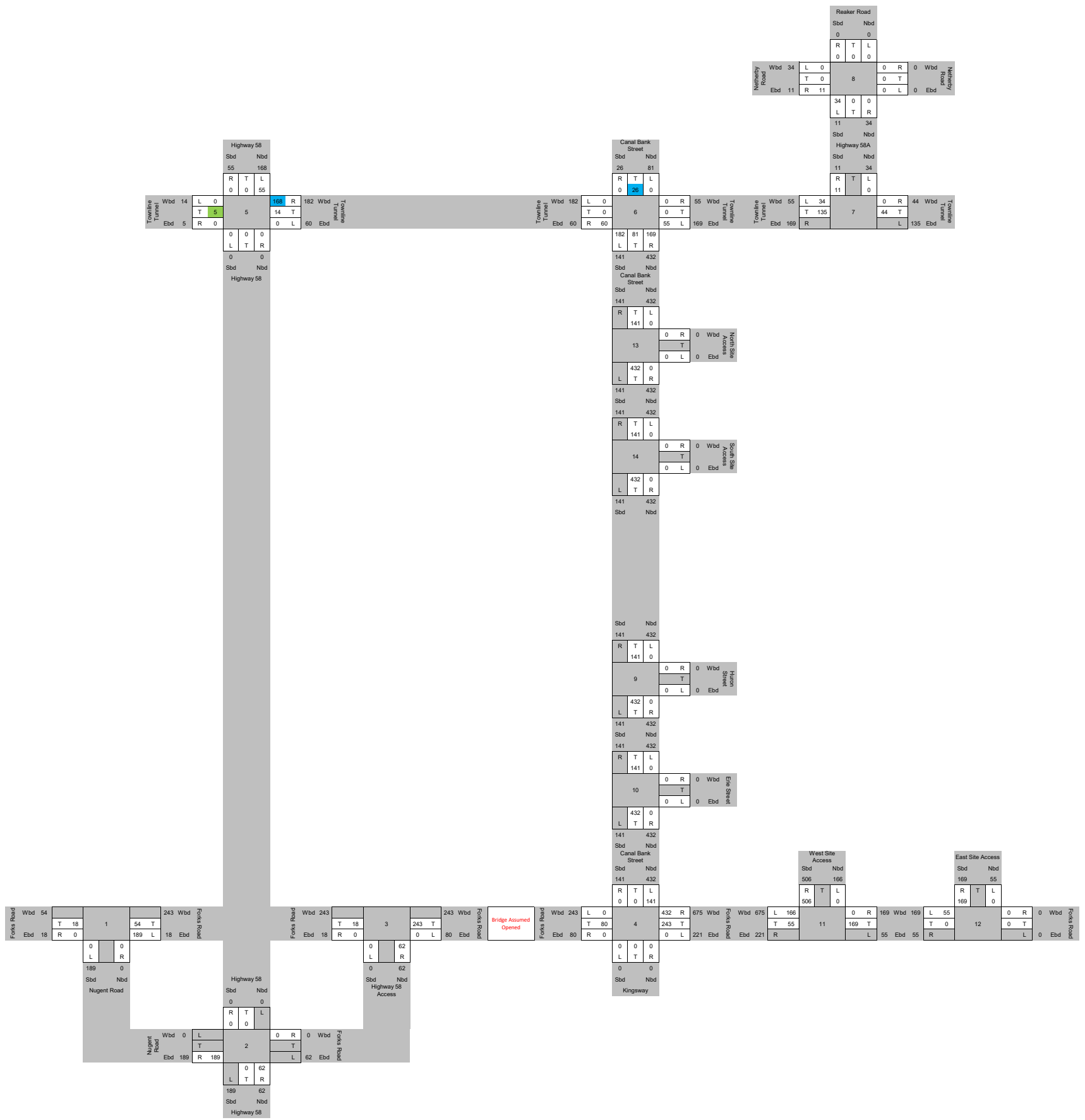


Figure 5-5
Phase 2 (2032) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - AM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded Up

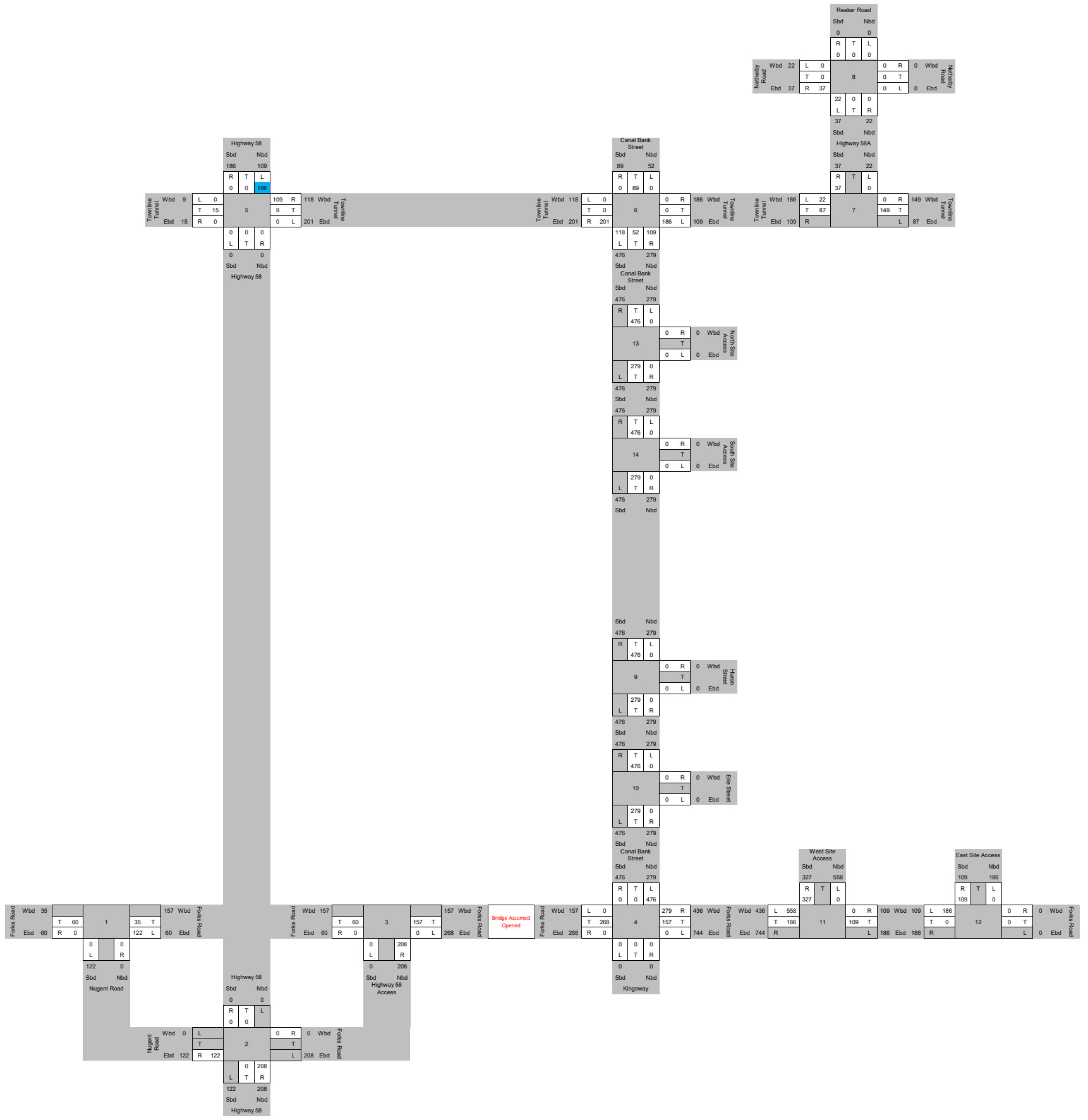


Figure 5-6
Phase 2 (2032) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

2014/07/24_01:00 City Traffic Study_20140724_01

Scale: NTS



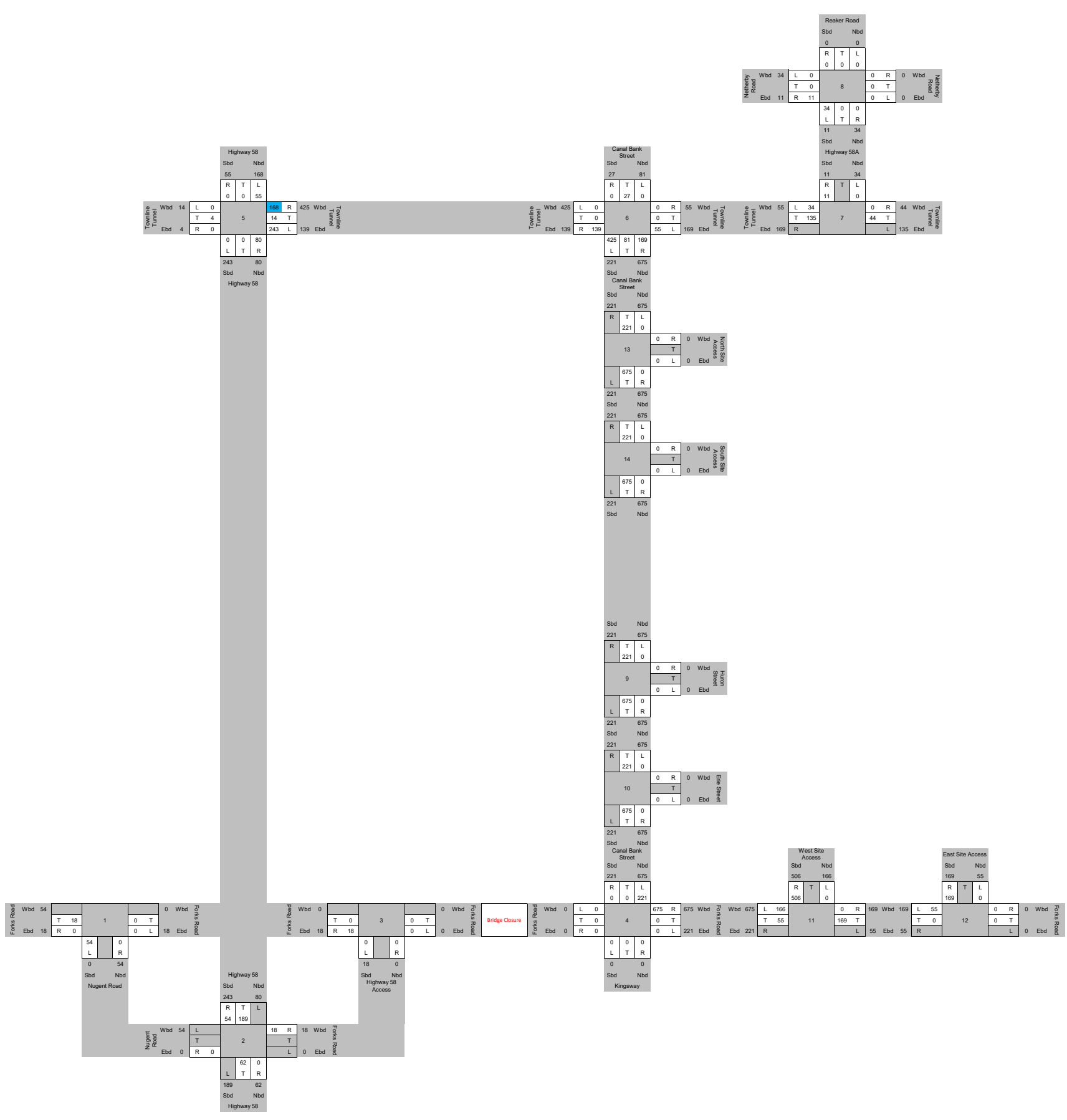


Figure 5-7
Phase 2 (2032) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

Scale: NTS



20140726_01a City Traffic Study_20140726.dwg

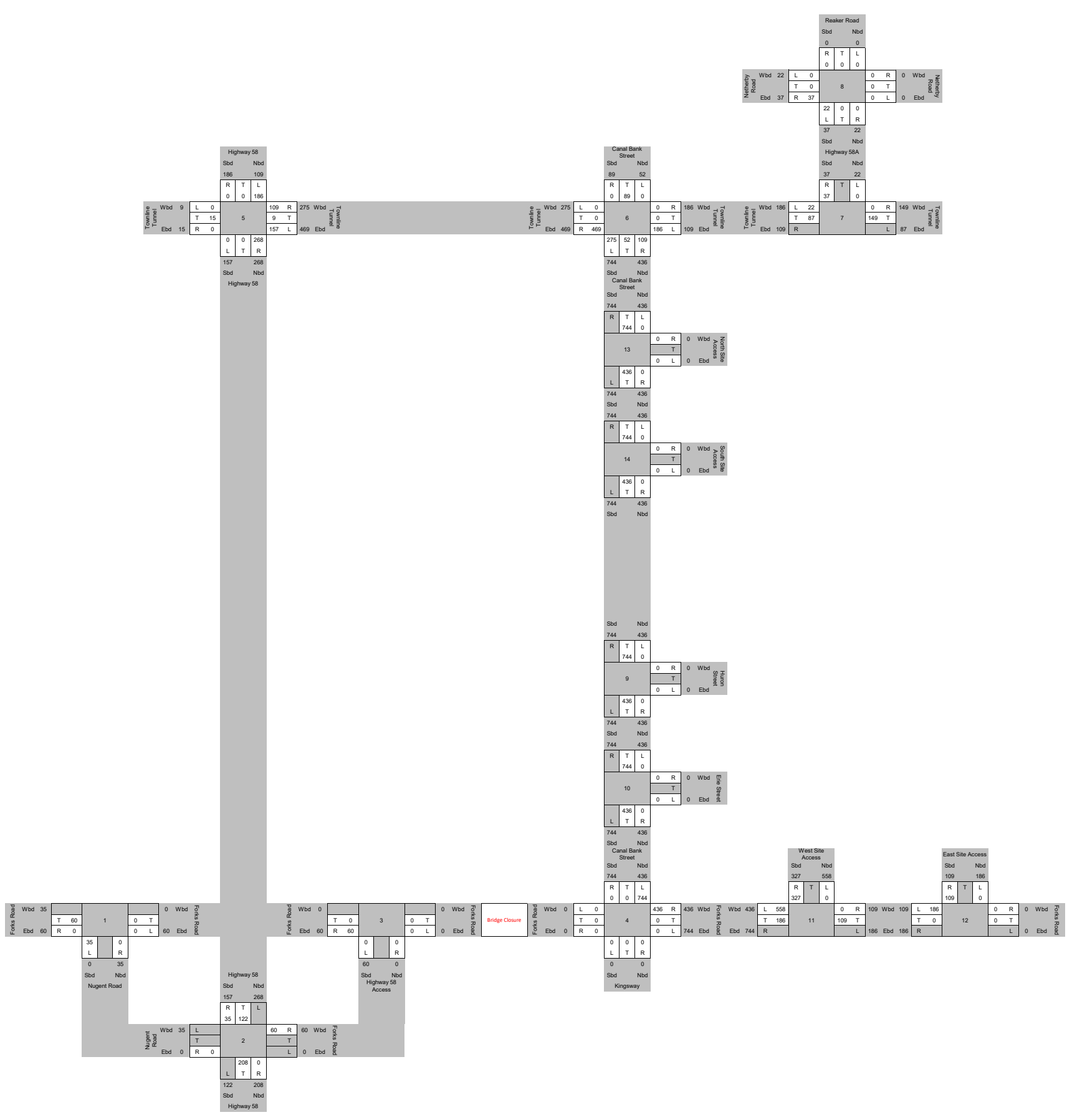


Figure 5-8
 Phase 2 (2032) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
Rounded up

Scale: NTS



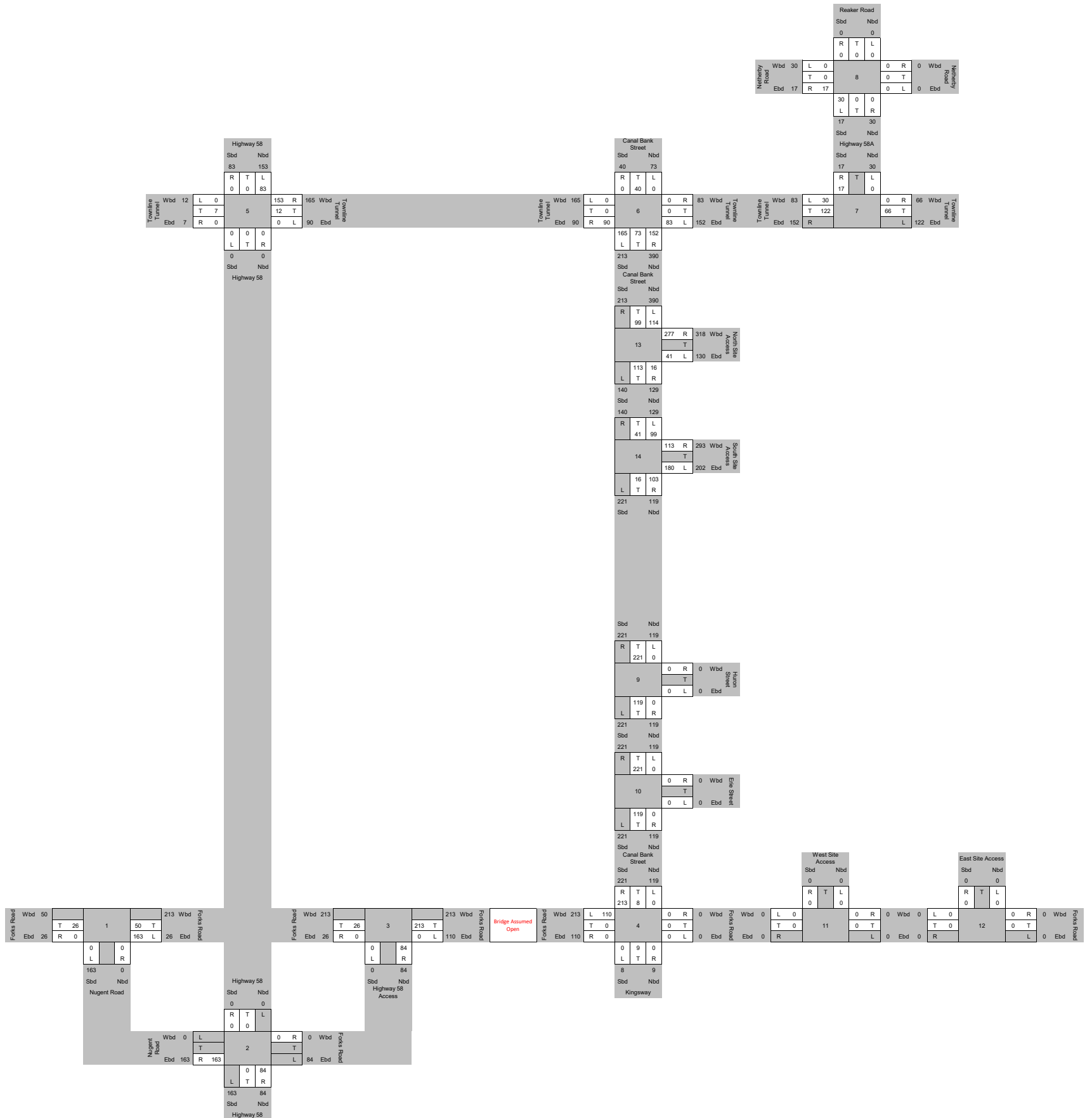


Figure 5-9
 Phase 2 (2032) Site Generated Traffic - Dain West Primary Trips - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

Scale: NTS



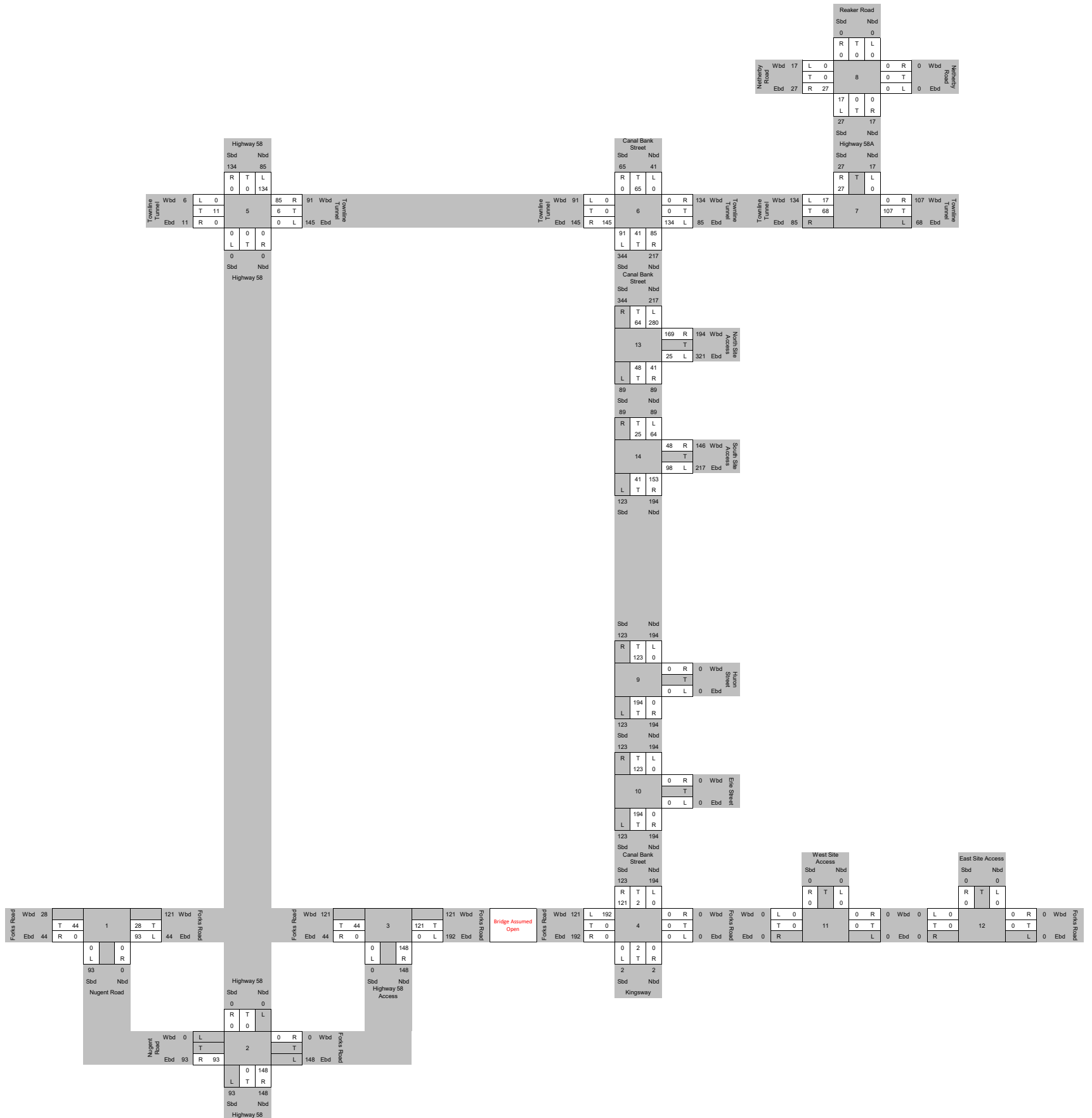


Figure 5-10
 Phase 2 (2032) Site Generated Traffic - Dain West Primary Trips - Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

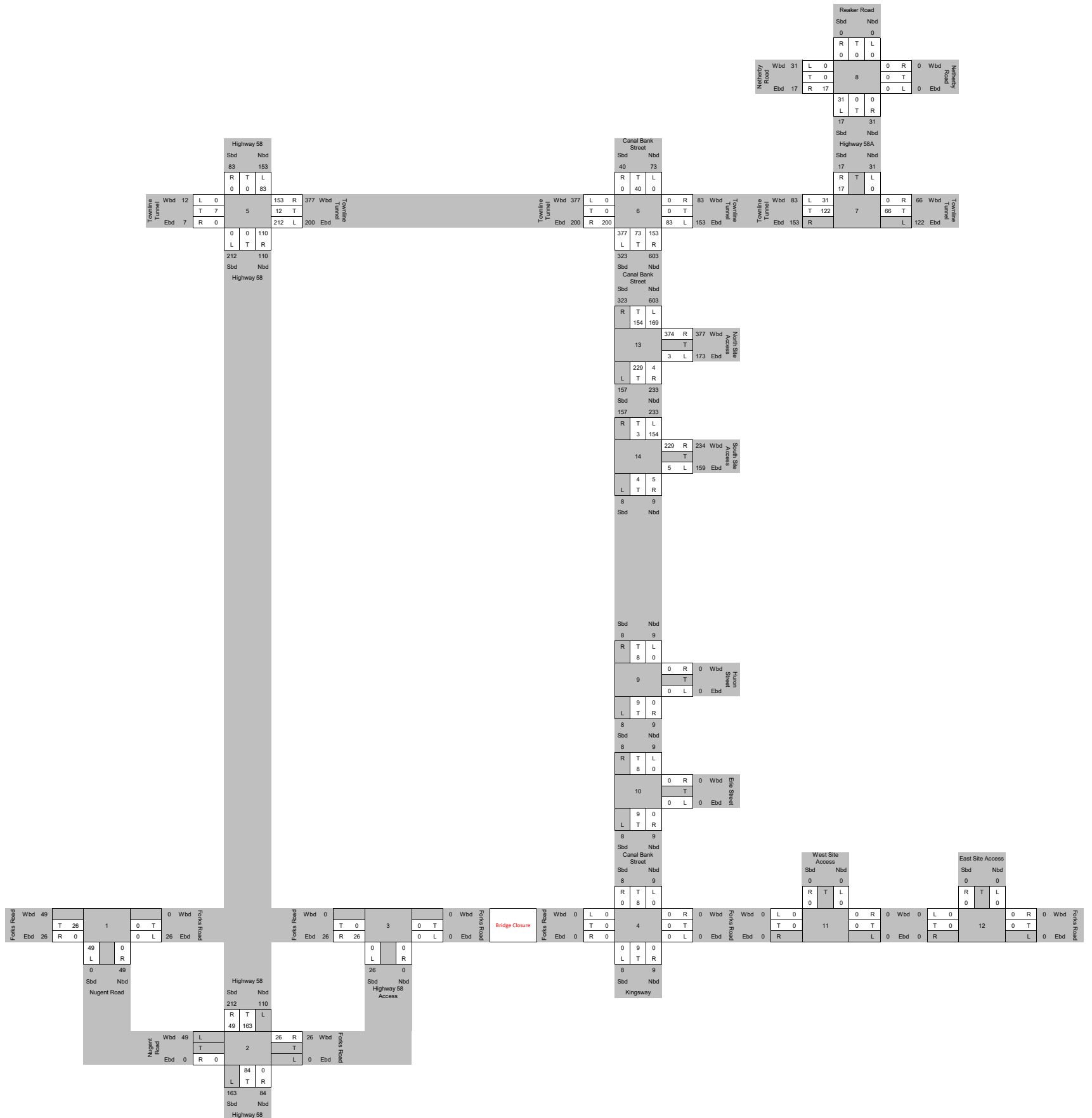


Figure 5-11
 Phase 2 (2032) Site Generated Traffic - Dain West Primary Trips - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded up

Scale: NTS



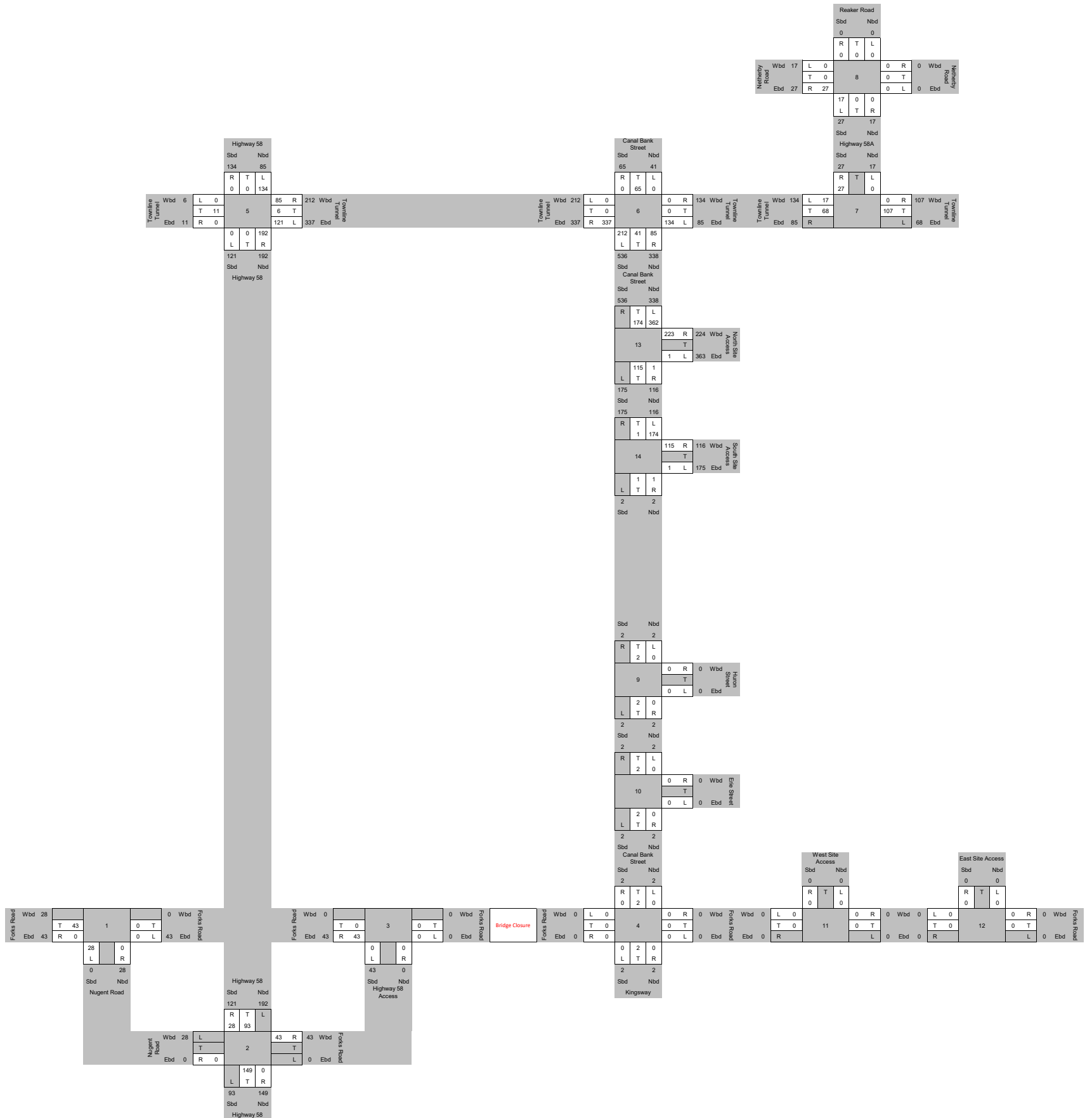


Figure 5-12
Phase 2 (2032) Site Generated Traffic - Dain West Primary Trips - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
Rounded Up

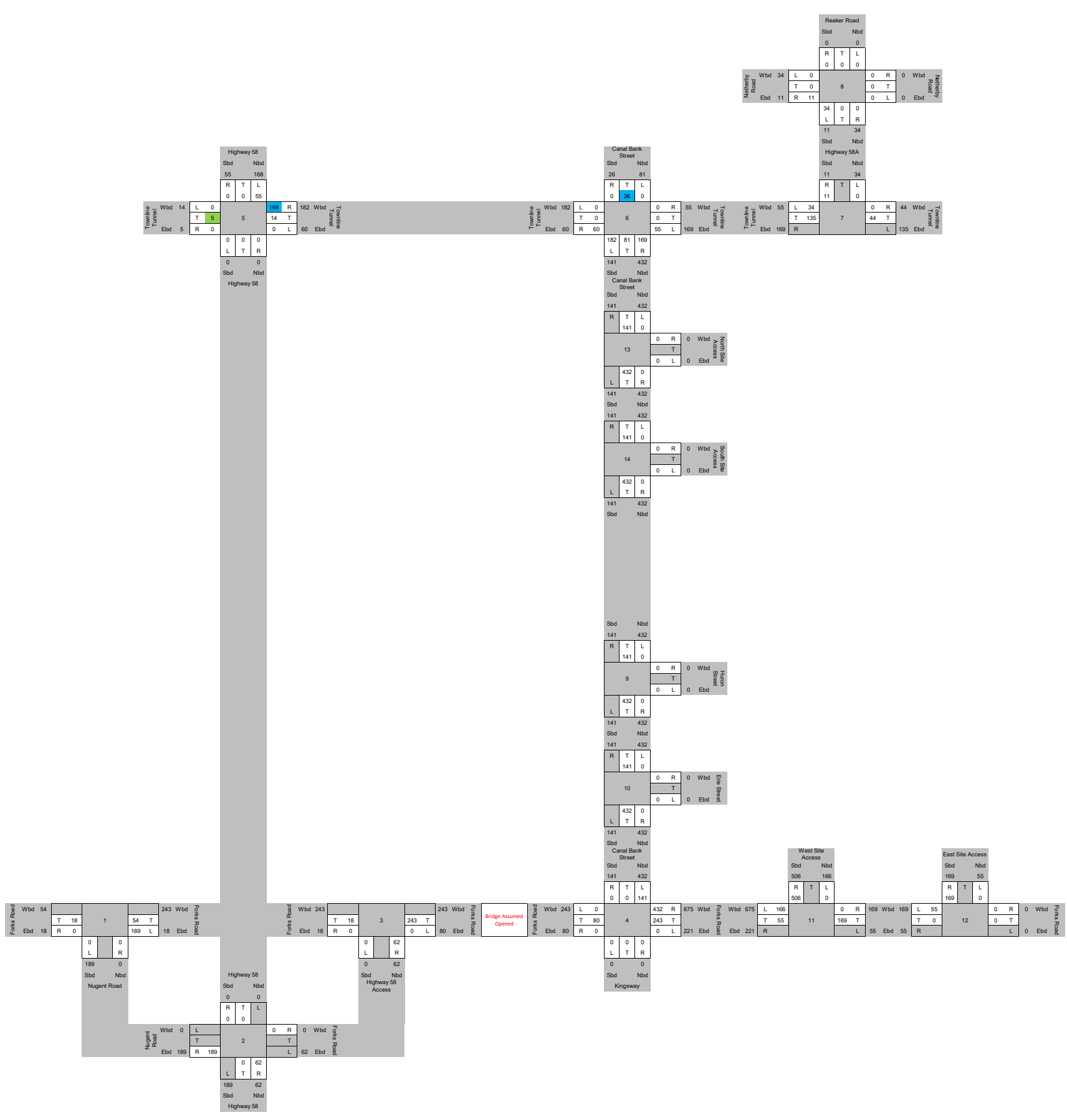


Figure 5-13
 Phase 3 (2037) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

Scale: NTS



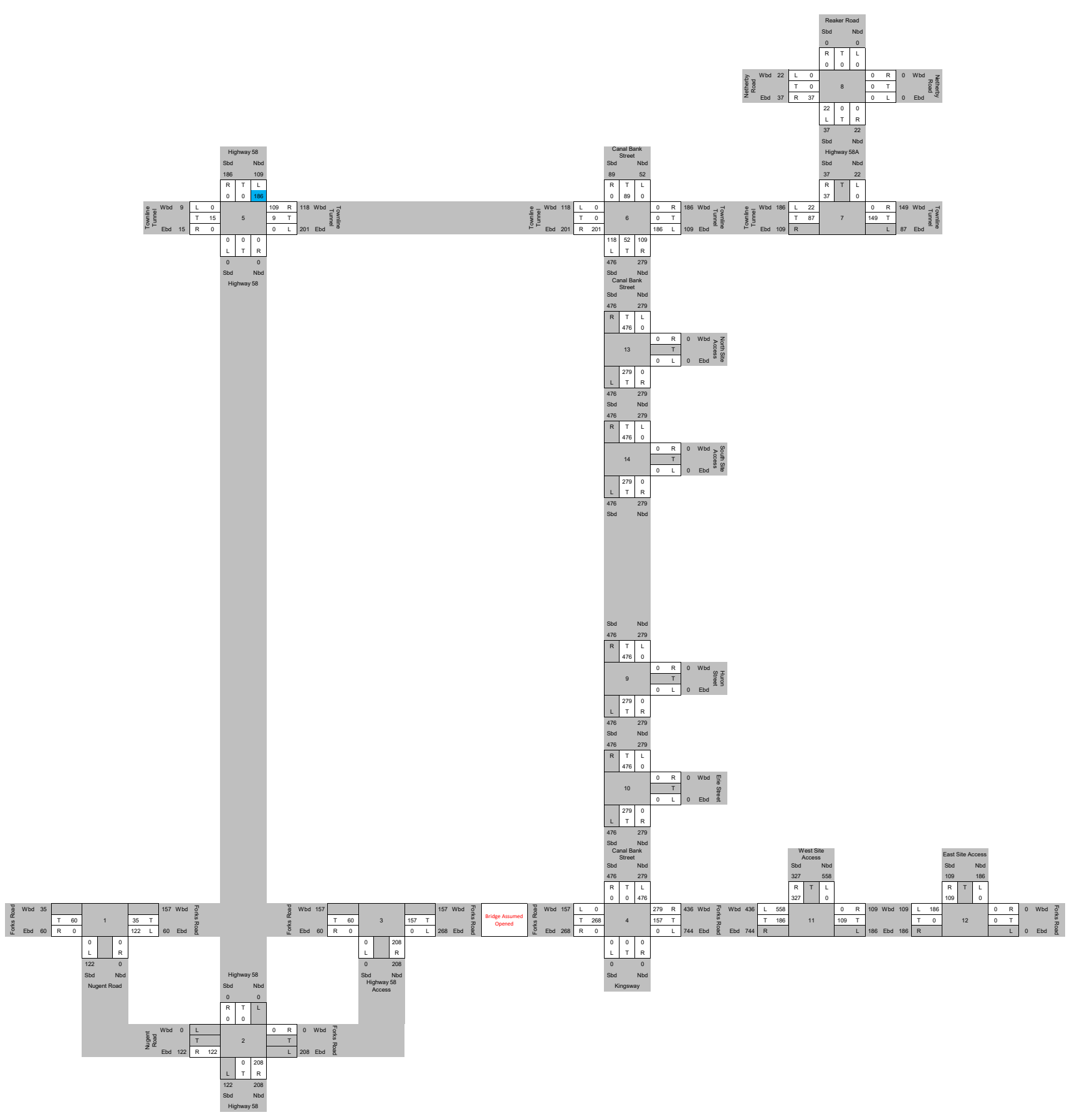


Figure 5-14
Phase 3 (2037) Site Generated Traffic - Dain East - Scenario 1 (Forks Bridge Open) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
Rounded up

Scale: NTS



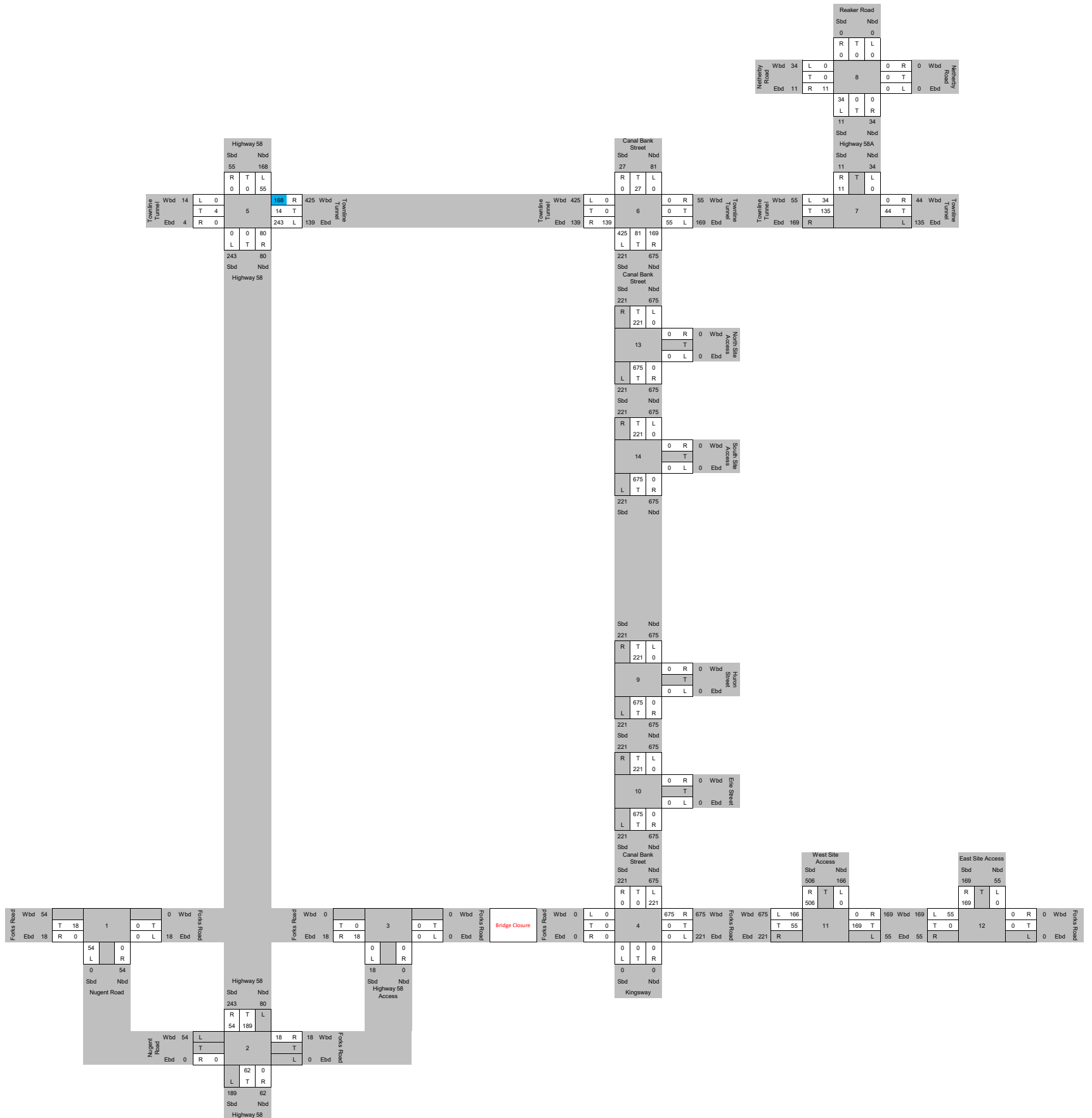


Figure 5-15
 Phase 3 (2037) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded up

Scale: NTS



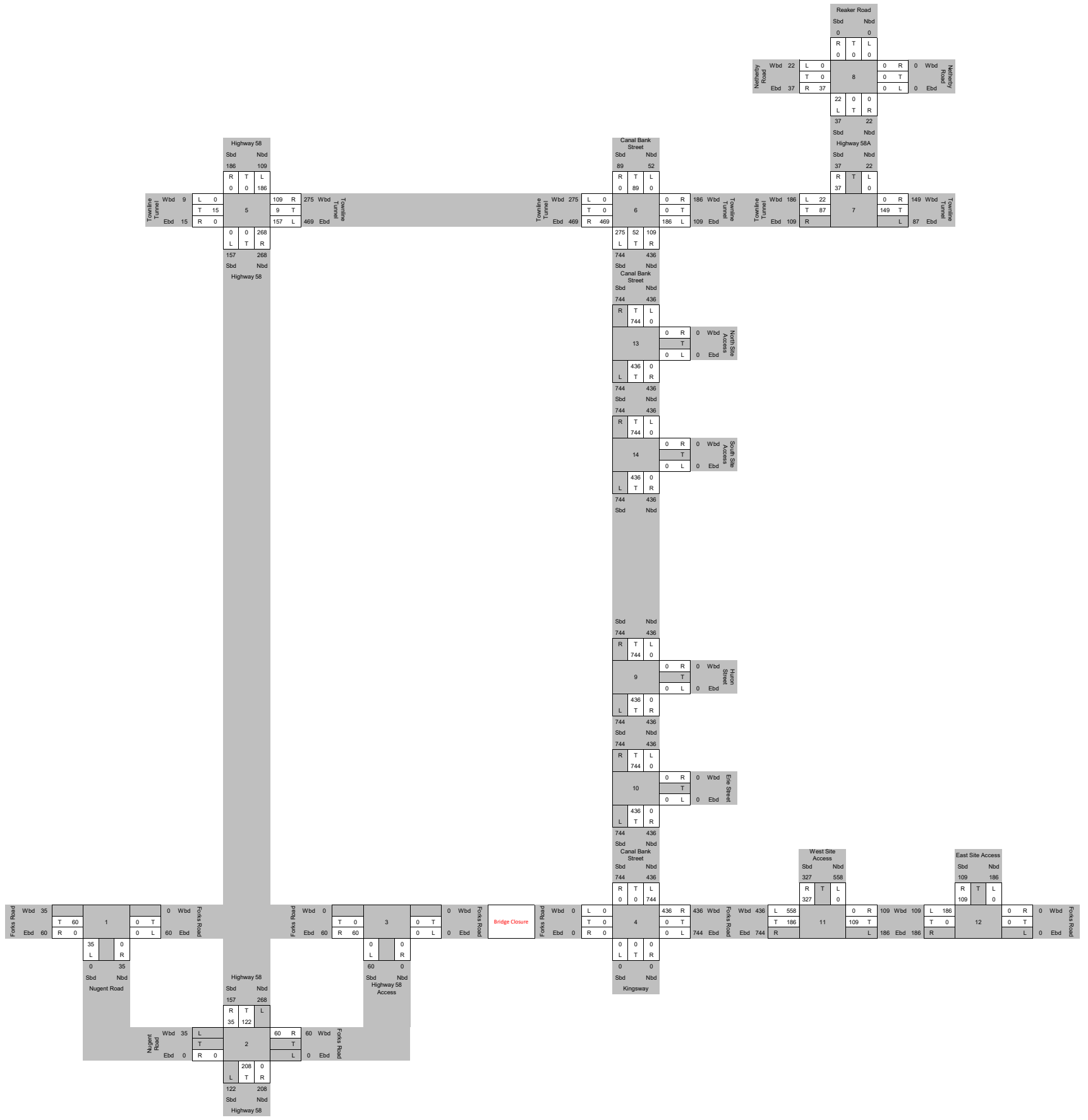


Figure 5-16
 Phase 3 (2037) Site Generated Traffic - Dain East - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded Up

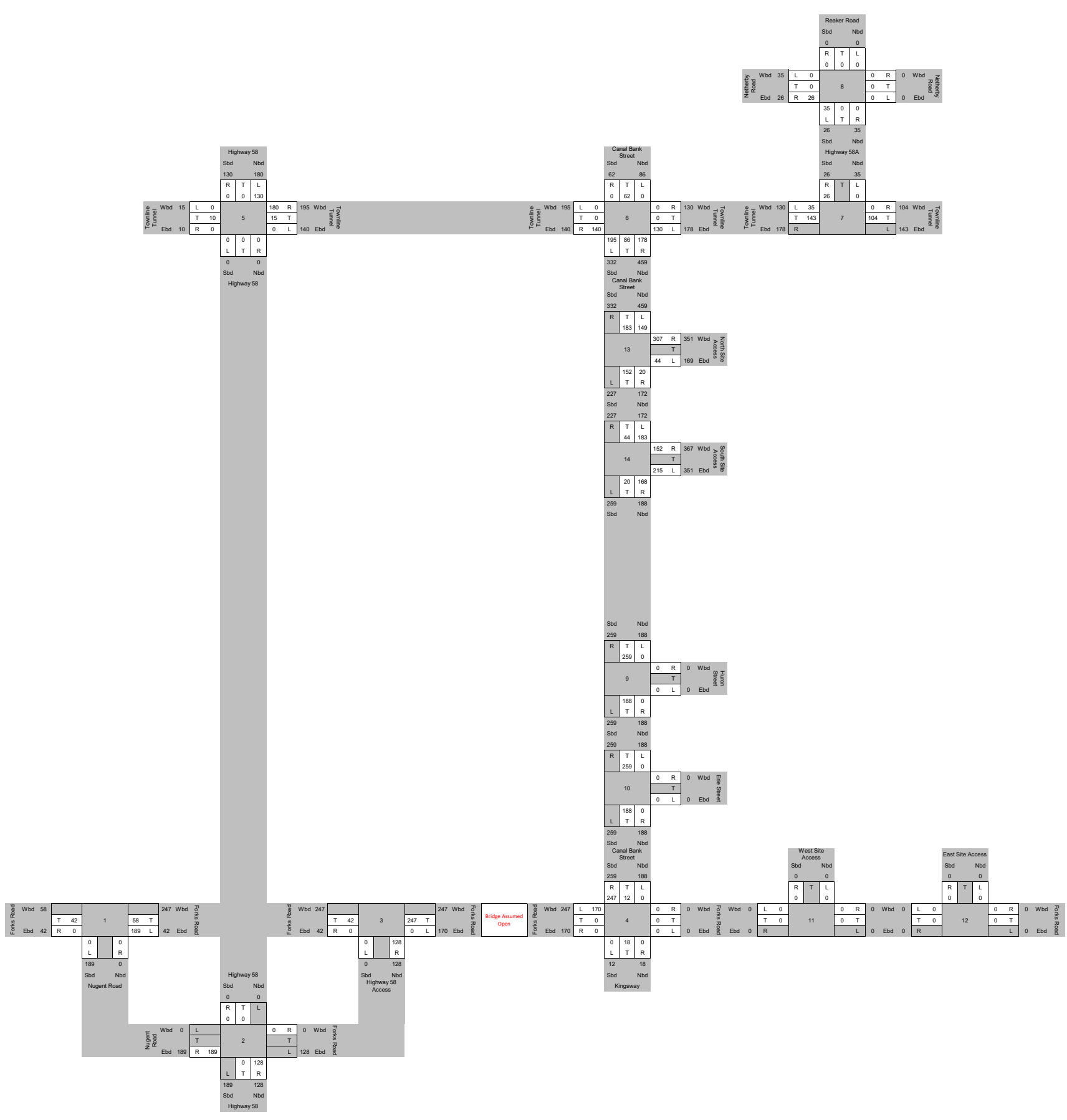


Figure 5-17
 Phase 3 (2037) Site Generated Traffic - Dain West Primary Trips - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded up

Scale: NTS



20140726_01a City Traffic Model_20140726.dwg

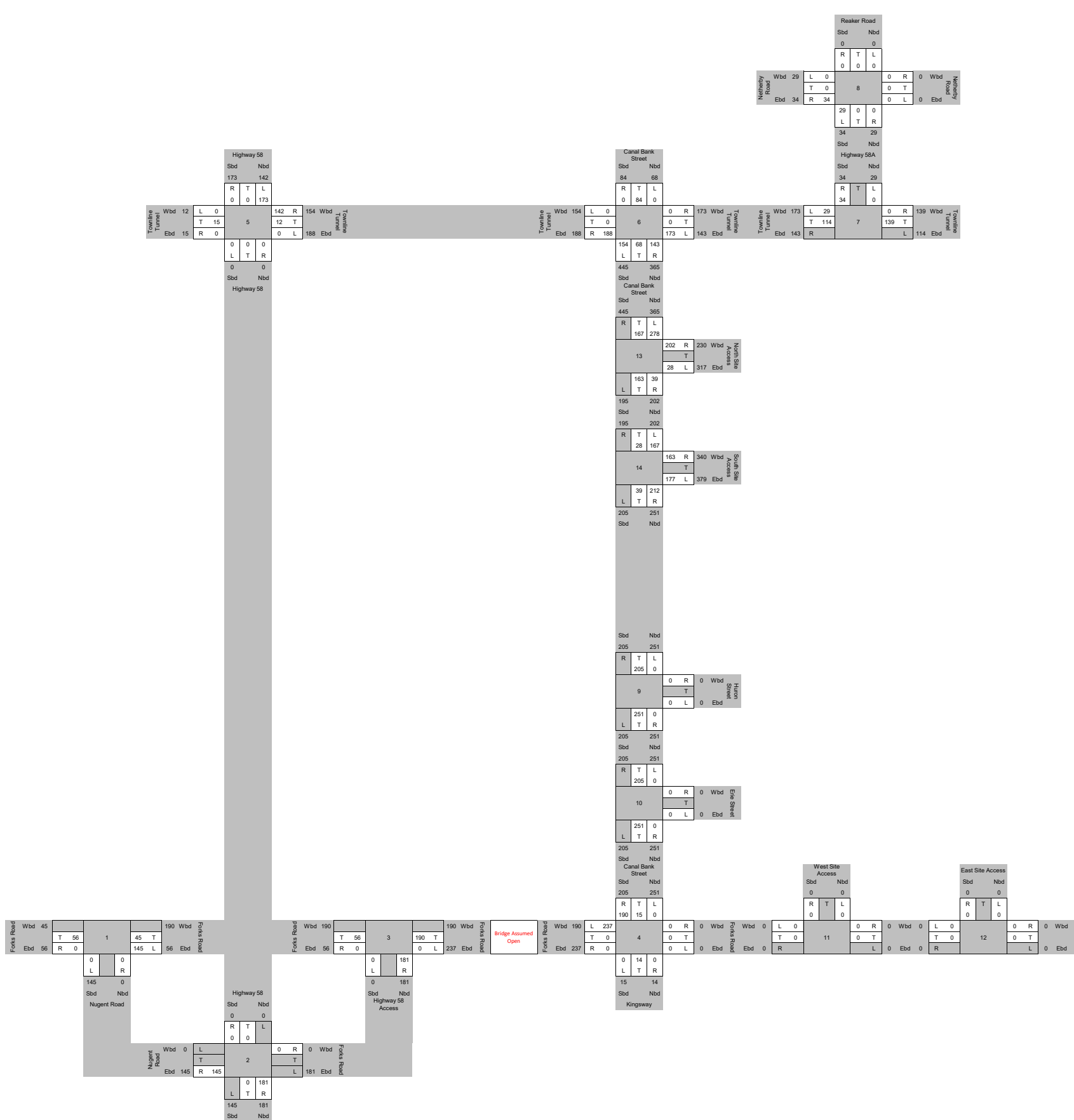


Figure 5-18
Phase 3 (2037) Site Generated Traffic - Dain West Primary Trips - Scenario 1 (Forks Bridge Open) - PM Peak Hour
401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
Rounded up

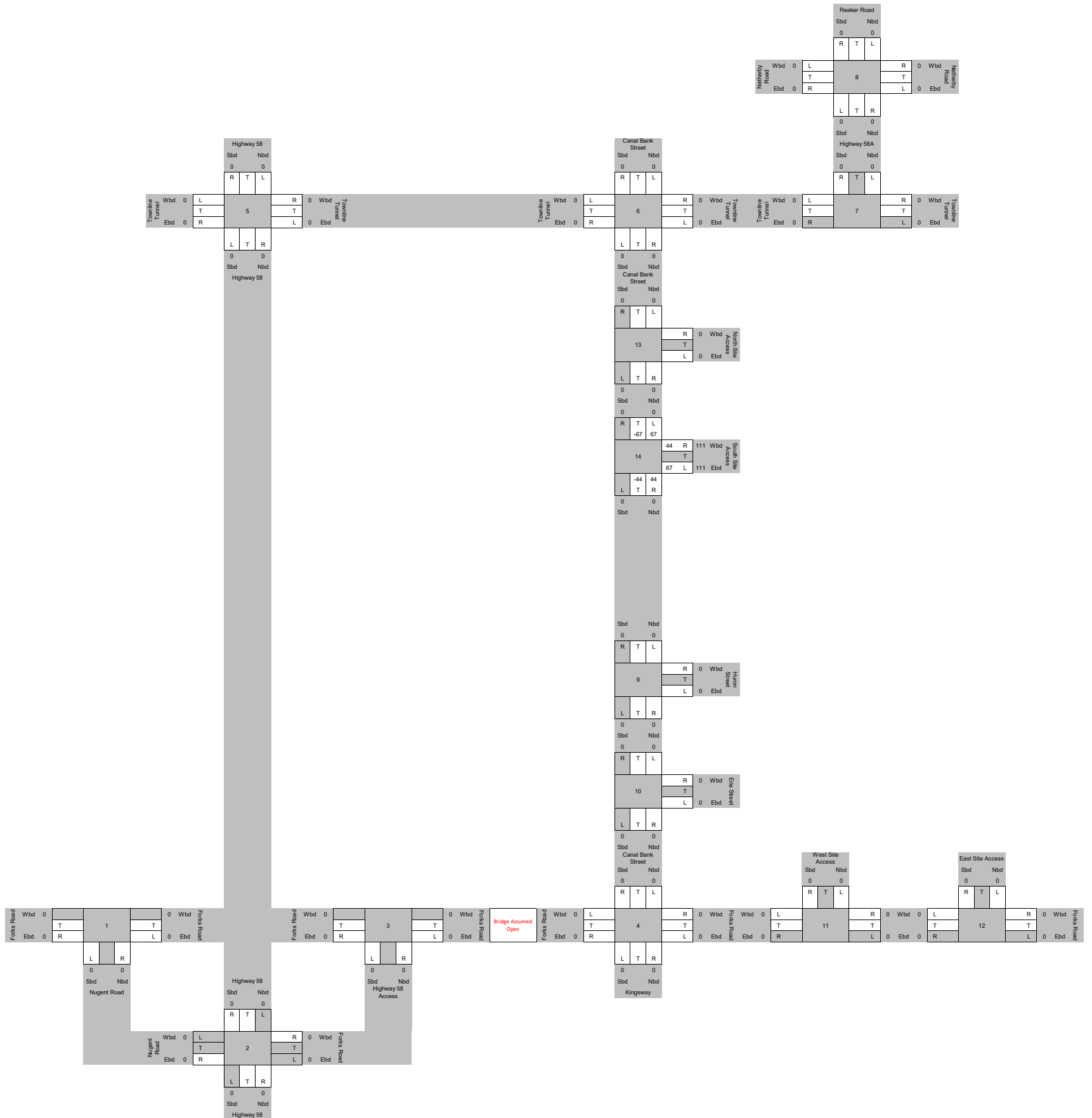


Figure 5-19
 Phase 3 (2037) Pass-by Site Generated Trips - Dain West - Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Rounded Down
 Rounded up

Scale: NTS



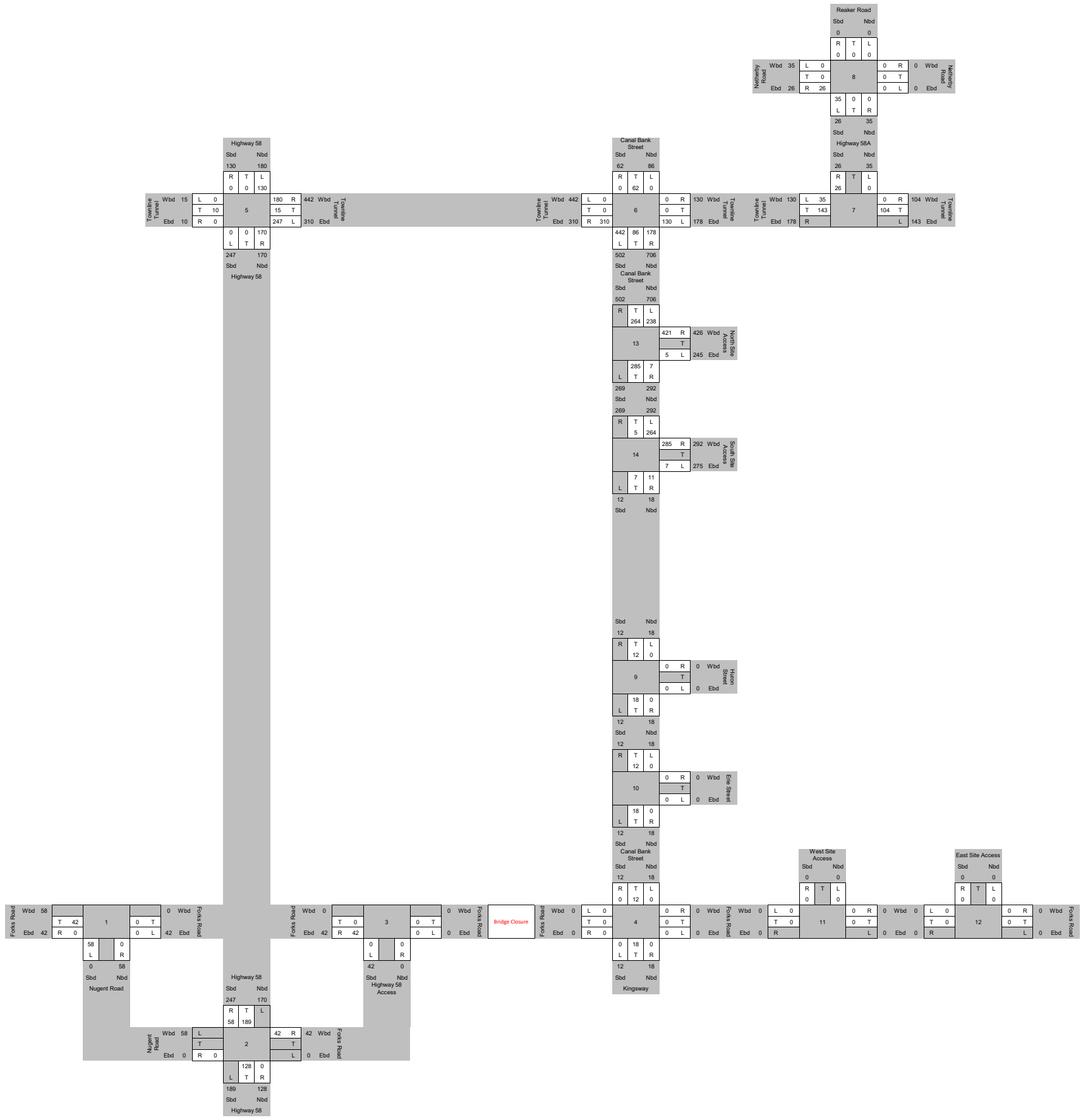
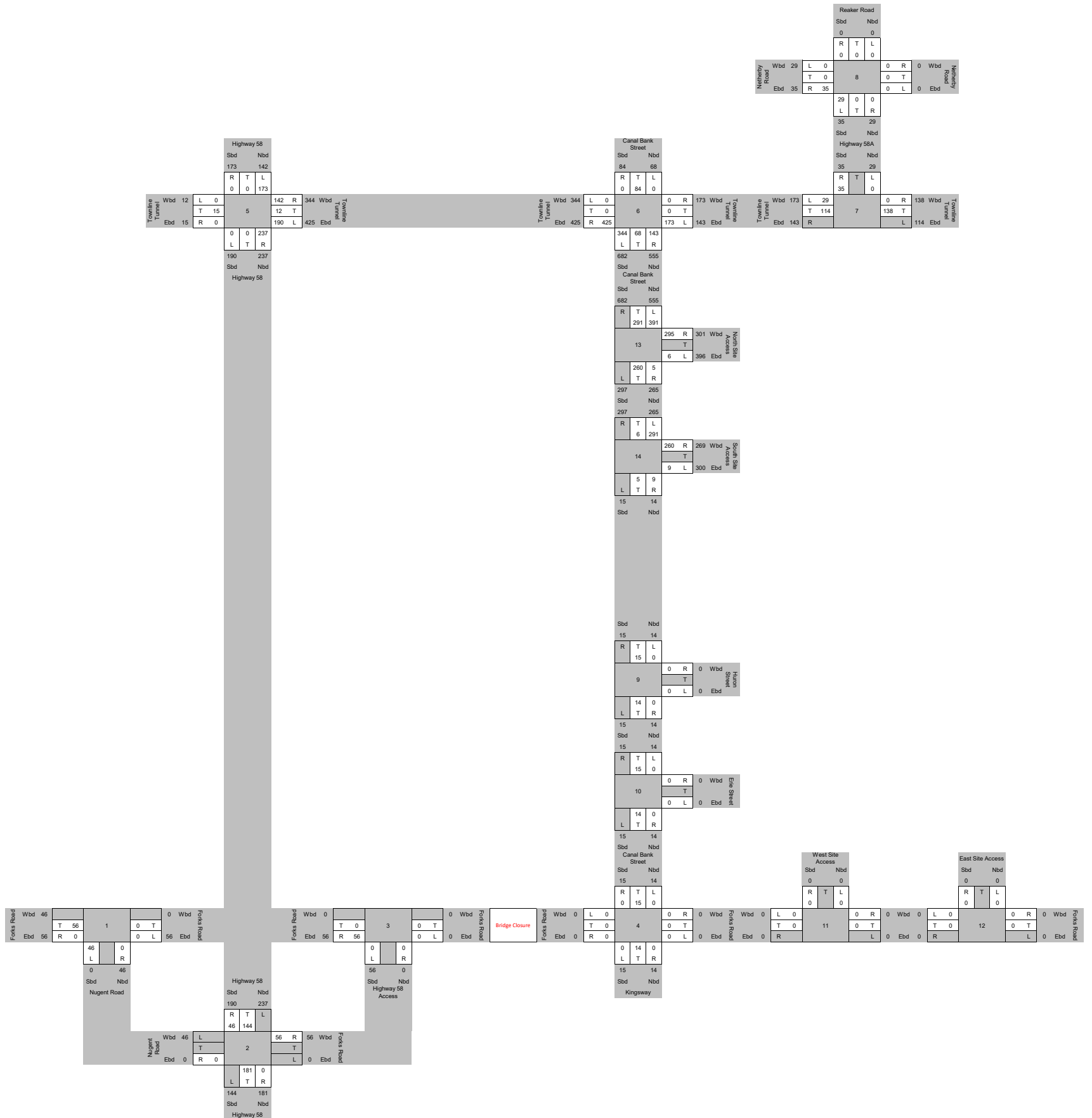


Figure 5-20
 Phase 3 (2037) Site Generated Traffic - Dain West Primary Trips - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

 Rounded Down
 Rounded up

Scale: NTS





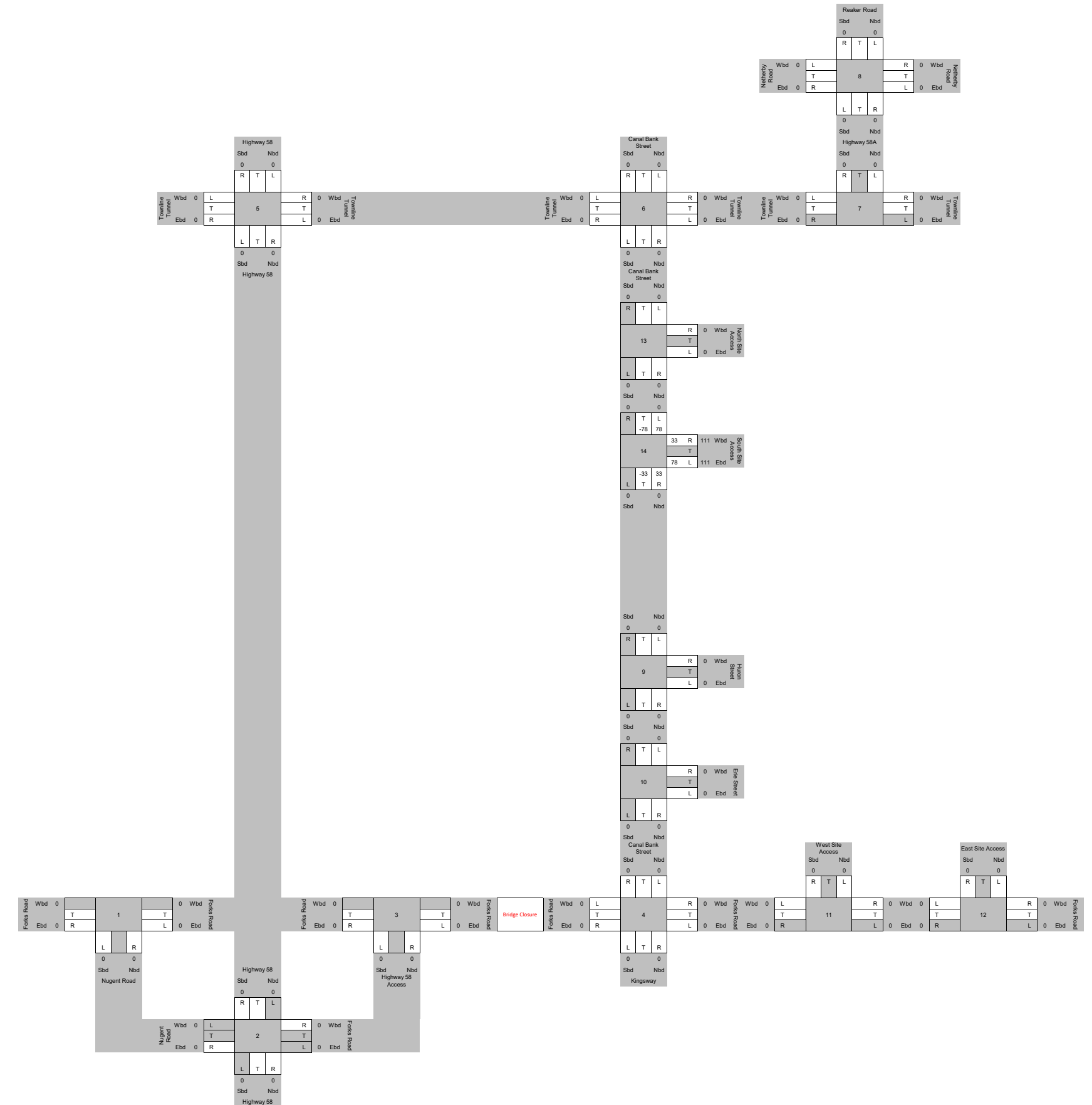


Figure 5-22
 Phase 3 (2037) Pass-by Site Generated Trips - Dain West - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

■ Rounded Down
■ Rounded up

Scale: NTS



5.3 TOTAL TRAFFIC VOLUMES

The Future Total traffic volumes were calculated by applying the site generated trips to the future background volumes.

For the 2027 horizon year, the future total traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 5-23** and **Figure 5-24**, respectively. The future total traffic volumes for scenario 2 are illustrated in **Figure 5-25** and **Figure 5-26**.

For the 2032 horizon year, the future total traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 5-27** and **Figure 5-28**, respectively. The future total traffic volumes for scenario 2 are illustrated in **Figure 5-29** and **Figure 5-30**.

For the 2037 horizon year, the future total traffic volumes for scenario 1 for the weekday AM and PM peak hours are illustrated in **Figure 5-31** and **Figure 5-32**, respectively. The future total traffic volumes for scenario 2 are illustrated in **Figure 5-33** and **Figure 5-34**.

5.4 ALL-WAY STOP-CONTROL WARRANTS

As requested by City staff, WSP completed an All-Way Stop-Control (AWSC) warrant analysis for the intersections of Kingsway at Erie Street and at Huron Street under the future total conditions. Additionally, based on the projected traffic volumes under future total conditions, WSP completed an AWSC warrant for the north and south accesses to Dain West at their intersection with Canal Bank Street. The AWSC warrant analyses have been included in **Appendix D**. The analysis has been summarized in **Table 5-5**.

The 6-hour non-peak traffic forecast was estimated using the following equation for average hourly volumes from the Ontario Traffic Manual Book 12:

$$(AM\ Peak\ Hour\ Volumes + PM\ Peak\ Hour\ Volumes) / 4$$

As under future background conditions, an assumption of 20 pedestrians crossing Kingsway/Canal Bank Street was assigned during the peak hours, with 10 pedestrians during non-peak hours, for the purpose of conservative analysis. The analysis was completed for the 2037 future total conditions as it forecasts the highest traffic volumes along the study roadways.

Table 5-5 AWSC Warrant Analyses Results Traffic Conditions

Horizon Year	Intersection	AWSC Warranted?	
		Scenario 1	Scenario 2
2037 Future Total	Kingsway at Huron Street	NO	NO
	Kingsway at Erie Street	NO	NO
	Canal Bank Street at North Access	NO	NO
	Canal Bank Street at South Access	NO	NO

Note: The AWSC warrant for the site accesses was completed for the 2037 horizon year. As an AWSC was not warranted under the 2037 horizon year (which includes the highest traffic forecast), WSP did not complete an AWSC warrant for the 2027 and 2032 horizon years.

The study intersections were assessed according to the above results, which shows that an AWSC is not warranted at these intersections.

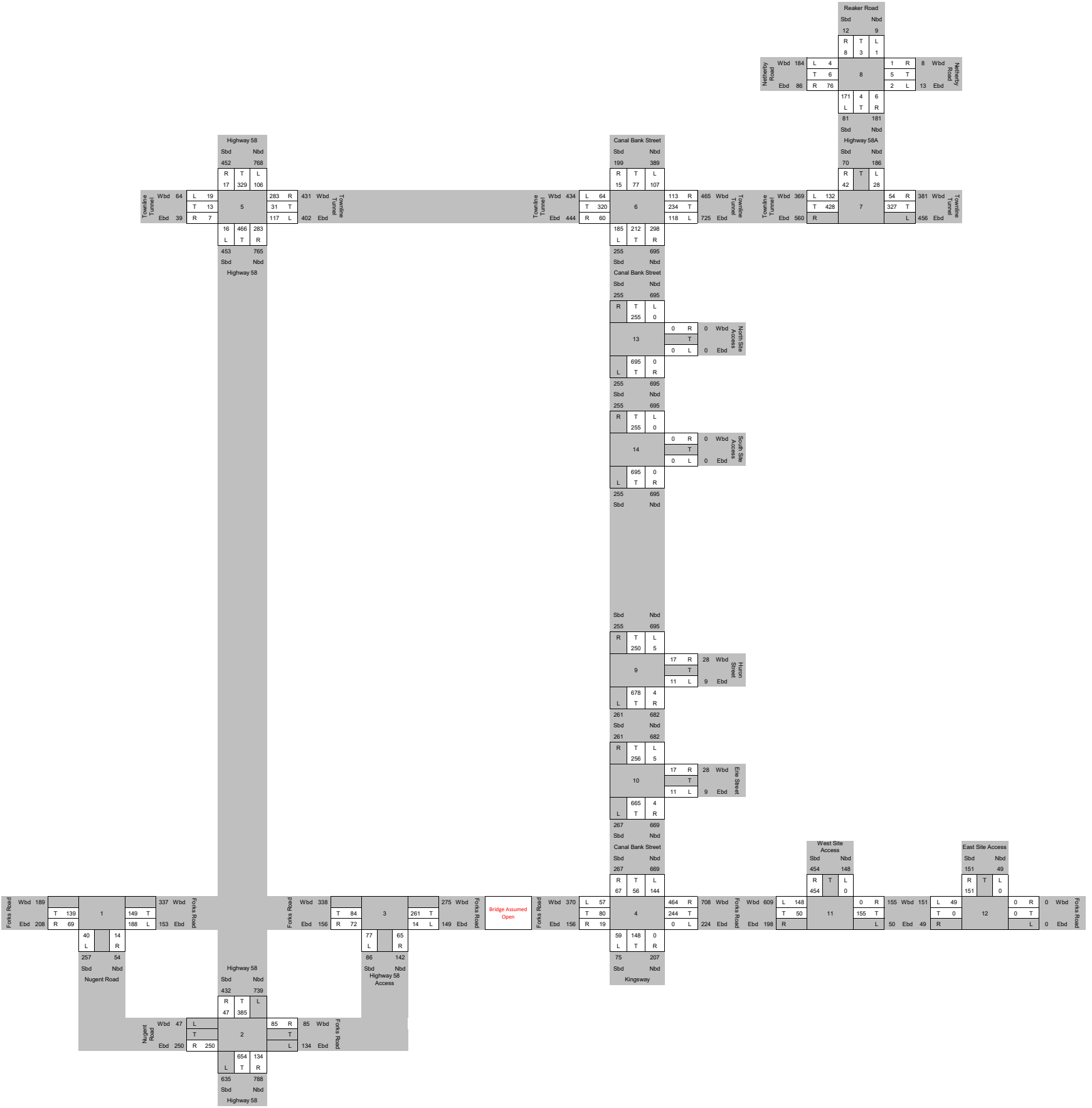


Figure 5-23
 2027 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_001_City Traffic_Mark_20200320.dwg

Scale: NTS



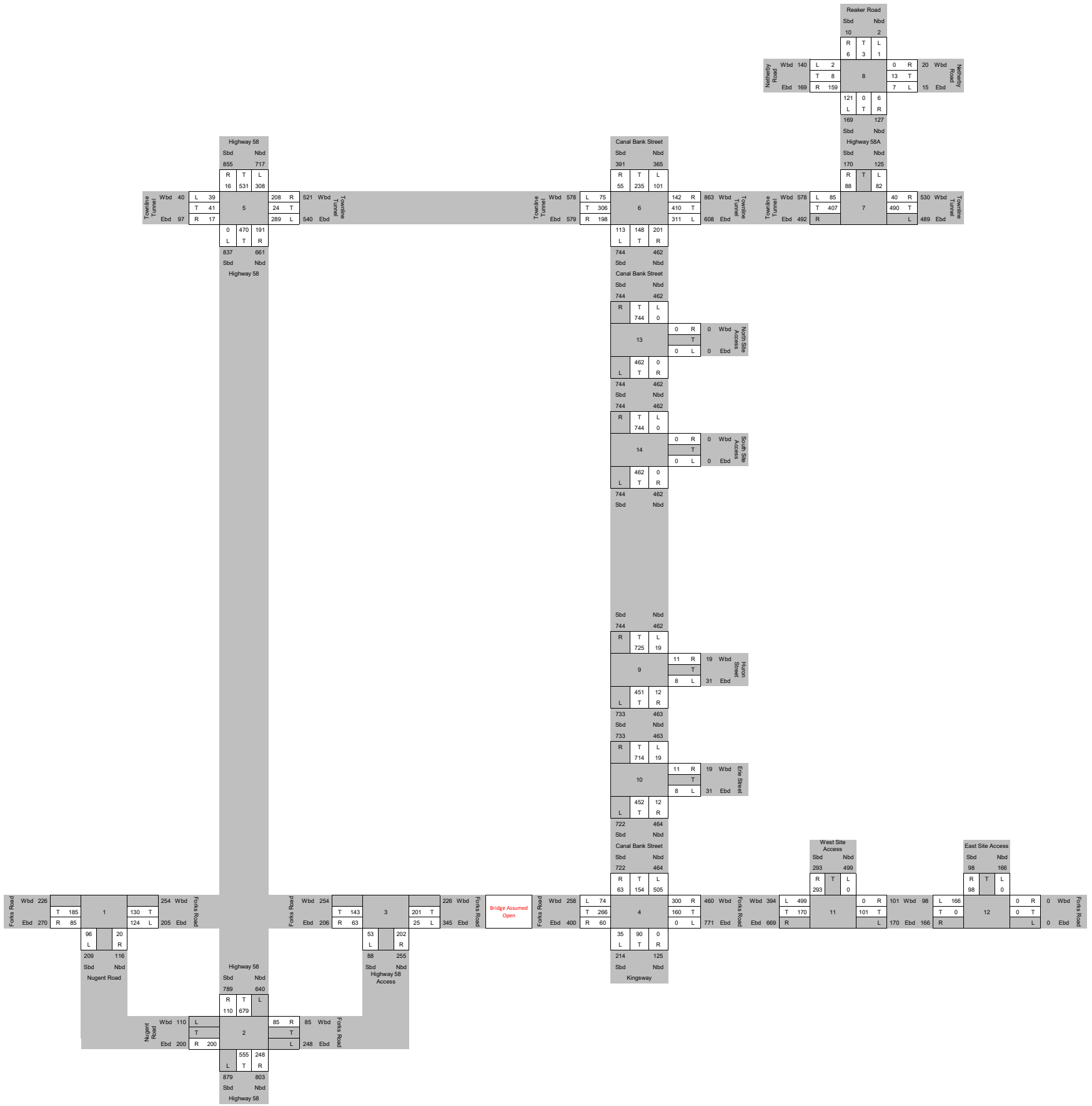


Figure 5-24
 2027 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

2014/05/20, 10:41 AM, 10:41 AM, 10:41 AM

Scale: NTS



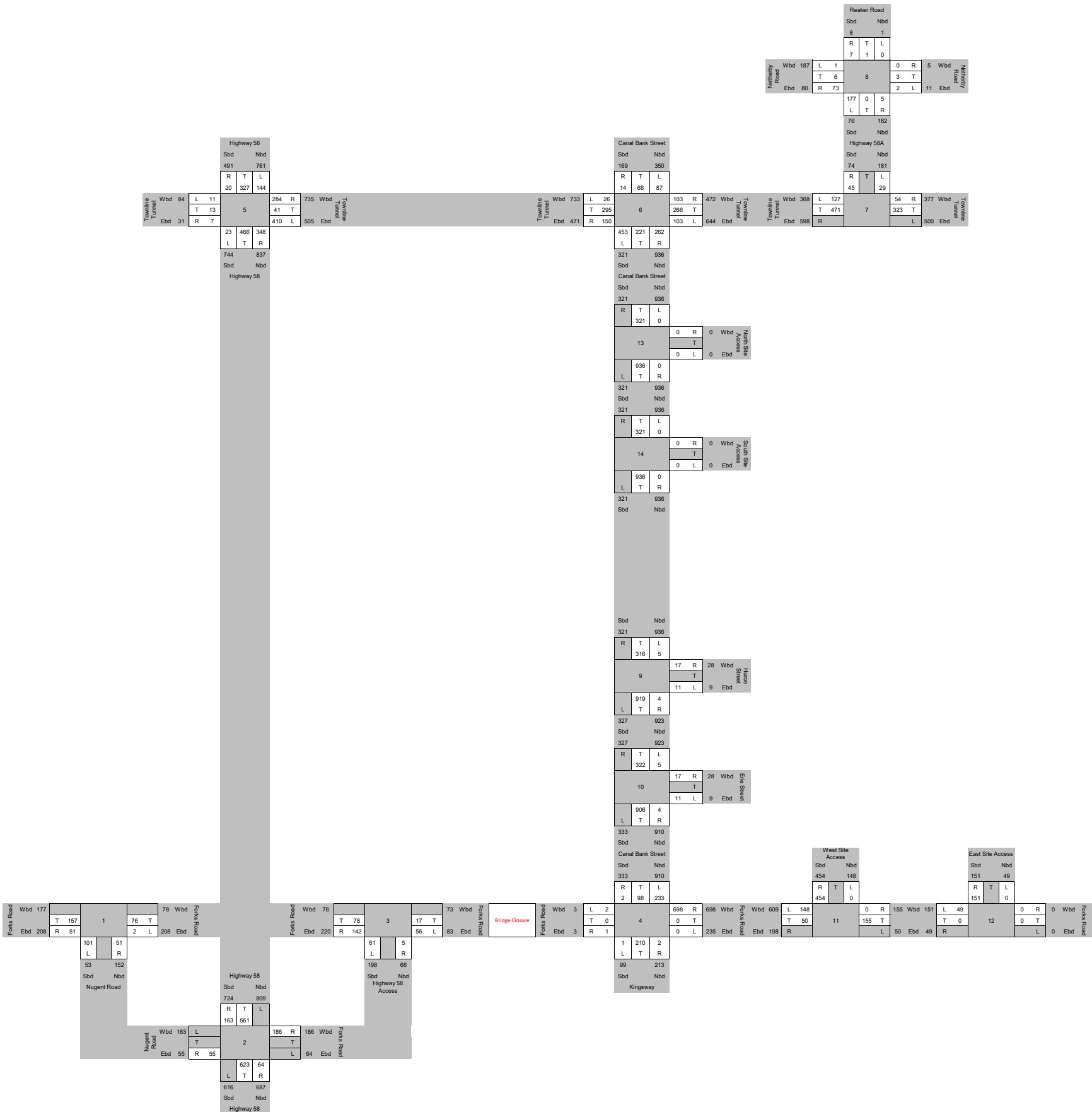


Figure 5-25
 2027 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041_Can Bank Traffic_Matn_20200320.dwg

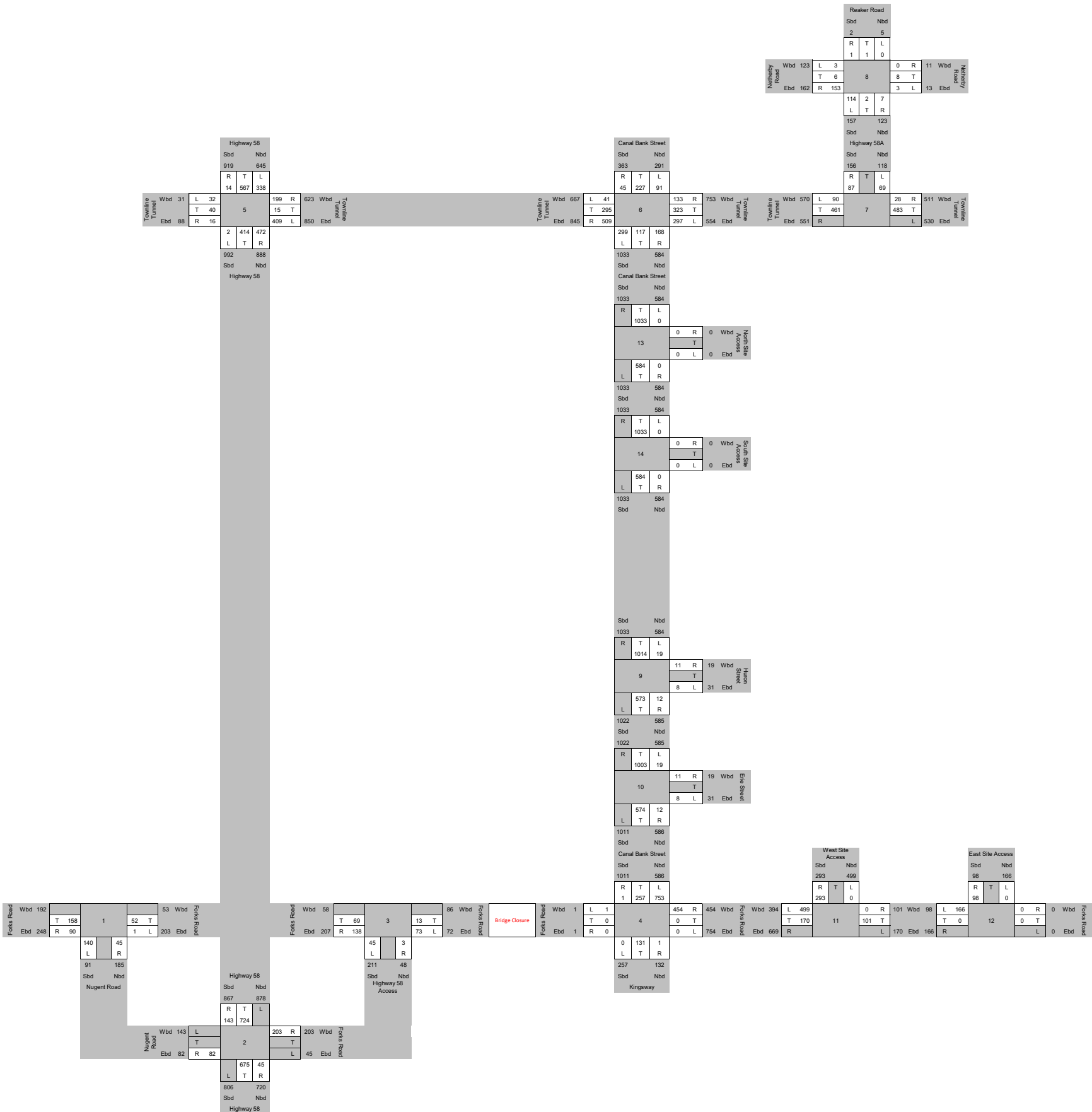


Figure 5-26
 2027 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041_City Traffic_Maps_20230320.dwg

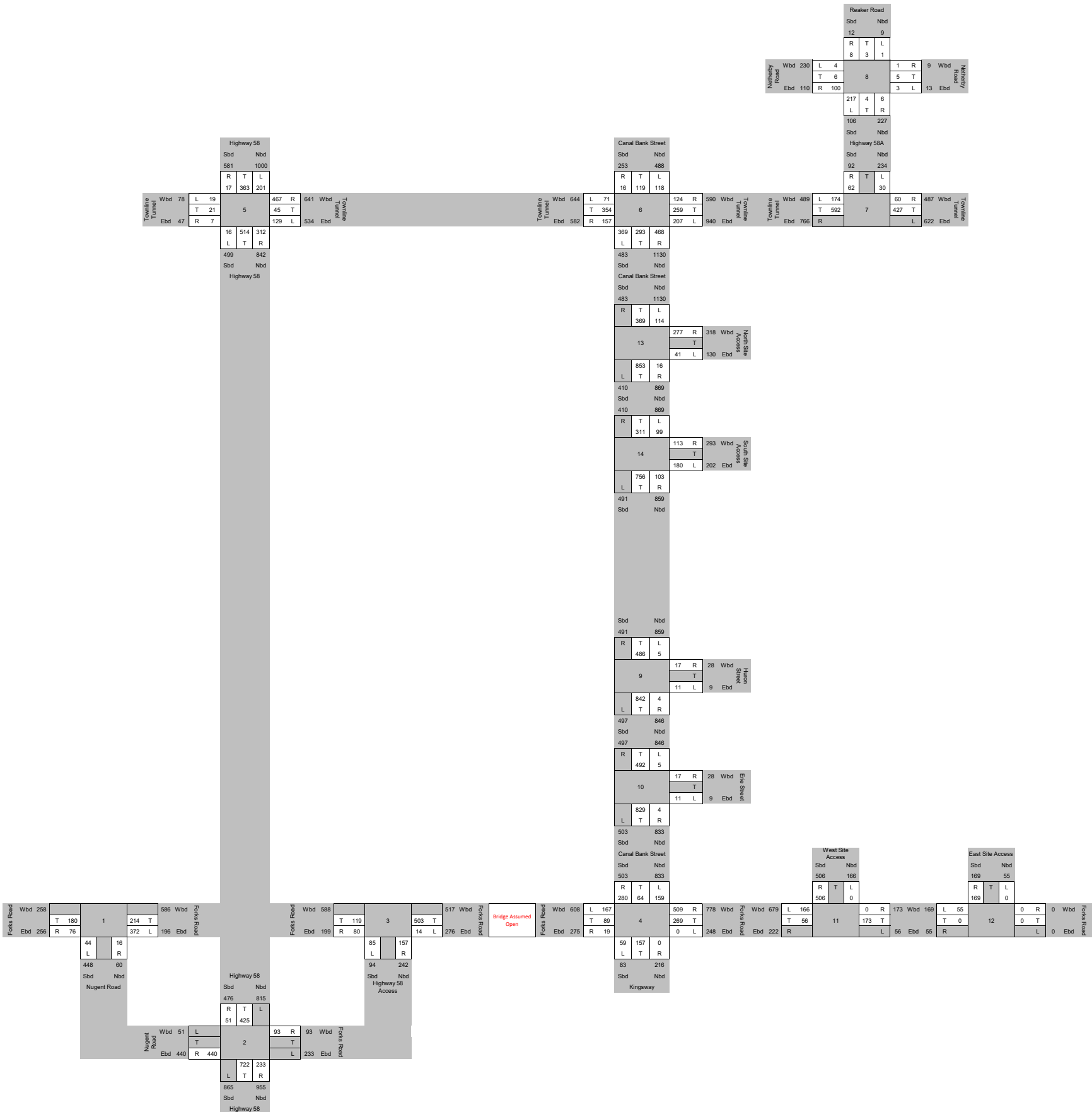


Figure 5-27
 2032 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041 City Traffic Map_20200301.dwg

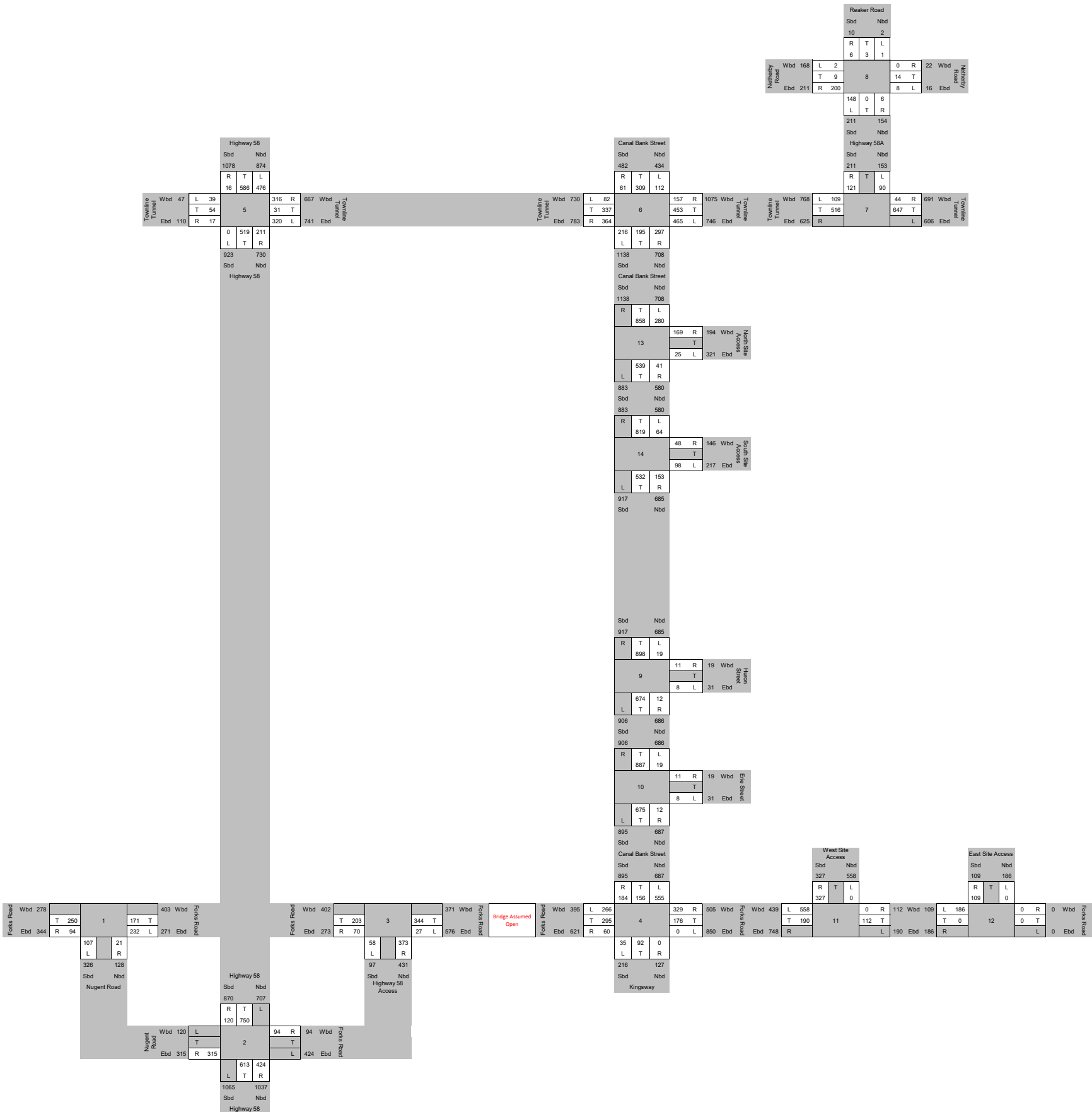


Figure 5-28
 2032 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041_Can Bank Traffic_Matn_20200301.dwg

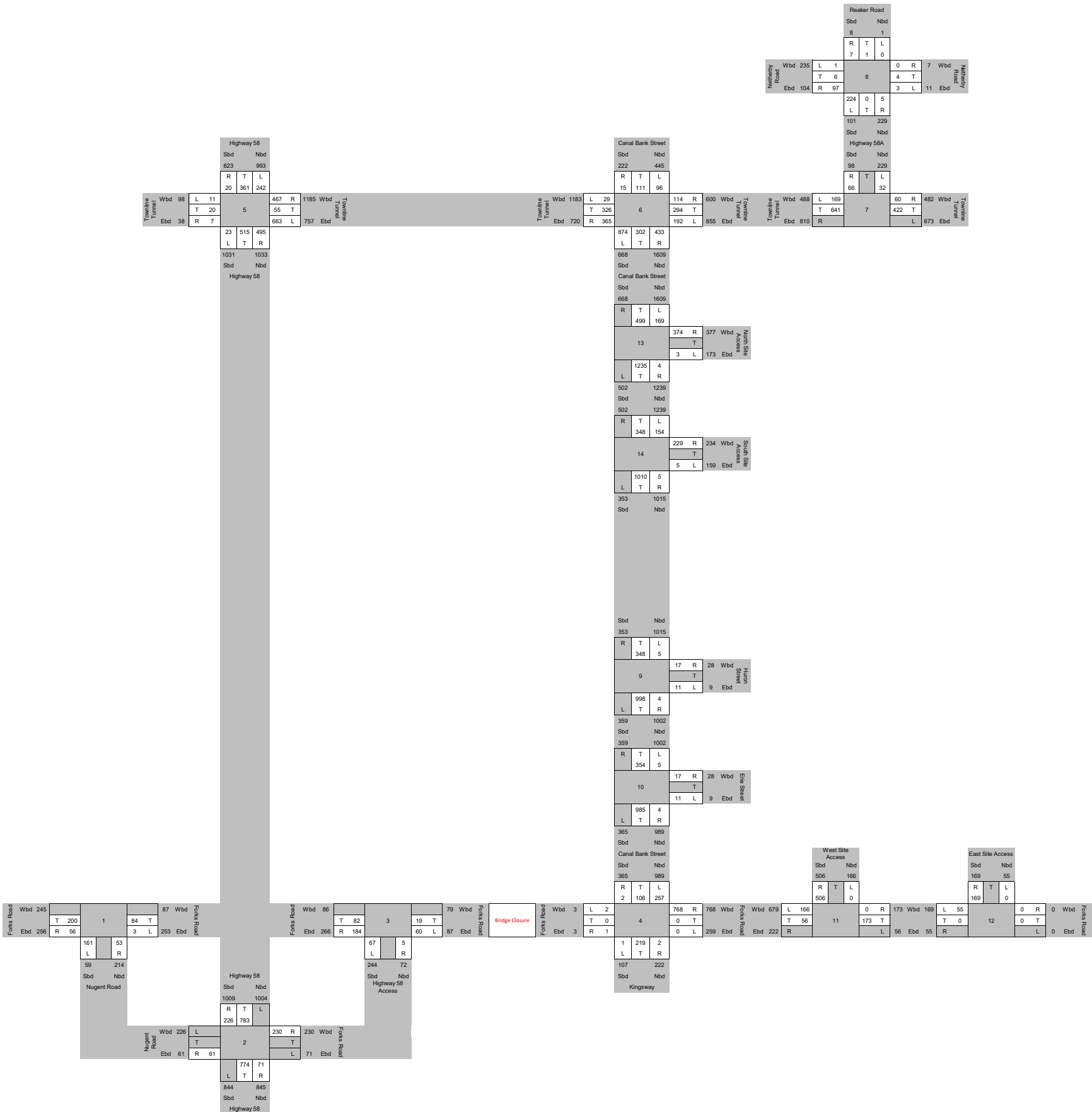


Figure 5-29
 2032 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041 City Traffic Map_20200301.dwg

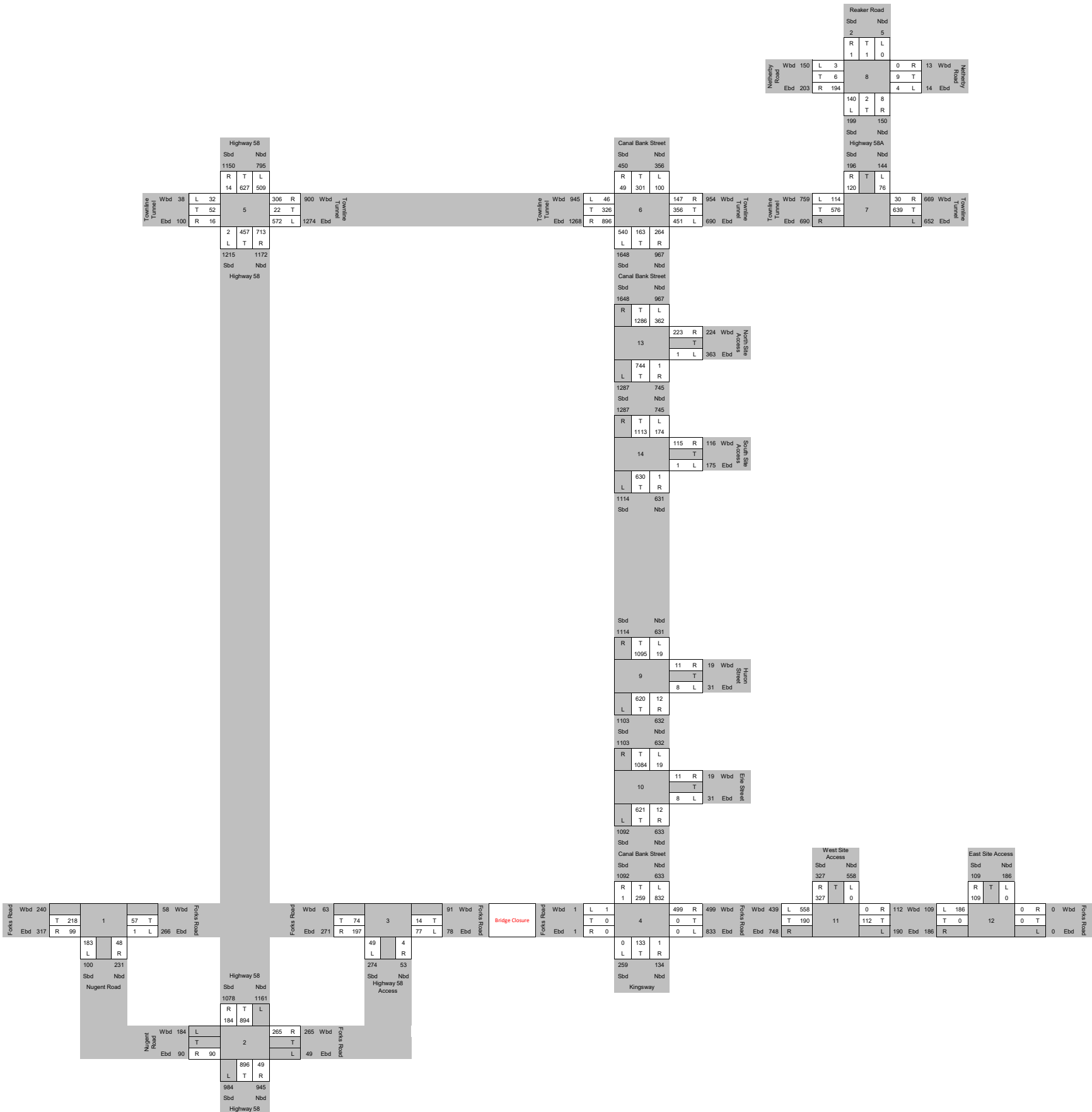


Figure 5-30
 2032 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041 City Traffic Map_202003.dwg

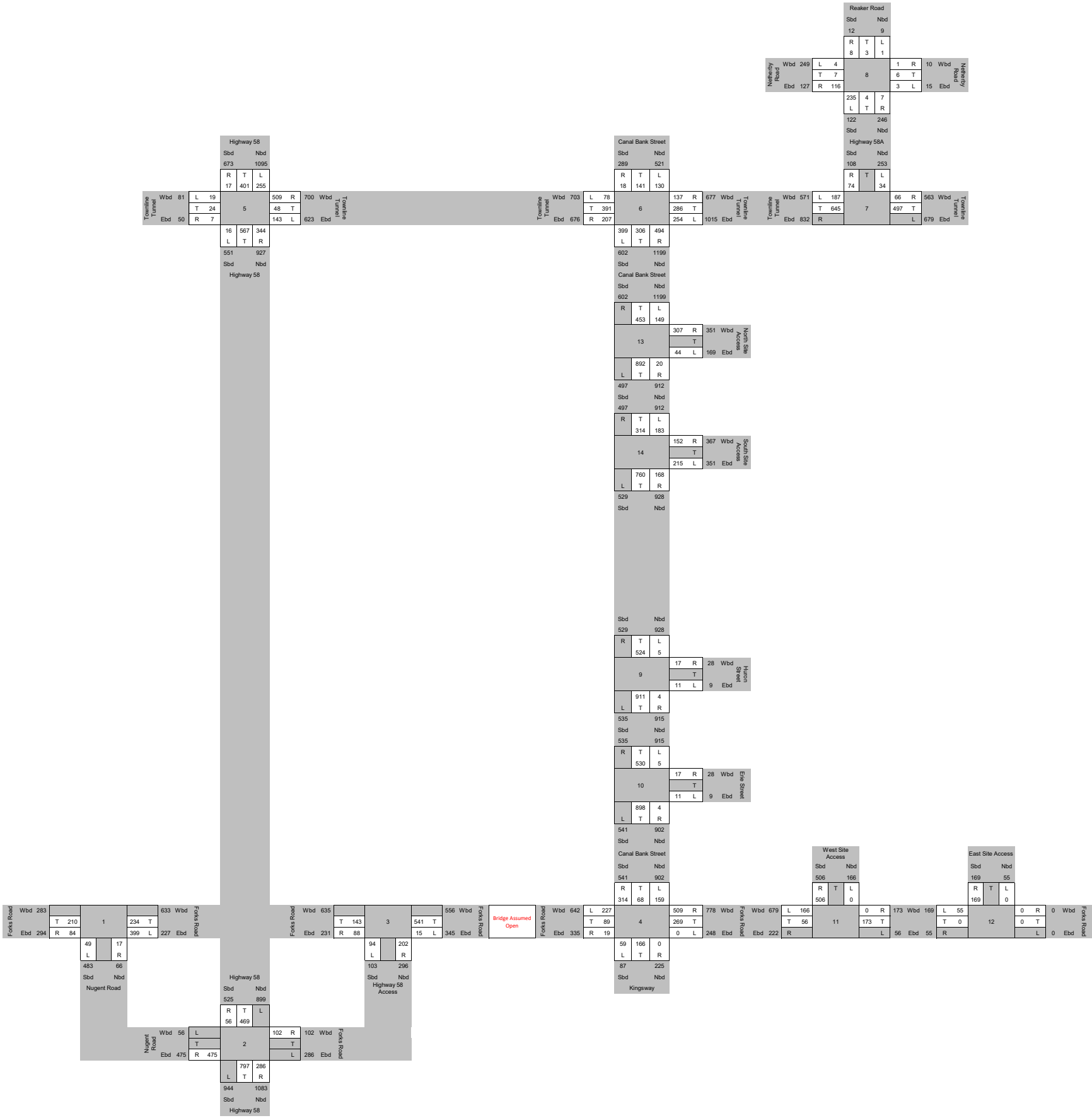


Figure 5-31
 2037 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0705-01_Site-CityTraffic_Main_202003.docx

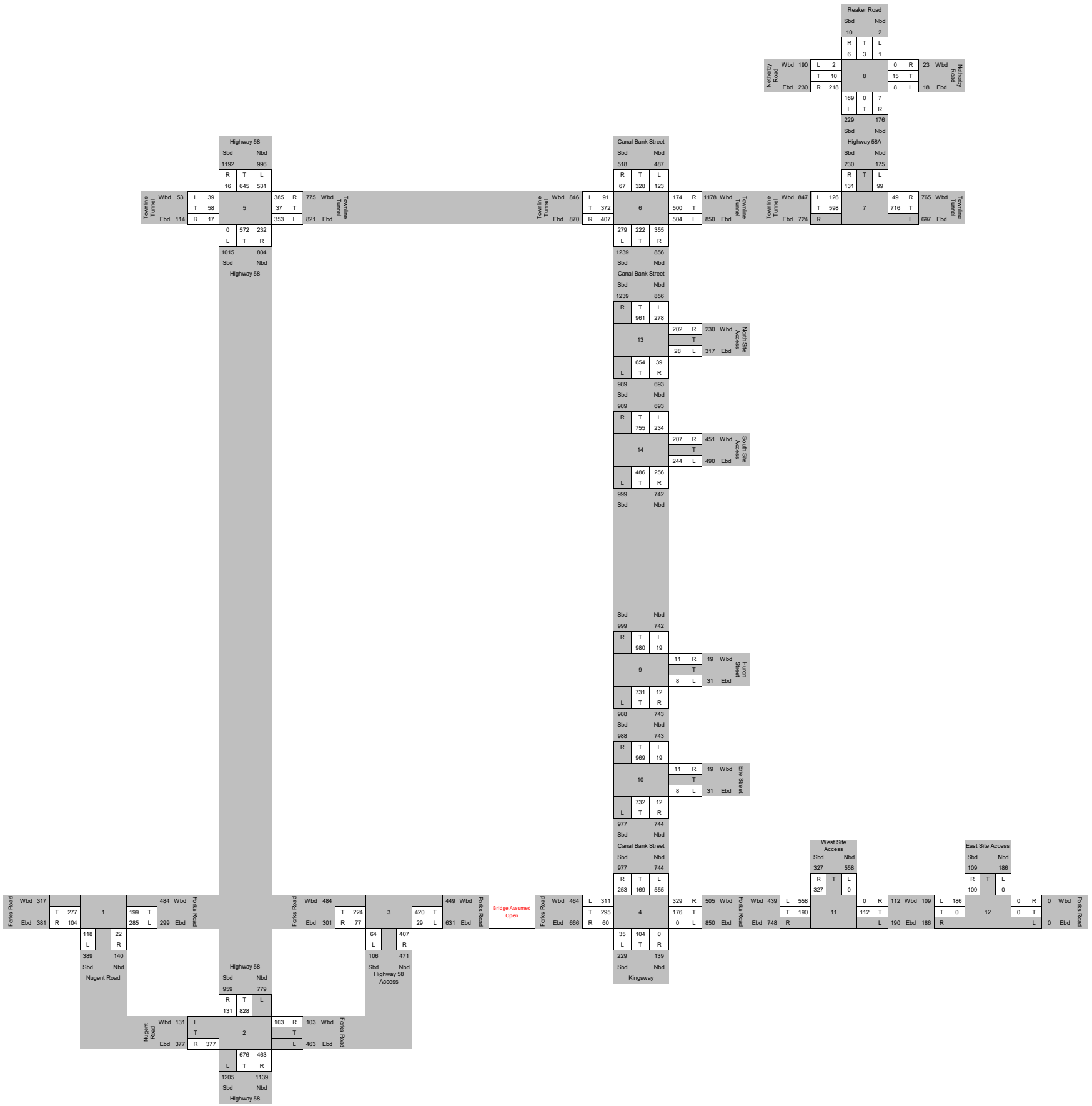


Figure 5-32
 2037 Future Total Traffic Volumes - Scenario 1 (Forks Bridge Open) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

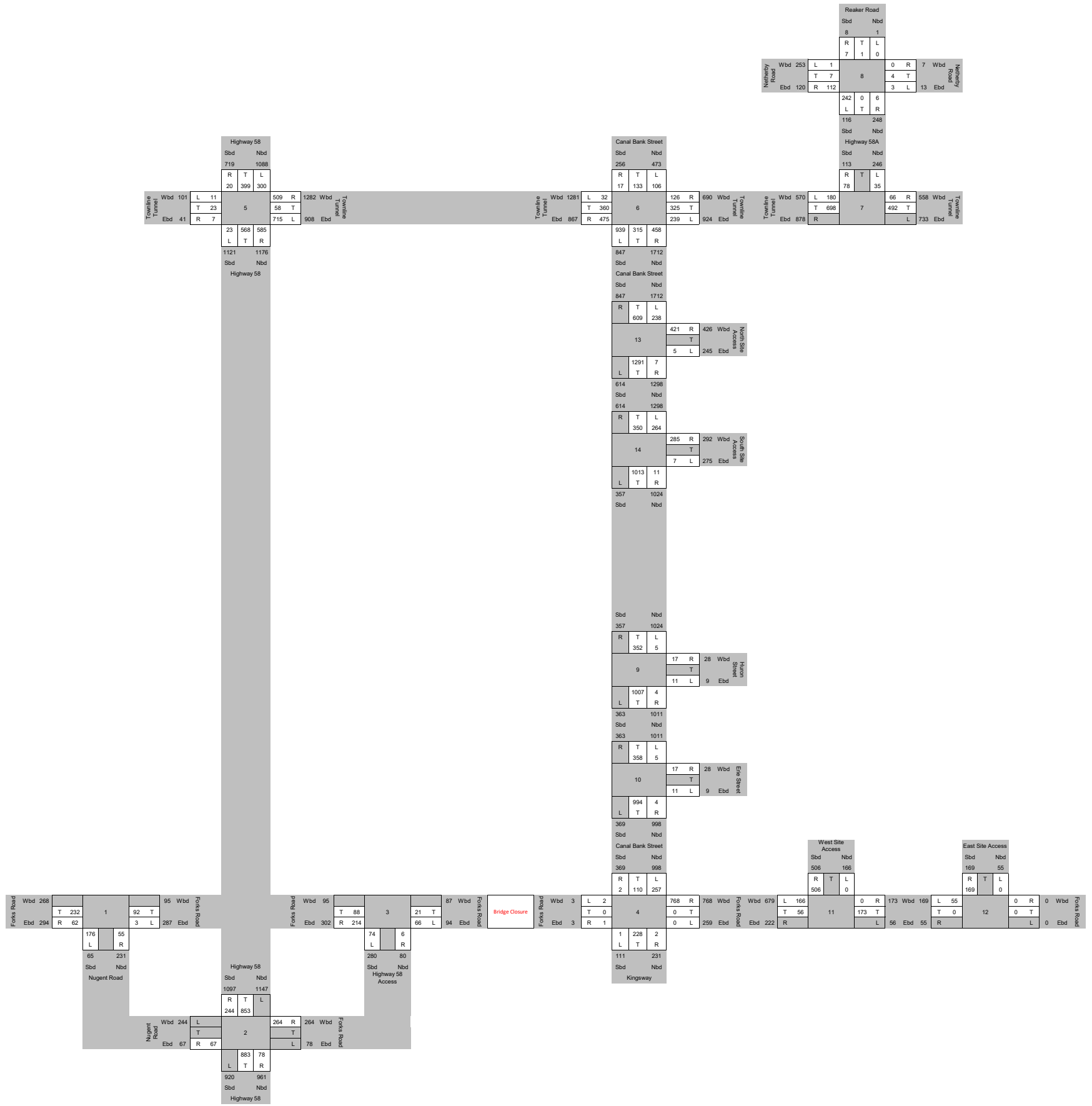


Figure 5-33
 2037 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

201-0725-01_041 City Traffic Map_20200301.dwg

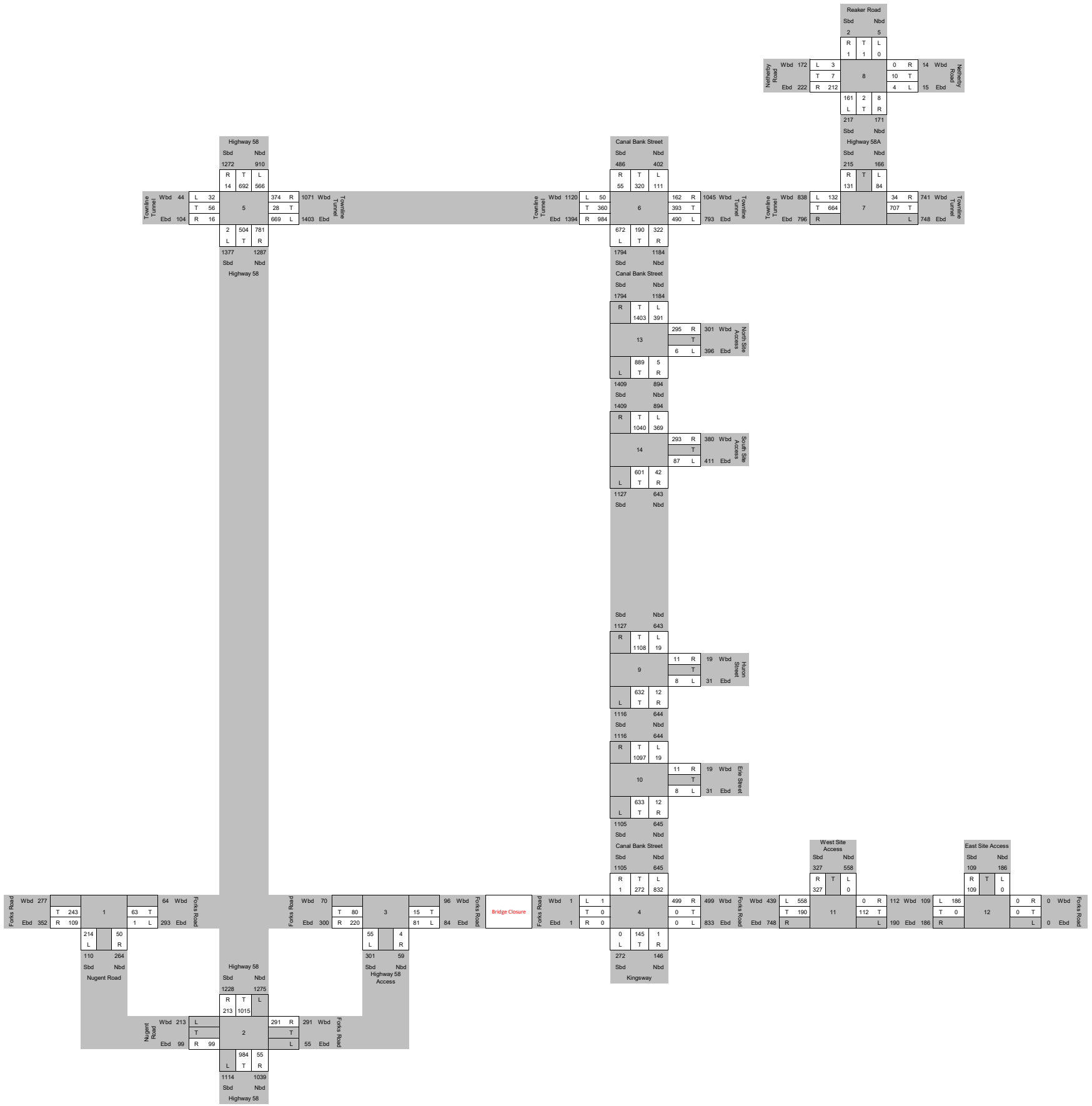


Figure 5-34
 2037 Future Total Traffic Volumes - Scenario 2 (Forks Bridge Closed) - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

5.5 LANE CONFIGURATION FOR THE PROPOSED SITE ACCESS INTERSECTIONS

5.5.1 INBOUND LEFT-TURN LANE WARRANTS

WSP completed a left-turn lane warrant analysis for the Dain West subdivision access intersections onto Canal Bank Street, as well as the Dain East westernmost intersection onto Forks Road, for both the AM and PM peak hours under scenario 1 and 2. The warrant was completed under the 2037 future total horizon year as it represents the highest traffic forecast.

The left-turn lane warrant was completed using graphs provided in the Geometric Design Standards for Ontario Highways. Based on the posted speed limits of 50km/h along Forks Road at the site frontage, and 60km/h along Canal Bank Street at the site frontage, WSP completed the warrants based on a design speed of 60km/h along Forks Road and 70km/h along Canal Bank Street.

Results of the analysis shows that a southbound left-turn lane is warranted at both the north and south accesses to Dain West under both scenario 1 and 2. For Scenario 1, the southbound left-turn at the north access is recommended with a storage length of 80m, while a storage length of 65m is recommended at the south access. For scenario 2, the southbound left-turn at the north access is recommended with a storage length of 75m, while a storage length of 50m is recommended at the south access. These storage lengths were derived based on the Synchro analysis as part of this study under the 2037 future total conditions.

In addition to the Dain West accesses, an eastbound left-turn lane is warranted at the west access to Dain East, with a storage length of 30m based on the warrant graphs.

The turning lane warrant analysis has been included in **Appendix F**.

5.5.2 INBOUND RIGHT-TURN LANE WARRANTS

Providing a right-turn lane reduces the severity of conflicts between through and turning traffic by separating slower right-turning vehicles from faster through vehicles. The general industry standard for the provision of a right-turn lane is when the right-turning volume exceeds 60 vehicles per hour, which is met at the south access to Dain West under scenario 1.

Therefore, WSP recommends providing a northbound right-turn lane at the south access to Dain West under scenario 1, with a 20m storage length (based on the Synchro analysis as part of this study under the 2037 future total conditions).

5.5.3 OUTBOUND LANE CONFIGURATION

It is desirable to separate left and right-turn traffic on a side road with stop control at an arterial road. Separating left and right-turn traffic reduces delays and queues. Therefore, WSP recommends providing an exclusive westbound left-turn lane at both the north and south accesses to Dain West.

5.6 2027 FUTURE TOTAL TRAFFIC ANALYSIS

Intersection capacity analyses were completed for the 2027 Future Total Traffic conditions under scenario 1 and 2 in order to determine the Level of Service during the weekday AM and PM peak hours. The Synchro results have been summarized in **Table 5-6**. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

5.6.1 SCENARIO 1

As shown the below table, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Kingsway at Forks Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Townline Tunnel Road at Highway 58 is projected to operate with its southbound left-turn over capacity during the PM peak hour.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with its westbound left-turn under critical conditions but below capacity during the PM peak hour, which is acceptable.
- The intersection of Highway 58A at Reaker Road is projected to operate with its southbound left-turn at LOS E during the PM peak hour, below capacity.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2027 future total conditions:

- For the intersection of Kingsway at Forks Road, WSP completed a traffic signal warrant that shows that a signal is not warranted (as detailed in **Appendix E**). However, based on the projected traffic operations at the intersection (i.e. the overall intersection delay is projected to be 186 seconds in the PM peak hour), WSP recommends the implementation of a traffic signal with a cycle length of 65 seconds during the AM peak hour and 85 seconds during the PM peak hour. Additionally, based on the projected traffic volumes WSP recommends the implementation of a southbound left-turn lane, with a protected-permissive phase during the PM peak hour. This could be implemented when the Forks Road bridge is constructed. *It should be noted that a roundabout was considered at this intersection but is not recommended as it requires an inscribed circle diameter of 14 to 27m (per TAC standards), which would be difficult to accommodate based on the existing intersection ROW as discussed with City staff. Additionally, a roundabout intersection would be more difficult to retrofit to any future changes in the roadways.*
- For the intersection of Townline Tunnel Road at Highway 58, WSP recommends optimizing the signal timing splits during the PM peak hour to ensure that all turning movements operate below capacity.
- For the intersection of Highway 58A at Reaker Road, WSP completed a traffic signal warrant that shows that a traffic signal is not warranted (see **Appendix E**). As the intersection is projected to operate with a maximum delay of 37 seconds, which is not excessive and below capacity during the PM peak hour, no improvements are recommended under 2027 future total conditions.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods. Accordingly, the Phase 1 site generated traffic can be accommodated by the boundary road network under scenario 1.

5.6.2 SCENARIO 2

As shown the below table, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Kingsway at Forks Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Townline Tunnel Road at Highway 58 is projected to operate with select movements over capacity during the study periods.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with its northbound left-turn under critical conditions but below capacity during the PM peak hour, which is acceptable.
- The intersection of Highway 58A at Reaker Road is projected to operate with its southbound left-turn at LOS E during the PM peak hour, below capacity.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2027 future total conditions:

- For the intersection of Kingsway at Forks Road, WSP completed a traffic signal warrant that shows that a signal is not warranted (see **Appendix E**). However, based on the projected traffic operations at the intersection (i.e. the overall intersection delay is projected to be 244 seconds in the PM peak hour), WSP recommends the implementation of a traffic signal with a cycle length of 70 seconds during the AM peak hour and 90 seconds during the PM peak hour. Additionally, based on the projected traffic volumes WSP recommends the implementation of a southbound left-turn lane, with a protected-permissive phase during the PM peak hour. *It should be noted that a roundabout was considered at this intersection but is not recommended as it requires an inscribed circle diameter of 14 to 27m (per TAC standards), which would be difficult to accommodate based on the existing intersection ROW as discussed with City staff. Additionally, a roundabout intersection would be more difficult to retrofit to any future changes in the roadways.*
- For the intersection of Townline Tunnel Road at Highway 58, WSP recommends optimizing the signal timing splits during the study periods to accommodate the Phase 1 site generated traffic and operate all turning movements below capacity.
- For the intersection of Highway 58A at Reaker Road, WSP completed a traffic signal warrant that shows that a traffic signal is not warranted (see **Appendix E**). As the intersection is projected to operate with a maximum delay of 39 seconds, which is not excessive and below capacity during the PM peak hour, no improvements are recommended under 2027 future total conditions.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods. Accordingly, the Phase 1 site generated traffic can be accommodated by the boundary road network under scenario 2.

Please refer to **Figure 5-35** for the recommended lane configuration at the study intersections under 2027 future total conditions for both scenario 1 and 2.

Table 5-6 2027 Future Total Traffic Conditions for Scenario 1 & 2

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)										Scenario 2 (Forks Road Bridge Closed)											
		2027 Future Total					2027 Future Total with Recommendations					2027 Future Total					2027 Future Total with Recommendations						
		AM Peak Hour V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	
Nugent Road at Forks Road Northbound Left+Right	Stop-Controlled		0.16	17	C	0.30	17	C				0.23	12	B	0.28	12	B						
Highway 58 at Forks Road Access Eastbound Right	Stop-Controlled		0.44	15	C	0.52	22	C				0.13	14	B	0.23	17	C						
Westbound Right			0.21	16	C	0.19	14	B				0.45	20	C	0.53	23	C						
Highway 58 Access at Forks Road Northbound Left+Right	Stop-Controlled		0.23	12	B	0.36	12	B				0.11	11	B	0.08	11	B						
Kingsway at Forks Road Eastbound Left+Through+Right	Stop-Controlled / Signalized		0.94	87	F	1.13	186	F	0.74	18	B	0.89	60	F	1.08	244	F	0.63	20	B	0.77	18	B
Westbound Left+Through+Right			0.34	14	B	0.95	58	F	-	-	D	0.01	11	B	0.00	11	B	-	-	-	-	-	
Northbound Left+Through+Right			1.26	150	F	1.03	77	F	-	-	-	1.12	93	F	0.77	25	C	-	-	-	-	-	
Southbound Left			0.45	16	C	0.36	18	C	-	-	-	0.42	14	B	0.26	12	B	-	-	-	-	-	
Southbound Left+Through+Right / Through-Right			0.57	19	C	1.72	355	F	-	-	-	-	-	-	-	-	-	-	-	0.85	14	B	
Highway 58 at Townline Tunnel Road Westbound Left	Signalized		0.49	17	B	0.97	34	C				0.67	22	C	1.78	373	F	-	-	-	-	-	
Northbound Through			-	-	-	-	-	-				1.46	261	F	0.99	70	E	0.88	40	D	0.95	59	E
Southbound Left			-	-	-	-	-	-				-	-	-	-	-	-	0.88	48	D	0.96	69	E
Townline Tunnel Road at Canal Bank Street Westbound Left	Signalized		0.49	13	B	0.66	18	B				0.69	16	B	0.85	20	B	-	-	-	-	-	
Northbound Left			-	-	-	0.86	35	D				-	-	-	-	-	-	-	-	-	-	-	
Townline Tunnel Road at Reaker Road Southbound Left	Stop-Controlled		0.15	26	D	0.45	37	E				0.17	28	D	0.42	39	E						
Southbound Right			0.07	11	B	0.17	13	B				0.07	16	B	0.17	13	B						
Reaker Road at Netherby Road Northbound Left+Through+Right	Stop-Controlled		0.22	10	B	0.17	10	B				0.22	10	B	0.16	10	A						
Southbound Left+Through+Right			0.01	9	A	0.01	9	A				0.01	9	A	0.00	9	A						
Kingsway at Huron Street Westbound Left+Right	Stop-Controlled		0.09	17	C	0.07	19	C				0.13	23	C	0.12	29	D						
Kingsway at Erie Street Westbound Left+Right	Stop-Controlled		0.09	17	C	0.07	19	C				0.13	23	C	0.12	29	D						
Forks Road at West Access Southbound Left+Right	Stop-Controlled		0.56	14	B	0.34	11	B				0.56	14	B	0.34	11	B						

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)						Scenario 2 (Forks Road Bridge Closed)					
		2027 Future Total			2027 Future Total with Recommendations			2027 Future Total			2027 Future Total with Recommendations		
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Forks Road at East Access Southbound Left+Right	Stop-Controlled	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
		0.15	9	A	0.10	9	A	0.15	9	A	0.10	9	A

As under existing and future background conditions, WSP assessed the projected queues along Canal Bank Street/Kingsway at the rail crossing located adjacent to St. Clair Drive based on the scenario 1 volumes. The analysis findings have been detailed in Table 5-7.

Table 5-7 2027 Future Total Conditions - Canal Bank Street Rail Crossing Queueing (Scenario 1)

Intersection	Available Storage (m) ¹	Queue Length (m)	
		2027 Future Total	PM
Kingsway/Canal Bank Street at Rail Crossing			
Northbound	50	405	270
Southbound	90	149	434

Note: ¹Distance to the nearest intersection/access. Northbound stop bar is approximately 250m north of the intersection at Forks Road.

Based on the above table, the northbound queues are projected to extend past the intersection of Forks Road at Kingsway during the study periods. The southbound queues are not projected to block any municipal intersections during the study periods.

WSP completed a grade separation warrant. The warrant is based on the AADT volumes along the roadway (calculated using the following rule of thumb → [AM peak hour + PM peak hour volumes] x 5) and the number of train crossings per day (assumed to be 12 trains per day on a busy day, as detailed in Section 3.0).

This warrant is based on research from Transport Canada (Transport Canada, Rail Safety, Oversight and Expertise “Applicant Guide for Crossing Closures, Grade Crossing Closure Program”) a crossing would be warranted using the following equation:

$$\text{Should AADT} * \# \text{ of crossing} \geq 200,000 \rightarrow \text{Crossing is Warranted}$$

Based on the projected volumes, a crossing is not warranted for the 2027 future total conditions (see **Appendix G**). It should be noted that the crossing is estimated to be activated only once an hour on very busy days. As such, these queues would not occur regularly and are only expected to last a short while when they do. Accordingly, WSP does not recommend any remedial measures.

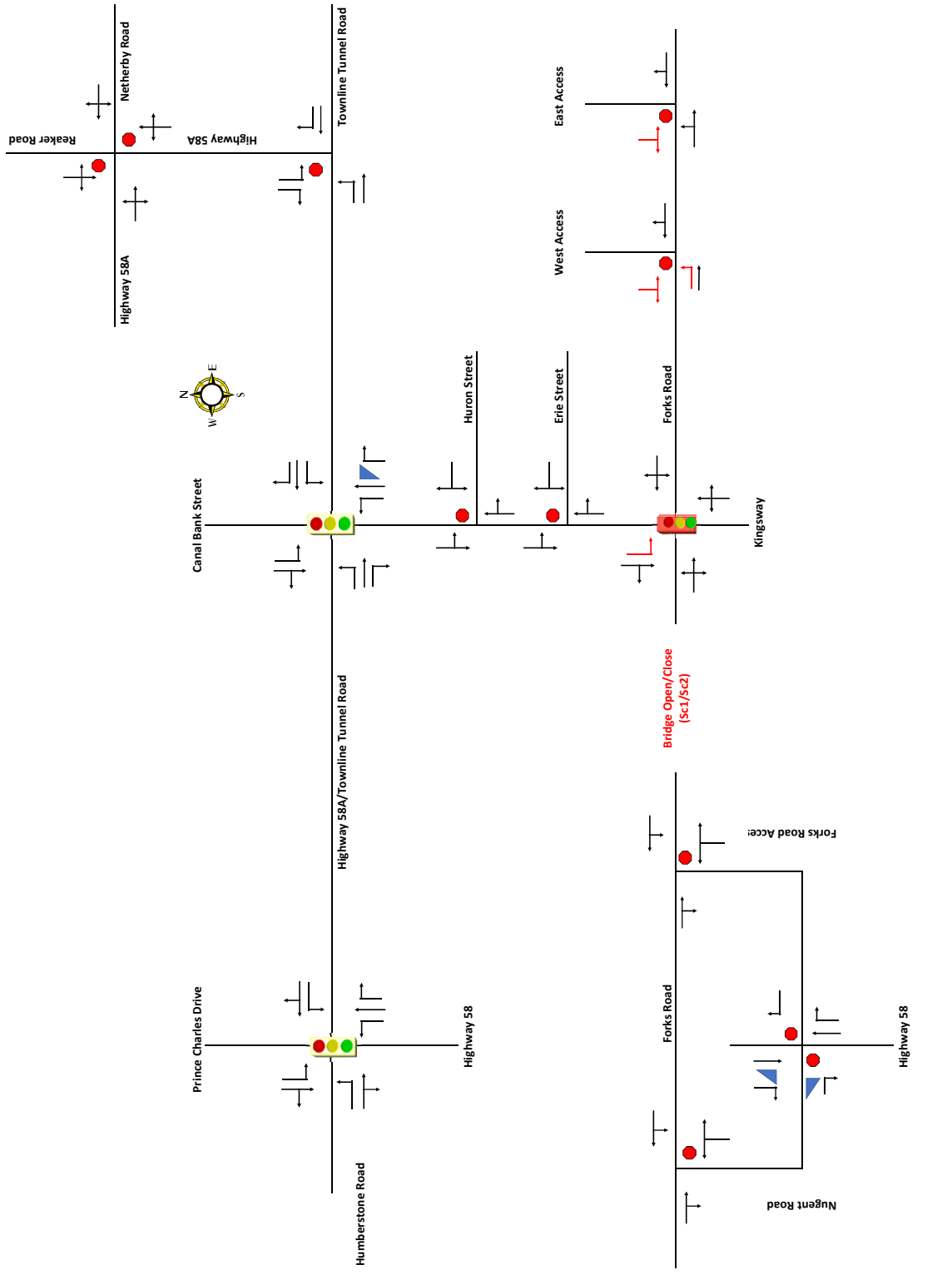


Figure 6-35
 2027 Future Total Lane Configuration - Scenario 1 & 2
 Phase 1 Drain/East Density
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Scale: NTS



- Traffic Signal
- Stop Control
- Existing Lane Configuration
- Recommended Lane Configuration
- Channeled Turn
- Recommended Traffic Signal

2023/05/10 Lane Configuration Fig. 003583-001

5.7 2032 FUTURE TOTAL TRAFFIC ANALYSIS

Intersection capacity analyses were completed for the 2032 Future Total Traffic conditions under scenario 1 and 2 in order to determine the Level of Service during the weekday AM and PM peak hours. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

All recommendations derived as part of the 2027 future total conditions were carried forward to the 2032 conditions, for both scenarios. Signal timing splits were optimized where applicable to account for the increase in traffic volumes.

5.7.1 SCENARIO 1

As shown in **Table 5-8**, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Nugent Road at Forks Road is projected to operate with the northbound approach at LOS E during the study periods, below capacity.
- The intersection of Highway 58 at the Forks Road access is projected to operate with its eastbound right-turn at LOS F during the PM peak hour, below capacity.
- The intersection of Kingsway at Forks Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Highway 58 at Townline Tunnel Road is projected to operate over capacity with its southbound left-turn over capacity during the PM peak hour.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with select movements over capacity during the PM peak hour periods.
- The intersection of Highway 58A at Reaker Road is projected to operate with its southbound left-turn at LOS E and F during the AM and PM peak hours, respectively, below capacity.
- The intersection of Canal Bank Street at the North Access is projected to operate with turning movements at LOS F during the study periods, below capacity.
- The intersection of Canal Bank Street at the South Access is projected to operate with turning movements at or above capacity during the study periods.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2032 future total conditions:

- For the intersection of Nugent Road at Forks Road, an AWSC is not warranted under 2032 future total conditions (see **Appendix D**). Considering the maximum delay is projected to be 41 seconds during the AM peak hour, which is not excessive, no recommendations were made for the intersection.
- For the intersection of Highway 58 at the Fork Road access, WSP completed a traffic signal warrant which confirmed the need for a signal at the intersection (see **Appendix E**). WSP recommends a signal with a 60 second cycle length during the AM and PM peak hours.
- For the intersection of Forks Road at Kingsway, WSP recommends the addition of an eastbound left-turn lane with a protect-permissive phase during the study periods and optimized signal timings.
- For the intersection of Highway 58 at Townline Tunnel Road, WSP recommends implementing a dual southbound left-turn lane with an additional eastbound receiving lane on Townline Tunnel Road (to taper back to one lane east of the intersection). Additionally, WSP recommends a protected-permissive westbound left-turn phase

during the PM peak hour. With this improvement the southbound left turn lane would operate under capacity with a V/C of 0.88 and 41 seconds delay (LOS D), which is acceptable.

- For the intersection of Canal Bank Street at Townline Tunnel Road, WSP recommends protected-permissive westbound and northbound left-turn phases during the PM peak hour.
- For the intersection of Highway 58A at Reaker Road, WSP completed a traffic signal warrant that shows that a signal is not warranted (see **Appendix E**). However, as the intersection is projected to operate with 112 seconds of delay at LOS F during the PM peak hour, WSP recommends the addition of a traffic signal with 60 second cycle length during the study periods.
- For the intersections of Canal Bank Street at the North and South Accesses, WSP completed a traffic signal warrant that shows that traffic signals are not warranted (see **Appendix E**). However, based on the projected operations (i.e. left turn delays exceeding 200 seconds during the peak hours), WSP recommends the addition of a traffic signal with 80 second cycle length during the study periods at both intersections.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods, with the exception of Forks Road at Kingsway.

After the recommended addition of the eastbound and southbound left-turn lanes at the intersection of Forks Road at Kingsway, no additional lanes can be recommended based on the existing right-of-way. Therefore, WSP recommends that the additional density planned for Dain East under Phase 2 (i.e. the addition of 124 single detached homes and 5 townhouses/semi-detached homes) be postponed to a future time past 2037. WSP recommends that said portion of the proposed Dain East development be reviewed once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

WSP removed the additional Dain East density proposed as part of Phase 2 and updated the analysis, as detailed below. The cycle length and splits at the intersection of Kingsway at Forks Road were optimized during the PM peak hour to account for the changes in traffic volume.

Results show that with the Dain East density proposed as under Phase 1, all intersections and turning movements are projected to operate below capacity under the 2032 future total conditions for scenario 1. Therefore, as stated above WSP recommends that the remaining proposed density for Dain East be implemented at a later stage.

Please refer to **Figure 5-36** for the recommended lane configuration at the study intersections under 2032 future total conditions for scenario 1.

Table 5-8 2032 Future Total Traffic Conditions - Scenario 1

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)														
		2032 Future Total				2032 Future Total with Recommendations				2032 Future Total with Recommendations & Phase I						
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	
Nugent Road at Forks Road	Stop-Controlled															
Northbound Left+Right		0.40	41	E	0.58	39	E			0.36	36	E	0.54	35	D	
Highway 58 at Forks Road Access	Stop-Controlled/ Signalized															
Eastbound Right		0.79	30	D	0.90	58	F									
Westbound Right		0.26	17	C	0.22	15	B									
Highway 58 Access at Forks Road	Stop-Controlled															
Northbound Left+Right		0.44	16	C	0.67	20	C			0.42	15	C	0.63	19	C	
Kingsway at Forks Road	Signalized															
Eastbound Left		1.10	46	D	1.91	265	F	0.95	43	D	1.09	67	E	0.88	34	C
Eastbound Left+Through+Right /Through-Right								0.88	55	D	0.97	70	E	0.86	54	D
Westbound Left+Through+Right		1.31	179	F	2.70	802	F									
Northbound Left+Through+Right		0.86	22	C	-	-	-	0.96	44	D	0.96	63	E	0.86	31	C
Southbound Left		-	-	-	-	-	-	0.94	73	E	-	-	-	0.94	73	E
Highway 58 at Townline Tunnel Road	Signalized															
Westbound Left		0.61	21	C	1.21	72	E	0.71	22	C	0.93	40	D	0.69	21	C
Northbound Through		-	-	-	0.88	51	D	-	-	-	0.96	68	E	-	-	-
Southbound Left		-	-	-	0.91	50	D	-	-	-	0.89	45	D	-	-	-
Townline Tunnel Road at Canal Bank Street	Signalized															
Eastbound Through		0.75	17	B	1.12	39	D									
Westbound Left		-	-	-	-	-	-	0.93	63	E	0.93	63	E	-	-	-
Northbound Left		-	-	-	1.21	137	F	0.99	68	E	0.99	68	E	-	-	-
Southbound Through+Right		-	-	-	1.01	87	F	0.91	61	E	0.91	61	E	-	-	-
Townline Tunnel Road at Reaker Road	Stop-Controlled/ Signalized															
Southbound Left		0.29	49	E	0.84	112	F	0.47	9	A	0.56	10	A	0.46	9	A
Southbound Right		0.11	12	B	0.30	17	C	-	-	-	-	-	-	-	-	-
Reaker Road at Netherby Road	Stop-Controlled															
Northbound Left+Through+Right		0.28	11	B	0.21	11	B									
Southbound Left+Through+Right		0.01	9	A	0.01	9	A									
Kingsway at Huron Street	Stop-Controlled															
Westbound Left+Right		0.14	24	C	0.13	30	D									
Kingsway at Erie Street	Stop-Controlled															
Westbound Left+Right		0.14	25	C	0.13	30	D									

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)																									
		2032 Future Total						2032 Future Total with Recommendations						2032 Future Total with Recommendations & Phase 1 Dain East Density													
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour										
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS								
Forks Road at West Access	Stop-Controlled																										
Southbound Left+Right		0.64	16	C	0.38	11	B									0.56	14	B	0.34	11	B						
Forks Road at East Access	Stop-Controlled																										
Southbound Left+Right		0.17	9	A	0.11	9	A									0.15	9	A	0.10	9	A						
Canal Bank Street at North Access	Stop-Controlled / Signalized																										
Westbound Left		0.45	67	F	0.74	233	F									0.76	16	B	0.63	11	B	0.72	15	B	0.59	10	B
Westbound Right		0.93	70	F	0.37	16	C									-	-	-	-	-	-	-	-	-	-	-	
Canal Bank Street at South Access	Stop-Controlled / Signalized																										
Westbound Left		1.42	286	F	1.00	161	F									0.67	12	B	0.65	8	A	0.63	12	B	0.62	8	A
Westbound Right		0.33	19	C	0.10	13	B									-	-	-	-	-	-	-	-	-	-	-	

WSP assessed the projected queues along Canal Bank Street/Kingsway at the rail crossing located adjacent to St. Clair Drive based on the scenario 1 volumes. The analysis findings have been detailed in **Table 5-9**.

Table 5-9 2032 Future Total Conditions - Canal Bank Street Rail Crossing Queueing (Scenario 1)

Intersection	Available Storage (m) ¹	Queue Length (m)	
		2032 Future Total with Phase 1 Dain East Density	AM PM
Kingsway/Canal Bank Street at Rail Crossing			
Northbound	50	475	383
Southbound	90	278	506

Note: ¹Distance to the nearest intersection/access. Northbound stop bar is approximately 250m north of the intersection at Forks Road.

Based on the above table, the northbound queue is projected to extend past the intersection of Forks Road at Kingsway during the study periods. The southbound queue is projected to block the Dain West south access during the PM peak hour.

As under 2027 future total conditions, WSP completed a grade separation warrant. Based on the projected volumes, a crossing is not warranted for the 2032 future total conditions with the Dain East Phase 1 density (see **Appendix G**). It should be noted that the crossing is estimated to be activated only once an hour on very busy days. As such, these queues would not occur regularly and are only expected to last a short while when they do. Accordingly, WSP does not recommend any remedial measures.

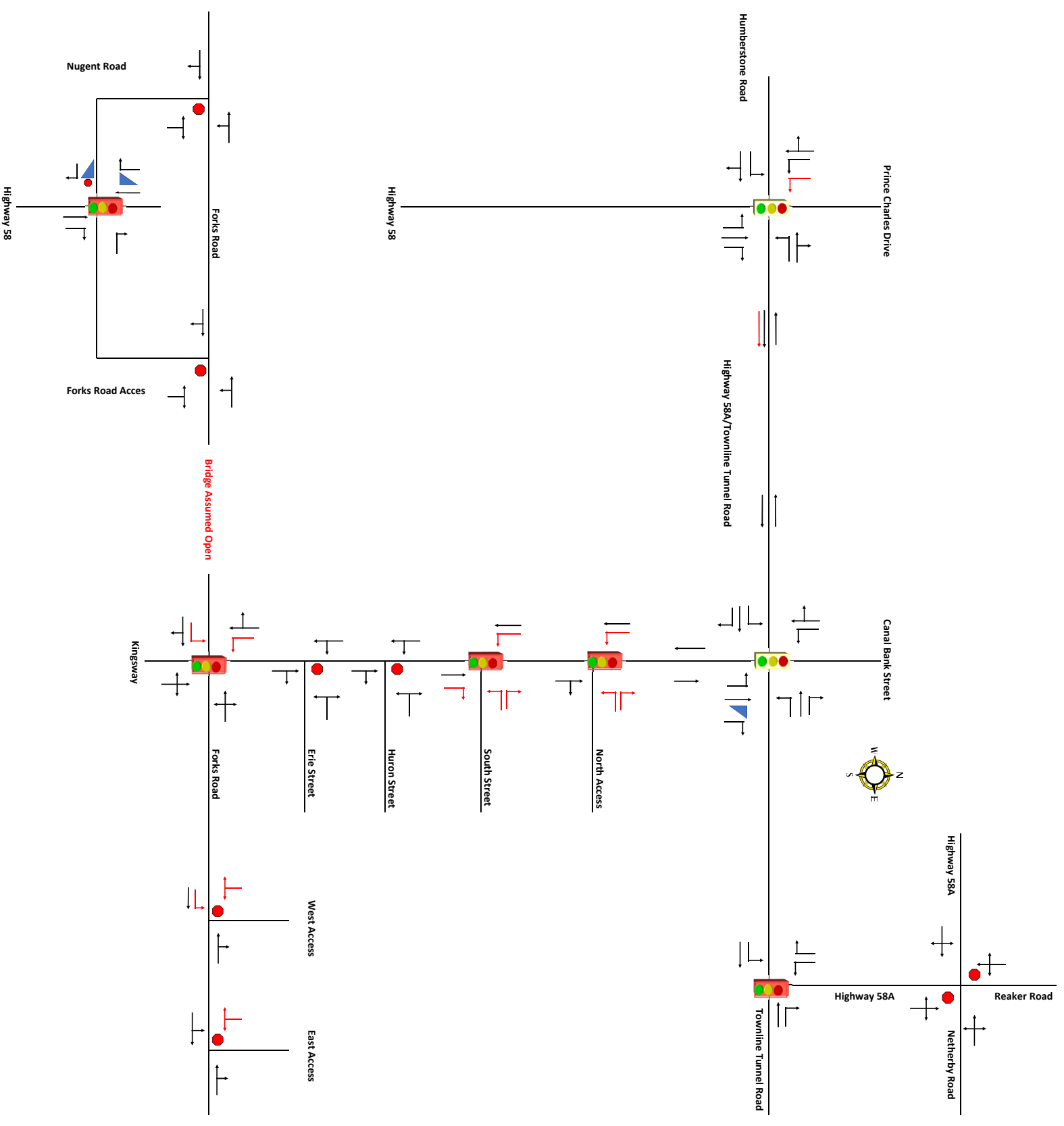


Figure S-36

2032 Future Total Lane Configuration - Scenario 1 (Forks Bridge Open)

Phase 1 *Dean East Density*
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- Stop Control
- ▴ Channelized Turn
- Traffic Signal
- Recommended Traffic Signal
- Existing Lane Configuration
- Recommended Lane Configuration

Scale: NTS



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5.7.2 SCENARIO 2

As shown in **Table 5-10**, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Highway 58 at the Forks Road access is projected to operate with its westbound right-turn at LOS E and F during the AM and PM peak hours, respectively, below capacity.
- The intersection of Kingsway at Forks Road is projected to operate with its southbound left-turn movement having a v/c under critical conditions but below capacity during the PM peak hour.
- The intersection of Highway 58 at Townline Tunnel Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Highway 58A at Reaker Road is projected to operate with its southbound left-turn at LOS F during the study periods, below capacity.
- The intersections of Kingsway at Huron Street and Erie Street are projected to operate with the westbound approach at LOS E during the PM peak hours, below capacity.
- The intersection of Canal Bank Street at the North Access is projected to operate with turning movements at LOS F during the study periods, and over capacity during the AM peak hour.
- The intersection of Canal Bank Street at the South Access is projected to operate with turning movements at LOS F during the study periods.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2032 future total conditions:

- For the intersection of Highway 58 at the Fork Road access, WSP completed a traffic signal warrant which confirmed the need for a signal at the intersection (see **Appendix E**). WSP recommends a signal with a 70 second cycle length during the AM peak hour and 90 second cycle length during the PM peak hour.
- For the intersection of Highway 58 at Townline Tunnel Road, WSP recommends implementing a dual southbound left-turn lane and dual westbound left-turn lane, with additional receiving lanes that will taper out. Additionally, WSP recommends increasing the signal cycle length to 130 seconds during the study periods. Finally, WSP recommends a permissive-overlap northbound right-turn phase during the study periods.
- For the intersection of Canal Bank Street at Townline Tunnel Road, WSP recommends implementing a dual northbound left-turn lane and dual westbound left-turn lane, with additional receiving lanes that will taper out. Additionally, WSP recommends implementing a channelized eastbound right-turn lane with an additional receiving lane to allow the movement to operate under free flow. Finally, WSP recommends increasing the signal cycle length to 120 seconds during the study periods.
 - in order to accommodate the additional receiving lanes along Canal Bank Street south of Townline Tunnel Road, as well as the traffic volumes along the corridor at the site frontage, WSP recommends widening Canal Bank Street to a four-lane cross-section from south of Townline Tunnel Road to south of the Dain West South Access.
- For the intersection of Highway 58A at Reaker Road, WSP completed a traffic signal warrant that shows that a traffic signal is not warranted (see **Appendix E**). However, as the intersection is projected to operate with 114 seconds of delay at LOS F during the PM peak hour, WSP recommends the addition of a traffic signal with 60 second cycle length during the study periods.

- The intersections of Kingsway at Huron Street and Erie Street are projected to operate with the westbound approach at LOS E during the PM peak hours. An AWSC is not warranted, as detailed in Section 5.4. Considering the movements are projected below capacity with a maximum delay of 37 seconds, no improvements were recommended.
- For the intersections of Canal Bank Street at the North and South Accesses, WSP completed a traffic signal warrant that shows that traffic signals are not warranted (see **Appendix E**). However, based on the projected operations, WSP recommends the addition of a traffic signal with 100 second cycle length during the study periods at both intersections.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods.

Please refer to **Figure 5-37** for the recommended lane configuration at the study intersections under 2032 future total conditions for scenario 2.

Table 5-10 2032 Future Total Traffic Conditions - Scenario 2

Intersection	Control Type	Scenario 2 (Forks Road Bridge Closed)											
		2032 Future Total		2032 Future Total with Recommendations		2032 Future Total with Recommendations							
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour						
Movement	Stop-Controlled	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS			
Nugent Road at Forks Road	Stop-Controlled												
Northbound Left+Right		0.36	14	B	0.38	14	B						
Highway 58 at Forks Road Access	Stop-Controlled/ Signalized												
Eastbound Right		0.19	18	C	0.33	23	C	0.64	11	B	0.74	14	B
Westbound Right		0.70	35	E	0.94	76	F	-	-	-	-	-	-
Highway 58 Access at Forks Road	Stop-Controlled												
Northbound Left+Right		0.13	12	B	0.09	12	B						
Kingsway at Forks Road	Signalized												
Eastbound Left+Through+Right		0.82	26	C	0.85	22	C						
Westbound Left+Through+Right		0.00	10	A	0.01	28	C						
Northbound Left+Through+Right		0.79	25	C	0.40	31	C						
Southbound Left		0.54	21	C	0.27	22	C						
Southbound Through-Right		0.84	33	C	0.94	23	C						
Highway 58 at Townline Tunnel Road	Signalized												
Westbound Left		1.29	89	F	1.40	109	F	0.88	40	D	0.85	50	D
Northbound Through		1.34	190	F	1.33	194	F	0.94	62	E	0.95	71	E
Northbound Right		1.06	92	F	1.06	97	F	0.90	53	D	0.97	77	E
Southbound Left		-	-	-	0.89	63	E	-	-	-	-	-	-
Southbound Through-Right		1.26	178	F	1.50	268	F	0.87	76	E	0.96	75	E
Townline Tunnel Road at Canal Bank Street	Signalized												
Eastbound Through		1.25	112	F	1.66	135	F	0.79	39	D	0.90	39	D
Eastbound Right		-	-	-	-	-	-	0.91	68	E	0.90	68	E
Westbound Left		-	-	-	1.05	67	E	-	-	-	-	-	-
Northbound Left		-	-	-	1.15	113	F	0.90	87	F	0.93	71	E
Southbound Through+Right		1.76	368	F	2.36	649	F	0.95	58	E	0.95	73	E
Townline Tunnel Road at Reaker Road	Stop-Controlled/ Signalized												
Southbound Left		0.35	58	F	0.80	114	F	0.53	14	B	0.55	17	B
Southbound Right		0.12	12	B	0.29	16	C	-	-	-	-	-	-
Reaker Road at Netherby Road	Stop-Controlled												
Northbound Left+Through+Right		0.28	11	B	0.20	10	B						
Southbound Left+Through+Right		0.01	9	A	0.00	9	A						
Kingsway at Huron Street	Stop-Controlled												
Westbound Left+Right		0.16	29	D	0.15	36	E						

Intersection	Control Type	Scenario 2 (Forks Road Bridge Closed)												
		2032 Future Total						2032 Future Total with Recommendations						
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	
Movement Kingsway at Erie Street Westbound Left+Right	Stop-Controlled	0.16	29	D	0.16	37	E							
Forks Road at West Access Southbound Left+Right	Stop-Controlled	0.64	16	C	0.38	11	B							
Forks Road at East Access Southbound Left+Right	Stop-Controlled	0.17	9	A	0.11	9	A							
Canal Bank Street at North Access Westbound Left	Stop-Controlled / Signalized	0.10	139	F	0.12	505	F	0.71	19	B	0.62	10	B	
Westbound Right		2.17	585	F	0.63	29	D	-	-	-	-	-	-	
Canal Bank Street at South Access Westbound Left	Stop-Controlled / Signalized	0.08	66	F	0.03	109	F	0.46	11	B	0.44	7	A	
Westbound Right		0.96	87	F	0.28	16	C	-	-	-	-	-	-	

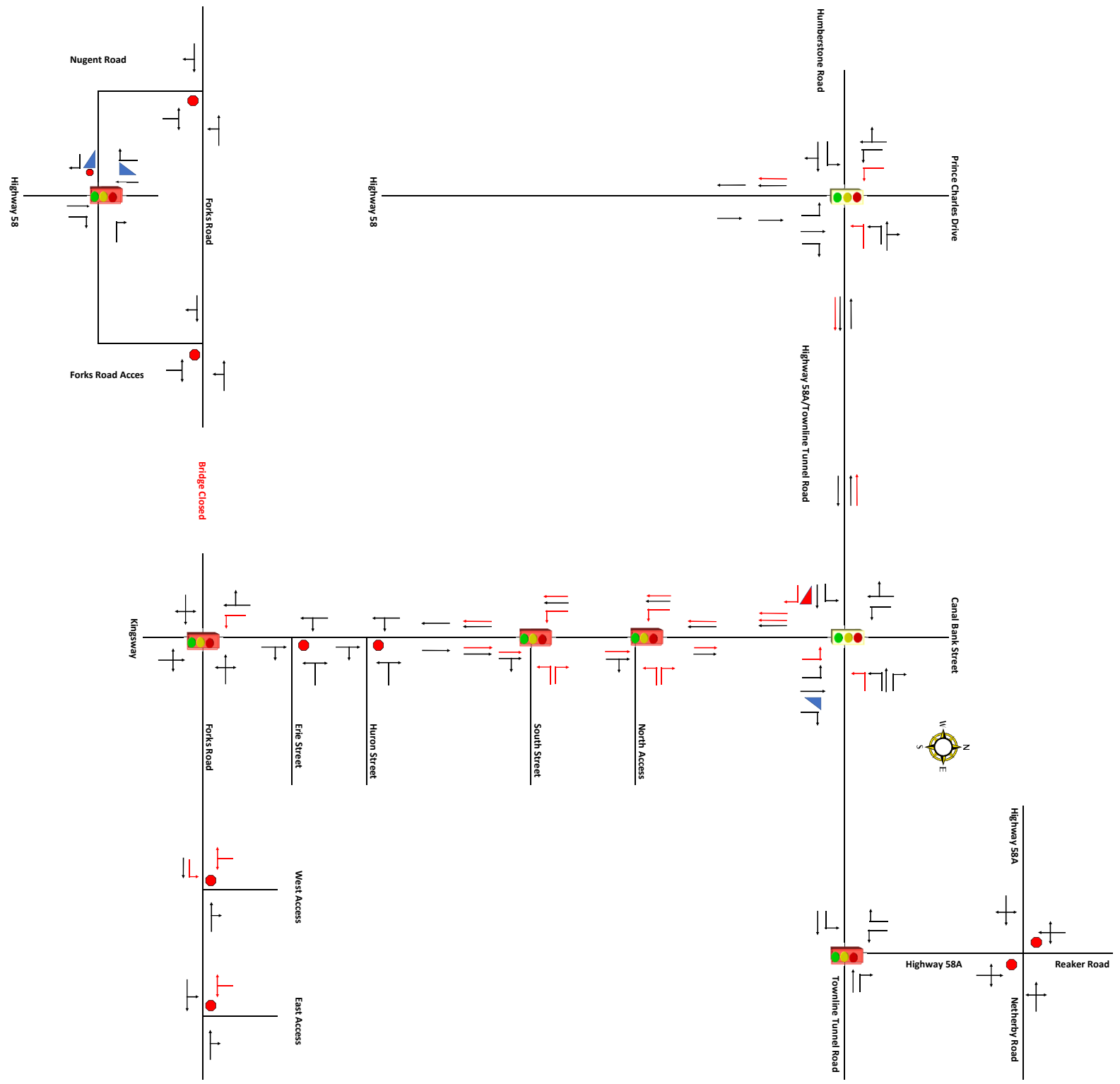


Figure 5-37

2032 Future Total Lane Configuration - Scenario 2 (Forks Bridge Closed)

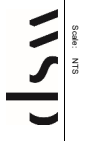
Ful/Dual East Density

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2023/04/14 Lane Configuration 19_20230322.doc

- Stop Control
- ▲ Channelized Turn
- Traffic Signal
- Recommended Traffic Signal
- + Existing Lane Configuration
- + Recommended Lane Configuration

- ▲ Recommended Channelized Turn



5.8 2037 FUTURE TOTAL TRAFFIC ANALYSIS

Intersection capacity analyses were completed for the 2037 Future Total Traffic conditions under scenario 1 and 2 in order to determine the Level of Service during the weekday AM and PM peak hours. Please note that only critical movements (i.e. with a v/c of 0.85 or higher, or LOS E or F), as well as movements operating under stop-control, were included within the summary tables.

All recommendations derived as part of the 2032 future total conditions were carried forward to the 2037 conditions, for both scenarios. Per the findings from the 2032 future total conditions for scenario 1, the initial analysis under the 2037 horizon year considers the Dain East density as under Phase 1 (i.e. 2027). Signal timing splits were optimized where applicable to account for the increase in traffic volumes.

5.8.1 SCENARIO 1

As shown in **Table 5-11**, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Nugent Road at Forks Road is projected to operate with the northbound approach at LOS F during the study periods, below capacity.
- The intersection of Kingsway at Forks Road is projected to operate with select movements over capacity during the AM peak hour and select movements at capacity during the PM peak hour.
- The intersection of Highway 58 at Townline Tunnel Road is projected to operate with select turning movements over capacity during the PM peak hour.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with select movements at capacity during the AM peak hour and select movements over capacity during the PM peak hour.
- The intersections of Kingsway at Erin Street and Huron Street are projected to operate with the westbound approach at LOS E during the PM peak hour, below capacity.
- The intersection of Canal Bank Street at the North Access is projected to operate with its southbound left-turn at LOS E during the AM peak hour, below capacity.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2037 future total conditions:

- For the intersection of Nugent Road at Forks Road, an AWSC control is not warranted under 2037 future total conditions (see **Appendix D**). Considering that the delay is at a maximum of 80 seconds during the PM peak hour, it is anticipated that the delay during non-peak hours will be lower with better LOS. As such the implementation of an AWSC would impact traffic flow during non-peak hours and is not recommended as per the warrant results. Therefore, as the intersection is projected to operate below capacity, WSP does not recommend any improvements under the 2037 future total conditions.
- For the intersection of Forks Road at Kingsway, WSP recommends increasing the cycle length to 120 seconds during the AM peak hour and 135 seconds during the PM peak hour to accommodate the increase in traffic volumes.
- For the intersection of Highway 58 at Townline Tunnel Road, WSP recommends increasing the cycle length to 120 seconds during the PM peak hour.
- For the intersection of Canal Bank Street at Townline Tunnel Road, WSP recommends a dual westbound left-turn lane, along with an additional receiving lane that will taper out. Additionally, WSP recommends a protected-permissive northbound left-turn phase during the AM peak hour. The recommended cycle length is 110 seconds during the study periods.

- The intersections of Kingsway at Erin Street and Huron Street are projected to operate with the westbound approach at LOS E during the PM peak hour. An AWSC is not warranted with greater volumes (i.e. full densities) for either intersection as detailed in Section 5.4. Considering the movements are projected below capacity with a maximum delay of 41 seconds at Erin Street, no improvements were recommended.
- For the intersections of Canal Bank Street at the North Access, WSP recommends a protective-permissive southbound left-turn phase during the AM peak hour, with a cycle length of 105 seconds.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods. Please refer to **Figure 5-38** for the recommended lane configuration at the study intersections under 2037 future total conditions for scenario 1 with the Dain East Phase 1 density.

2037 FUTURE TOTAL CONDITIONS WITH FULL DAIN EAST DENSITY

WSP completed an analysis of the proposed development assuming full build-out of Dain East. For the purpose of this study, WSP assumed that the full build-out would take place once all roadway improvements have been implemented per the City of Welland Official Plan, Schedule F. The planned roadway improvements consist of widening Canal Bank Street and Forks Road.

As such, WSP completed the 2037 future total analysis with full Dain East build-out assuming widening of Canal Bank Street/Kingsway north of Forks Road to a four-lane cross-section, and widening of Forks Road to allow for a westbound right-turn lane at its intersection with Kingsway. The analysis results have been detailed in **Table 5-11** below. Cycle lengths and signal timing splits were optimized to account for the changes in lane configuration along Canal Bank Street/Kingsway and the increased traffic volumes throughout the network.

Accounting for the planned improvements, the full Dain East and West densities are projected to be accommodated by the road network. All intersections are projected to operate below capacity. It should be noted that the intersection of Nugent Road at Forks Road is projected to operate with the northbound approach at LOS F, however an AWSC is not warranted (see **Appendix D**). As all movements are projected to operate below capacity, no additional improvements were recommended for the study intersection. Please refer to **Figure 5-39** for the recommended lane configuration at the study intersections under 2037 future total conditions for scenario 1 with the planned improvements and full Dain East density.

Therefore, per the above WSP recommends that the implementation of 124 single detached units and 5 Townhouse/Semi-Detached Units from Dain East be implemented at a later time once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

Table 5-11 2037 Future Total Traffic Conditions - Scenario 1

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)																	
		2037 Future Total with Phase 1 Dain East Density						2037 Future Total with Recommendations & Phase 1 Dain East Density						2037 Future Total with Full Dain East Density & Canal Bank Street/Kingsway/Forks Road Widening					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	
Nugent Road at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.51	56	F	0.83	80	F			0.56	65	F	0.89	97	F				
Highway 58 at Forks Road Access	Signalized																		
Highway 58 at Forks Road Access	Signalized	0.81	14	B	0.85	15	B			0.83	15	B	0.86	15	B				
Highway 58 Access at Forks Road	Stop-Controlled																		
Northbound Left+Right		0.54	19	C	0.75	25	D			0.57	19	C	0.79	29	D				
Kingsway at Forks Road	Signalized																		
Eastbound Left		1.04	55	D	1.00	59	E	0.98	59	E	0.99	61	E	0.56	18	B	0.90	33	C
Westbound Left+Through+Right		1.01	84	F	0.99	85	F	0.96	80	E	0.98	84	F	-	-	-	0.90	53	D
Northbound Left+Through+Right		0.96	47	D	1.00	86	F	0.99	62	E	0.99	87	F	-	-	-	-	-	-
Southbound Left		1.09	118	F	0.58	55	D	0.98	91	F	0.63	63	E	-	-	-	-	-	-
Highway 58 at Townline Tunnel Road	Signalized																		
Westbound Left		0.81	26	C	1.03	55	E	0.98	51	D	0.98	72	E	-	-	-	0.88	31	C
Northbound Through		-	-	-	1.05	92	F	0.98	77	E	0.98	77	E	0.77	27	C	0.97	52	D
Southbound Left		0.90	38	D	0.98	60	E	0.99	70	E	0.99	70	E	-	-	-	0.99	74	E
Townline Tunnel Road at Canal Bank Street	Signalized																		
Eastbound Through		-	-	-	1.11	115	F	0.98	79	E	0.98	79	E	-	-	-	0.94	73	E
Westbound Left		0.99	29	C	1.10	60	E	0.90	36	D	0.95	43	D	-	-	-	0.87	38	C
Northbound Left		-	-	-	1.10	118	F	0.89	54	D	0.95	71	E	0.89	54	D	0.89	55	D
Southbound Through+Right		0.99	74	E	1.03	79	E	0.88	72	E	0.96	73	E	0.90	75	E	0.89	58	E
Townline Tunnel Road at Reaker Road	Signalized																		
Northbound Left+Through+Right		1.00	67	E	1.13	125	F	0.90	43	D	0.94	62	E	0.88	40	D	0.83	40	D
Southbound Left+Right		-	-	-	1.03	94	F	-	-	-	0.87	56	E	-	-	-	-	-	-
Reaker Road at Netherby Road	Stop-Controlled																		
Northbound Left+Through+Right		0.51	10	B	0.62	11	B			0.52	10	B	0.63	12	B				
Southbound Left+Through+Right		0.30	11	B	0.24	11	B			0.31	11	B	0.25	11	B				
Kingsway at Huron Street	Stop-Controlled																		
Westbound Left+Right		0.02	9	A	0.01	9	A			0.02	9	A	0.01	9	A				
Kingsway at Erie Street	Stop-Controlled																		
Westbound Left+Right		0.15	27	D	0.17	39	E			0.11	20	C	0.09	21	C				
Forks Road at West Access	Stop-Controlled																		
Southbound Left+Right		0.16	28	D	0.17	41	E			0.11	20	C	0.09	21	C				
Forks Road at East Access	Stop-Controlled																		
Southbound Left+Right		0.56	14	B	0.34	11	B			0.64	16	C	0.38	11	B				
Southbound Left+Right		0.15	9	A	0.10	9	A			0.17	9	A	0.11	9	A				

Intersection	Control Type	Scenario 1 (Forks Road Bridge Open)														
		2037 Future Total with Phase 1 Dain East Density				2037 Future Total with Recommendations & Phase 1 Dain East Density				2037 Future Total with Full Dain East Density & Canal Bank Street/Kingsway/Forks Road Widening						
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour				
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS			
Canal Bank Street at North Access Southbound Left	Signalized	0.83	20	C	0.67	13	B	0.77	20	C	0.49	14	B	0.59	8	A
Canal Bank Street at South Access	Signalized	0.91	57	E	-	-	-	-	-	-	0.57	11	B	0.55	11	B

WSP assessed the projected queues along Canal Bank Street/Kingsway at the rail crossing located adjacent to St. Clair Drive based on the scenario 1 volumes assuming full build-out of both Dain East and Dain West. The analysis findings have been detailed in **Table 5-12**.

Table 5-12 2037 Future Total Conditions - Canal Bank Street Rail Crossing Queueing (Scenario 1)

Intersection	Available Storage (m) ¹	Queue Length (m)	
		2037 Future Total	
		AM	PM
Kingsway/Canal Bank Street at Rail Crossing	50	541	433
Northbound	90	309	583

Note: ¹Distance to the nearest intersection/access. Northbound stop bar is approximately 250m north of the intersection at Forks Road.

Based on the above table, the northbound queue is projected to extend past the intersection of Forks Road at Kingsway during the study periods. The southbound queue is projected to block the Dain West south access during the PM peak hour. As for the 2027 and 2032 future total conditions, WSP completed a grade separation warrant. Based on the projected volumes, a crossing is not warranted for the 2037 future total conditions with the Dain East Phase 1 density (see **Appendix G**). It should be noted that the crossing is estimated to be activated only once an hour on very busy days. As such, these queues would not occur regularly and are only expected to last a short while when they do. Accordingly, WSP does not recommend any remedial measures.

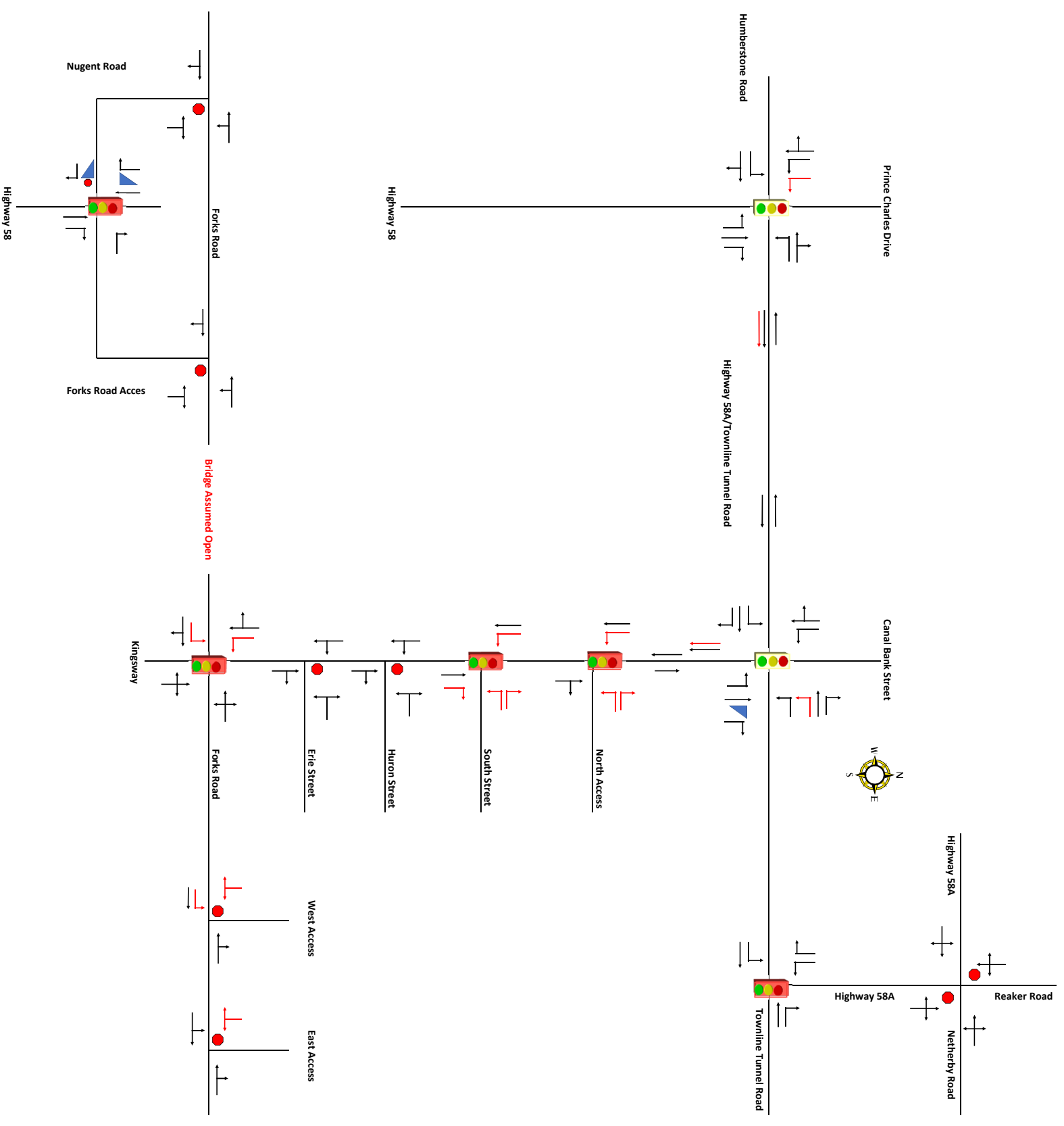


Figure S-38

2037 Future Total Lane Configuration - Scenario 1 (Forks Bridge Open)

Phase 1 *Dean East Density*
401 Canal Bank Street Draft Plan of Subdivision, Wetland - Transportation Study

- Stop Control
- ▲ Channelized Turn
- Traffic Signal
- Recommended Traffic Signal
- Existing Lane Configuration
- Recommended Lane Configuration

Scale: NTS



WSP | 2023/24 Lane Configuration Study

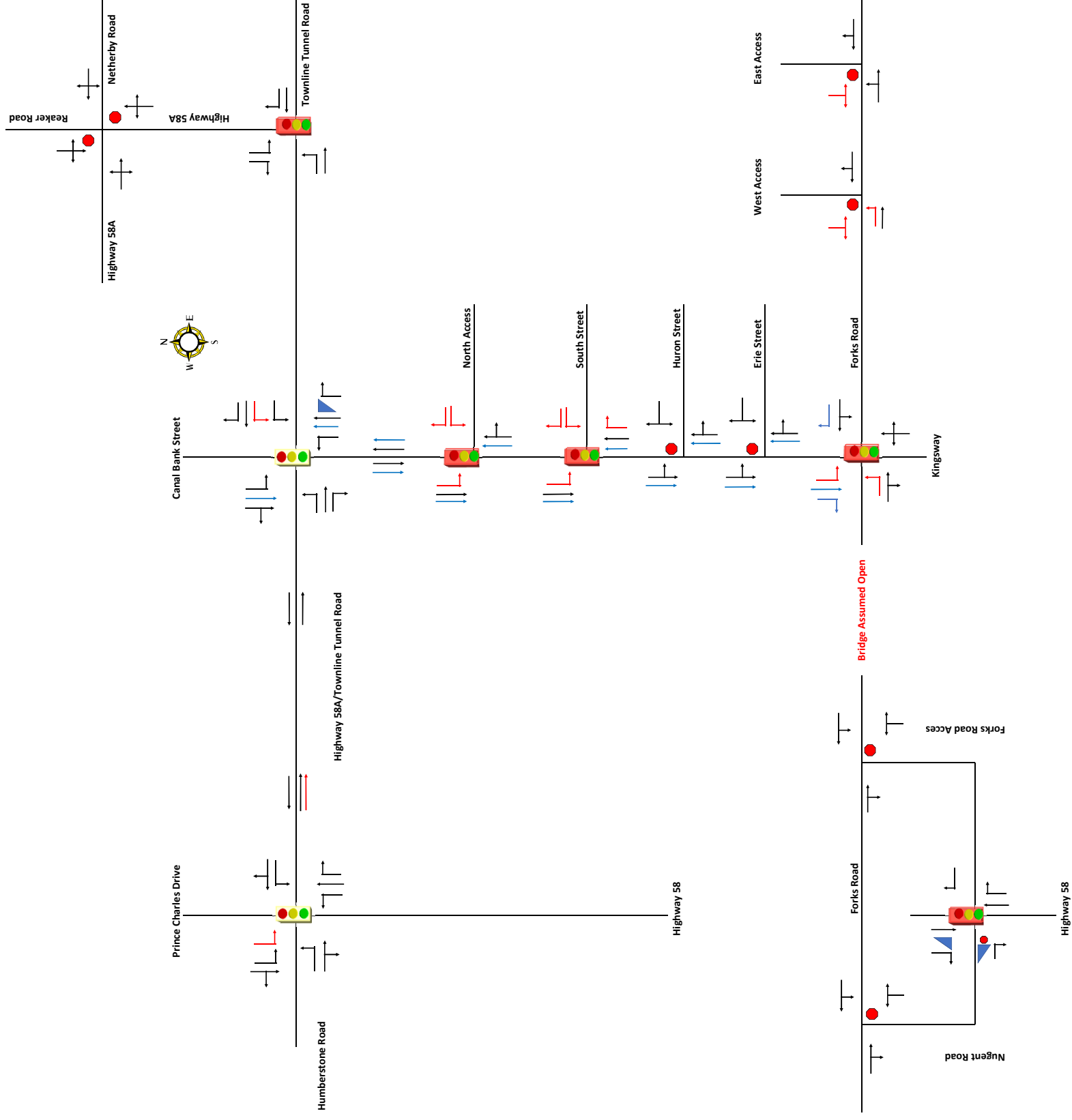


Figure 5-39

Scale: NTS



5.8.2 SCENARIO 2

As shown in **Table 5-13**, the majority of intersections and turning movements are projected to operate below critical conditions with the following exceptions:

- The intersection of Kingsway at Forks Road is projected to operate with its southbound left-turn movement with its v/c under critical conditions but below capacity during the PM peak hour.
- The intersection of Highway 58 at Townline Tunnel Road is projected to operate with select movements over capacity during the study periods.
- The intersection of Canal Bank Street at Townline Tunnel Road is projected to operate with the northbound left-turn movement at capacity during the AM peak hour and select movements over capacity during the PM peak hour.
- The intersection of Highway 58A at Reaker Road is projected to operate with select turning movement under critical conditions but below capacity during the study periods.
- The intersections of Kingsway at Huron Street and Erie Street are projected to operate with the westbound approach at LOS E during the PM peak hours, below capacity.

In order to improve traffic operations, WSP recommends that the following improvements be implemented under the 2032 future total conditions:

- For the intersection of Forks Road at Kingsway, WSP recommends increasing the cycle length to 100 seconds during the PM peak hour to improve traffic operations.
- For the intersection of Highway 58 at Townline Tunnel Road, WSP recommends implementing a second northbound through lane to be tapered on and off before and after the intersection, as well as maintaining the 130 second cycle length during the study periods.
- For the intersection of Canal Bank Street at Townline Tunnel Road, WSP recommends increasing the signal cycle length to 130 and 140 seconds during the AM and PM peak hours, respectively.
- For the intersection of Highway 58A at Reaker Road, WSP recommends increasing the cycle length to 70 seconds during the study periods.
- The intersections of Kingsway at Huron Street and Erie Street are projected to operate with the westbound approach at LOS E during the PM peak hours. An AWSC is not warranted, as detailed in Section 5.4. Considering the movements are projected below capacity with a maximum delay of 39 seconds, no improvements were recommended.

With the applied recommendations, the study intersections are projected to operate below capacity during the study periods.

Please refer to **Figure 5-40** for the recommended lane configuration at the study intersections under 2037 future total conditions for scenario 2.

Table 5-13 2037 Future Total Traffic Conditions - Scenario 2

Intersection	Control Type	Scenario 2 (Forks Road Bridge Closed)											
		2037 Future Total			2037 Future Total with Recommendations								
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	V/C	Delay (sec.)						
Movement	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS				
Nugent Road at Forks Road Northbound Left+Right	Stop-Controlled	0.41	15	B	0.46	16	C						
		0.78	13	B	0.85	17	B						
Highway 58 at Forks Road Access	Signalized												
		0.15	12	B	0.11	12	B						
Highway 58 Access at Forks Road Northbound Left+Right	Signalized	0.82	25	C	0.86	23	C		0.82	21	C		
		-	-	-	0.95	25	C		0.89	16	B		
Kingsway at Forks Road Southbound Left	Signalized	0.99	54	D	0.96	70	E	0.78	32	C	0.89	52	D
		1.02	80	F	1.11	118	F	0.86	43	D	0.94	63	E
Northbound Through		0.99	71	E	1.07	104	F	-	-	-	-	-	
		-	-	-	0.92	42	D	-	-	0.97	53	D	
Northbound Right		1.09	130	F	1.06	105	F	0.78	55	D	0.94	69	E
		-	-	-	0.85	35	C	-	-	0.92	46	D	
Southbound Through+Right	Signalized	0.88	45	D	1.01	52	D	0.87	43	D	0.99	51	D
		0.98	86	F	1.00	91	F	0.97	84	F	0.99	96	F
Eastbound Through		0.96	99	F	0.98	83	F	0.91	90	F	0.98	90	F
		1.00	68	E	1.10	113	F	0.96	60	E	0.99	83	F
Southbound Left		-	-	-	-	-	-	0.59	59	E	-	-	-
		-	-	-	0.96	79	E	-	-	0.99	95	F	
Townline Tunnel Road at Canal Bank Street	Signalized	0.57	16	B	0.63	20	C	0.56	14	B	0.59	19	B
		0.98	86	F	1.00	91	F	0.97	84	F	0.99	96	F
Eastbound Left		-	-	-	0.91	59	E	-	-	-	-	-	
		0.88	22	C	-	-	-	-	-	-	-	-	
Eastbound Through		-	-	-	0.87	20	C	-	-	-	-	-	
		-	-	-									
Reaker Road at Netherby Road	Stop-Controlled												
		0.31	11	B	0.23	11	B						
Northbound Left+Through+Right		0.01	9	A	0.00	10	A						
Southbound Left+Through+Right	Stop-Controlled												
		0.17	29	D	0.16	37	E						
Westbound Left+Right	Stop-Controlled												
		0.17	29	D	0.16	39	E						
Kingsway at Erie Street Westbound Left+Right	Stop-Controlled												
		0.17	29	D	0.16	39	E						
Forks Road at West Access	Stop-Controlled												
		0.64	16	D	0.38	11	B						
Southbound Left+Right													

Intersection	Control Type	Scenario 2 (Forks Road Bridge Closed)										
		2037 Future Total					2037 Future Total with Recommendations					
		AM Peak Hour		PM Peak Hour		LOS	AM Peak Hour		PM Peak Hour		LOS	
V/C	Delay (sec.)	V/C	Delay (sec.)	V/C	Delay (sec.)		V/C	Delay (sec.)				
Movement												
Forks Road at East Access Southbound Left+Right	Stop-Controlled	0.17	9	A	0.11	9	A					
Canal Bank Street at North Access	Signalized	0.81	24	C	0.68	14	B					
Canal Bank Street at South Access	Signalized	0.66	15	B	0.65	11	B					

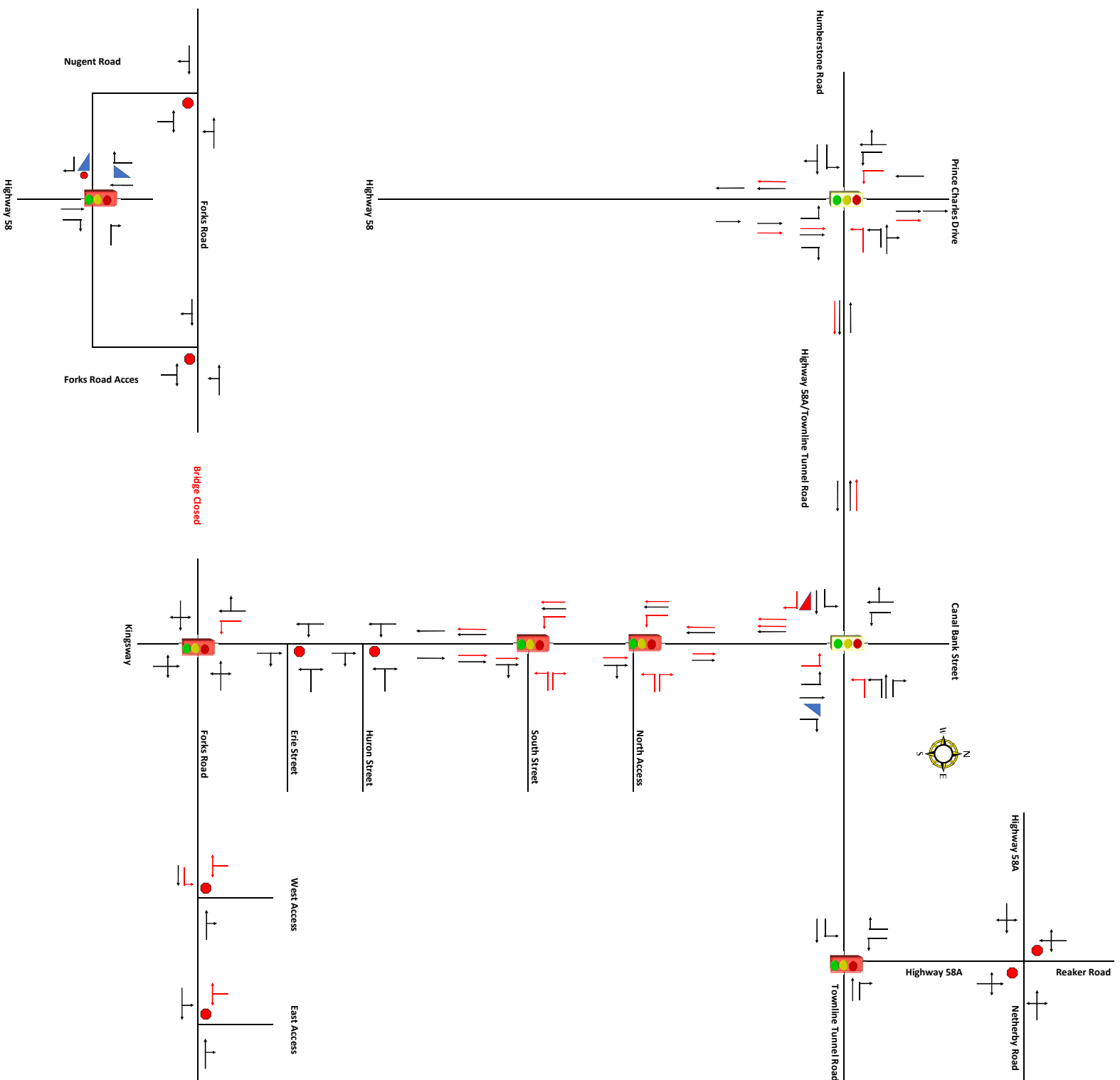


Figure 5-40

2037 Future Total Lane Configuration - Scenario 2 (Forks Bridge Closed)

Full Day, East Density

401 Canal Bank Street (Part of Subdivision, Weekend - Transportation Study)

- Stop Control
- ▲ Channelized Turn
- Traffic Signal
- Recommended Traffic Signal
- + Existing Lane Configuration
- + Recommended Lane Configuration
- ▲ Recommended Channelized Turn

Scale: NTS



6 SUMMARY AND CONCLUSIONS

6.1 SUMMARY

WSP has been retained to complete a Traffic Impact Study (TIS) in support of the Dain West Draft Plan of Subdivision, proposed within the City of Welland. The subject lands for Dain West are bounded by Canal Bank Street to the west, St. Clair Drive to the south and rail corridors to the north and east.

The Dain West and Dain East subdivisions are two separate projects divided by a rail corridor. Dain East is proposed to consist of residential developments, accessible via two full-moves accesses to Forks Road. Dain West is proposed to consist of residential, institutional and mixed-use developments, accessible via two full-moves accesses to Canal Bank Street. The analysis completed as part of this study is based on the most recent site statistics received June 29th, 2020.

The ultimate density for Dain East consists of 1,013 single detached homes and 316 townhouses/semi-detached homes. The ultimate density for Dain West consists of 583 single detached homes, 192 townhouses/semi-detached homes, 375 apartments, 75,000sq.ft of retail, 138,000sq.ft of commercial, 67,000sq.ft of office and an elementary school of 500 pupils. The developments are planned to be phased in, with densities detailed further below.

As part of this study, WSP completed a review of the proposed development impacts to the study area intersections for the two following scenarios:

- Scenario 1 – assumed the Forks Road Bridge as open, providing a second access point to the study area.
- Scenario 2 – assumed the Forks Road Bridge as closed, reducing connectivity to the study area to one intersection.

EXISTING TRAFFIC CONDITIONS

Under existing conditions, the majority of intersections and turning movements operate with LOS C or better during the study periods, for both scenarios.

FUTURE BACKGROUND TRAFFIC CONDITIONS

As established through correspondence with the City of Welland and the MTO, the following three horizon years were selected to assess future traffic conditions:

- 2027 – assumed as Phase 1 of the development
- 2032 – assumed as Phase 2 of the development
- 2037 – assumed as Phase 3 of the development

As under existing conditions, the majority of intersections and turning movements are projected to operate with LOS C or better during the study periods, for both scenarios under the 2027, 2032 and 2037 future background conditions. No turning movements are projected to operate above capacity.

TRIP GENERATION

WSP derived the trip generation for both the Dain East and Dain West subdivisions based on the phasing plan provided by the project team, as detailed in Section 2.2.1. The trip generation is detailed in the below table.

Phase	Non-Cumulative Primary Trip Generation (Inbound + Outbound)					
	Dain East		Dain West		Total Development	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 (2027)	802	1056	0	0	802	1056
2 (2032)	896	1180	943	878	1839	2058
3 (2037)	896	1180	1238	1266	2134	2446
Total	896	1180	1238	1266	-	-

FUTURE TOTAL TRAFFIC CONDITIONS

WSP completed a review of the study intersections under the 2027, 2032 and 2037 future total conditions for both scenario 1 and 2.

SCENARIO 1 – FORKS BRIDGE OPEN

Based on the analysis completed as part of this study, WSP recommends that the proposed development be phased as per the below table under scenario 1.

Horizon Year	Overall Recommended Density Per Use for Each Horizon Year (non-cumulative)									Recommended Roadway Network Improvements
	Dain East		Dain West							
	Single Detached Units	Townhouse /Semi-Detached Units	Single Detached Units	Townhouse /Semi-Detached Units	Apartments Units	Retail GFA (sq.ft)	Commercial GFA (sq.ft)	Office GFA (sq.ft)	Elementary School (pupils)	
2027	889	311	0	0	0	0	0	0	0	Figure 5-35
2032	889	311	583	192	241	0	0	0	500	Figure 5-36
2037	889	311	583	192	375	75,000	138,000	67,000	500	Figure 5-38
2037 with Planned Widening	1013	316	583	192	375	75,000	138,000	67,000	500	Figure 5-39
Total	1013	316	583	192	375	75,000	138,000	67,000	500	-

WSP recommends that the proposed development be phased per the above table under scenario 1. The Dain West development is projected to be accommodated by the existing road network with applied recommendations, as well as the majority of the Dain East development. Only a portion of the Dain East development should be reviewed once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

SCENARIO 2 – FORKS BRIDGE CLOSED

Based on the analysis completed as part of this study, WSP recommends that the proposed development be phased as per the below table under scenario 2, which is as proposed by the project team.

Horizon Year	Overall Recommended Density Per Use for Each Horizon Year (non-cumulative)									Recommended Roadway Network Improvements
	Dain East		Dain West							
	Single Detached Units	Townhouse /Semi-Detached Units	Single Detached Units	Townhouse /Semi-Detached Units	Apartments Units	Retail GFA (sq.ft)	Commercial GFA (sq.ft)	Office GFA (sq.ft)	Elementary School (pupils)	
2027	889	311	0	0	0	0	0	0	0	Figure 5-35
2032	1013	316	583	192	241	0	0	0	500	Figure 5-37
2037	1013	316	583	192	375	75,000	138,000	67,000	500	Figure 5-40
Total	1013	316	583	192	375	75,000	138,000	67,000	500	-

The Dain East and Dain West developments are projected to be accommodated by the existing road network with applied recommendations.

Overall, the development is projected to be accommodated by the existing road network with applied recommendations under both scenarios. Only under scenario 1 does WSP recommend that the implementation of 124 single detached units and 5 Townhouse/Semi-Detached Units from Dain East be implemented at a later time once the remainder of the proposed Dain East and West developments mature and future traffic counts are available, allowing for a more fulsome analysis to be completed at that time.

6.2 RECOMMENDATIONS

Based on the findings from the study, WSP has provided road network improvements to support traffic generated by the proposed development for each horizon year.

For Scenario 1:

- Under the 2027 future total conditions, all physical improvements at the intersections have been illustrated in **Figure 5-35**.
- Under the 2032 future total conditions, WSP recommends that the Dain East density remain as proposed in Phase 1 (2027). All physical improvements at the intersections have been illustrated in **Figure 5-36**.
- Under the 2037 future total conditions:
 - Before the planned widenings, WSP recommends that the Dain East density remain as proposed in Phase 1 (2027), and that a TIS be completed to determine if the additional density can be accommodated without the additional widening at that time. All physical improvements at the intersections have been illustrated in **Figure 5-38**.
 - After the planned widenings, WSP recommends that the full Dain East density be implemented. All physical improvements at the intersections have been illustrated in **Figure 5-39**.

For Scenario 2:

- Under the 2027 future total conditions, all physical improvements at the intersections have been illustrated in **Figure 5-35**.
- Under the 2032 future total conditions, all physical improvements at the intersections have been illustrated in **Figure 5-37**.
- Under the 2037 future total conditions, all physical improvements at the intersections have been illustrated in **Figure 5-40**.

APPENDIX

A TMC & STP DATA



A-1 2017 TMC DATA



Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowen@ptsl.com

Count Name: Forks Rd & Kingsway
Site Code:
Start Date: 11/15/2017
Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

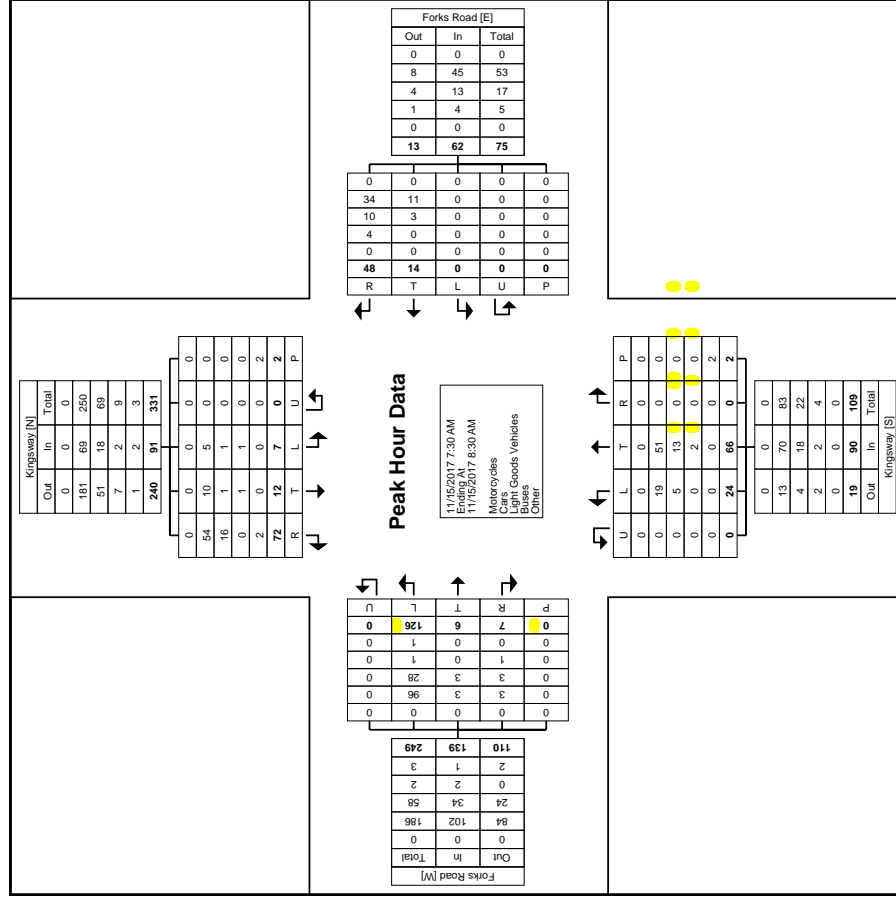
Start Time	Forks Road Eastbound						Forks Road Westbound						Kingsway Northbound						Kingsway Southbound					
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total
7:30 AM	29	2	4	0	0	35	0	3	16	0	0	19	7	23	0	0	0	30	3	7	17	0	2	27
7:45 AM	43	1	1	0	0	45	0	5	11	0	0	16	2	12	0	0	2	14	0	4	18	0	0	22
8:00 AM	21	3	0	0	0	24	0	3	10	0	0	13	9	13	0	0	0	22	2	1	22	0	0	25
8:15 AM	33	0	2	0	0	35	0	3	11	0	0	14	6	18	0	0	0	24	2	0	15	0	0	17
Total	128	6	7	0	0	139	0	14	48	0	0	62	24	66	0	0	2	90	7	12	72	0	2	91
Approach %	90.6	4.3	5.0	0.0	-	-	0.0	22.6	77.4	0.0	-	-	26.7	73.3	0.0	0.0	-	-	7.7	13.2	78.1	0.0	-	-
Total %	33.0	1.6	1.8	0.0	-	36.4	0.0	3.7	12.6	0.0	-	16.2	6.3	17.3	0.0	0.0	-	23.6	1.8	3.1	18.8	0.0	-	23.8
PHF	0.733	0.500	0.438	0.000	-	0.772	0.000	0.700	0.750	0.000	-	0.816	0.667	0.717	0.000	0.000	-	0.750	0.583	0.429	0.818	0.000	-	0.843
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0
Cars	96	3	3	0	-	102	0	11	34	0	-	45	19	51	0	0	-	70	5	10	54	0	-	69
% Cars	76.2	50.0	42.9	-	-	73.4	-	78.6	70.8	-	-	72.6	79.2	77.3	-	-	-	77.8	71.4	83.3	75.0	-	-	75.8
Light Goods Vehicles	28	3	3	0	-	34	0	3	10	0	-	13	5	13	0	0	-	18	1	1	16	0	-	18
% Light Goods Vehicles	22.2	50.0	42.9	-	-	24.5	-	21.4	20.8	-	-	21.0	20.8	19.7	-	-	-	20.0	14.3	8.3	22.2	-	-	19.8
Buses	1	0	1	0	-	2	0	0	4	0	-	4	0	2	0	0	-	2	1	1	0	0	-	2
% Buses	0.8	0.0	14.3	-	-	1.4	-	0.0	8.3	-	-	6.5	0.0	3.0	-	-	-	2.2	14.3	8.3	0.0	-	-	2.2
Single-Unit Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	2	0	-	2
% Single-Unit Trucks	0.8	0.0	0.0	-	-	0.7	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	2.8	-	-	2.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	2	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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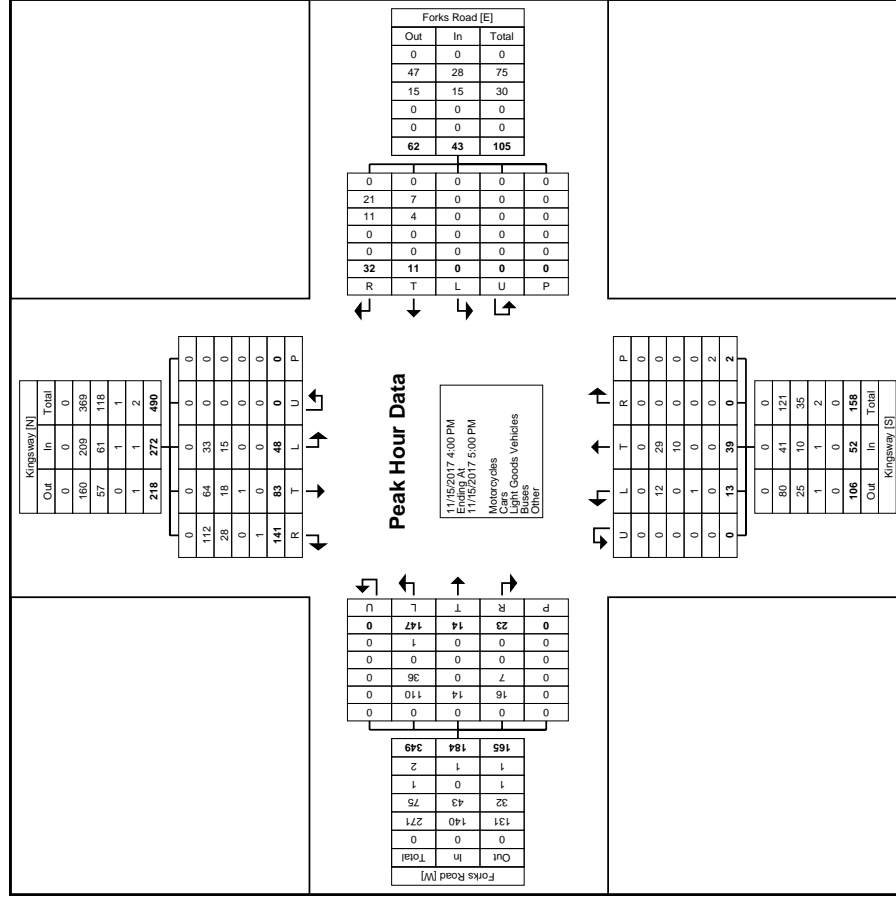
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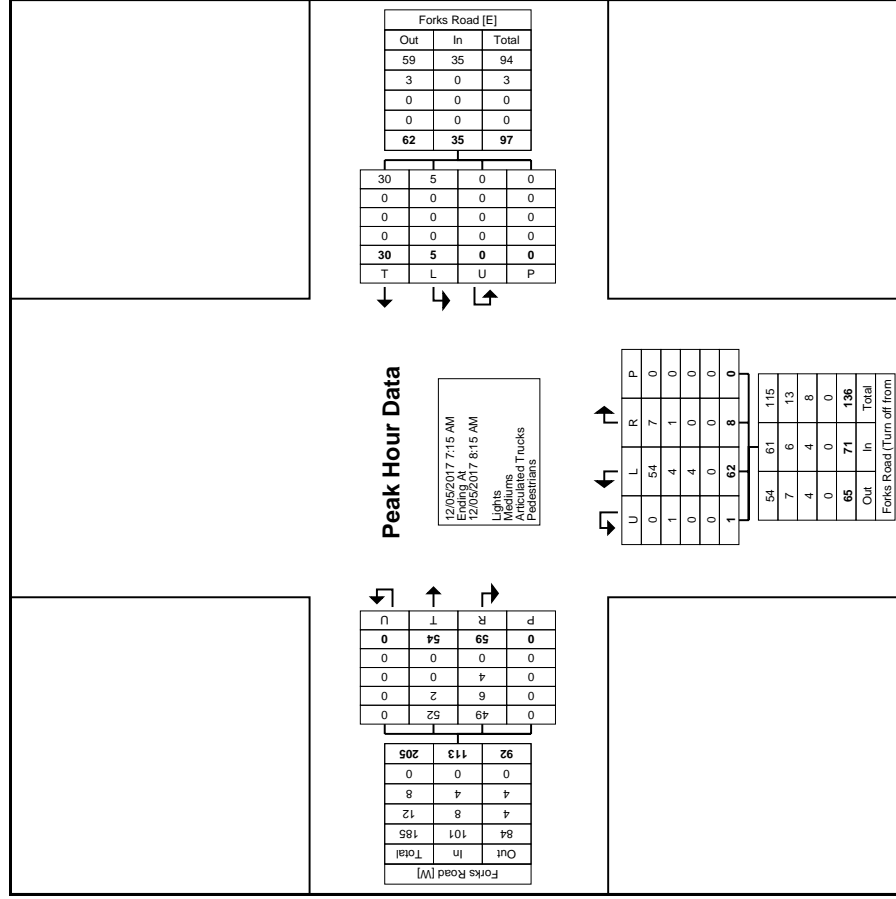
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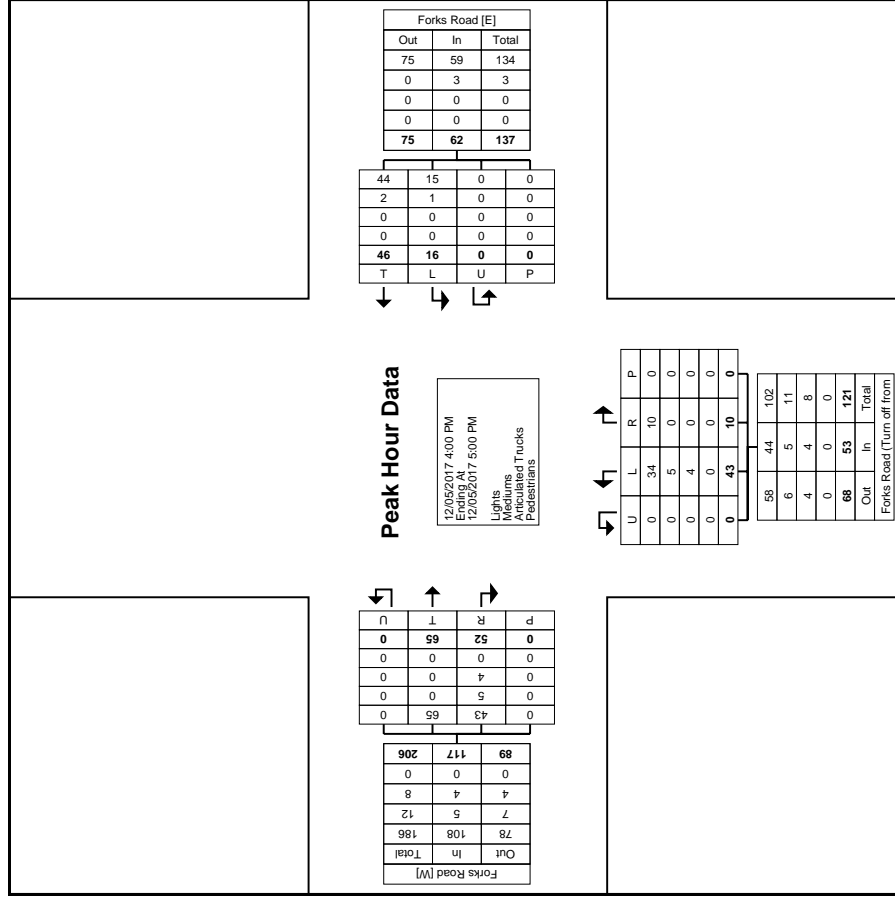
Turning Movement Peak Hour Data Plot (7:15 AM)



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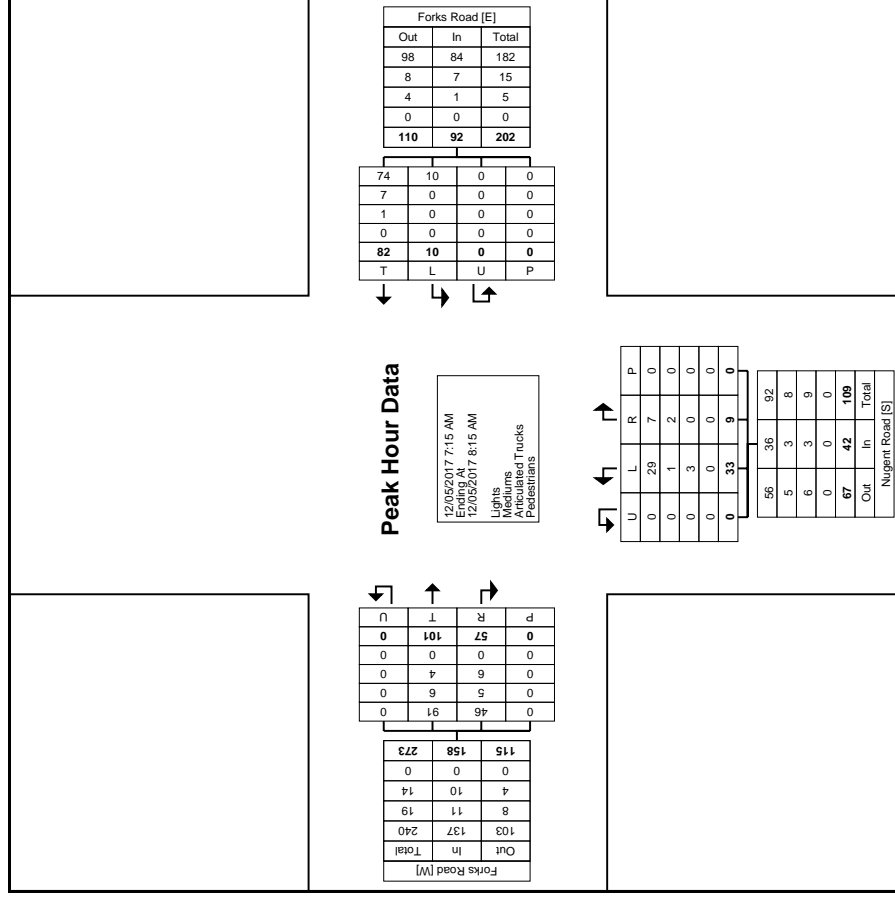
Turning Movement Peak Hour Data Plot (4:00 PM)



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Count Name: Forks Road & Nugent Road
Site Code:
Start Date: 12/05/2017
Page No: 5



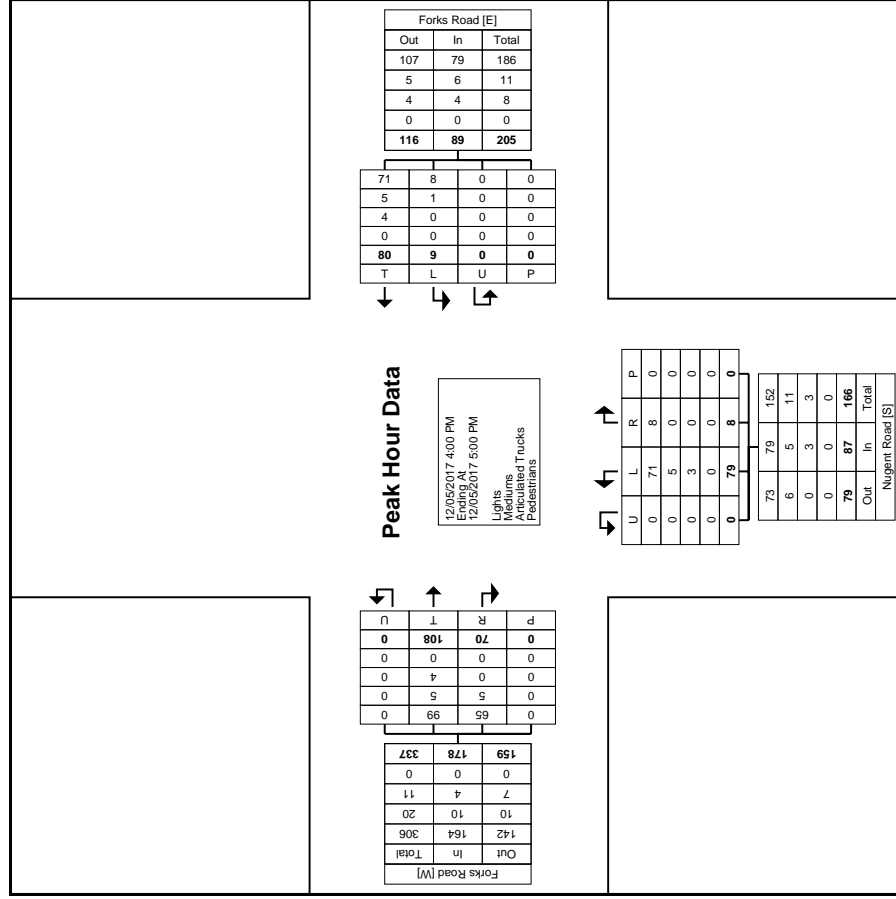
Turning Movement Peak Hour Data Plot (7:15 AM)



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Count Name: Forks Road & Nugent Road
Site Code:
Start Date: 12/05/2017
Page No: 9



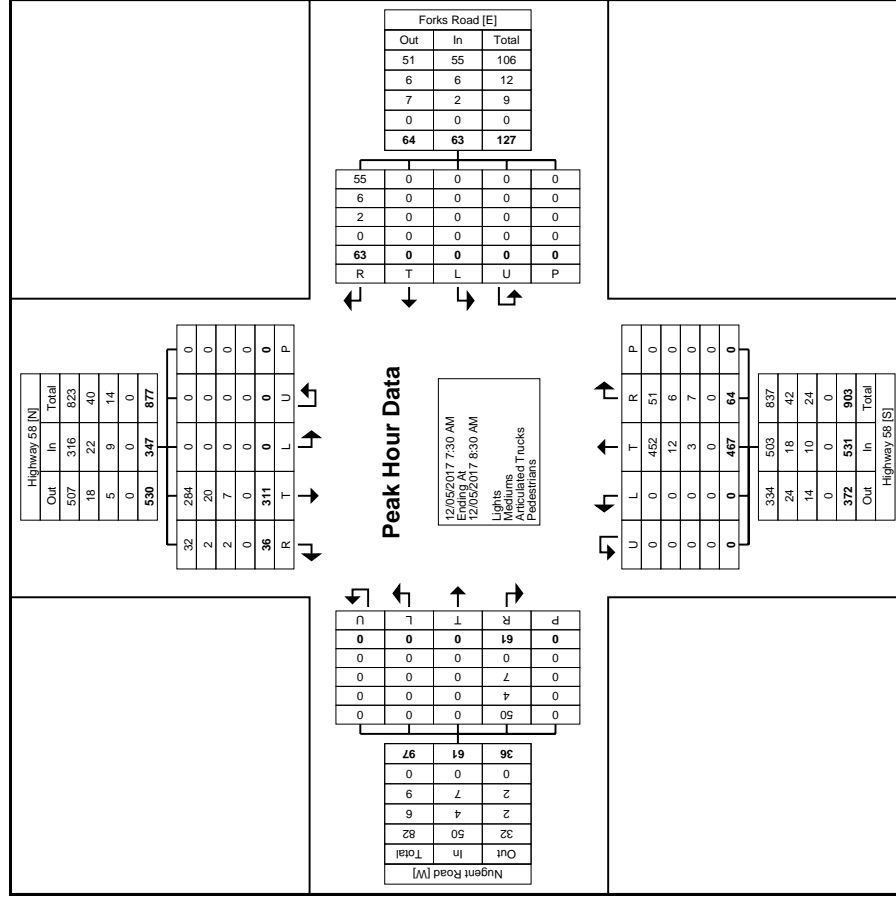
Turning Movement Peak Hour Data Plot (4:00 PM)



Paradigm Transportation Solutions Limited
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Count Name: Highway 58 & Forks Road
Site Code:
Start Date: 12/05/2017
Page No: 5



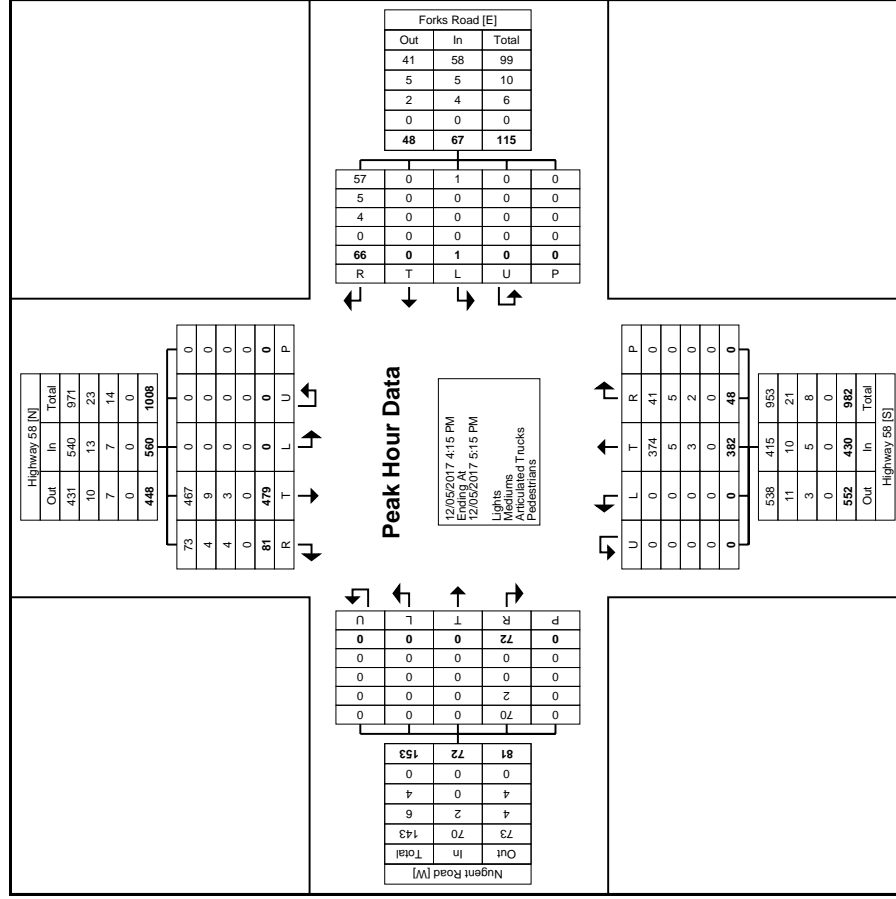
Turning Movement Peak Hour Data Plot (7:30 AM)



Paradigm Transportation Solutions Limited
 22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
 519-896-3163 cbowness@ptsl.com

Count Name: Highway 58 & Forks Road
 Site Code:
 Start Date: 12/05/2017
 Page No: 9



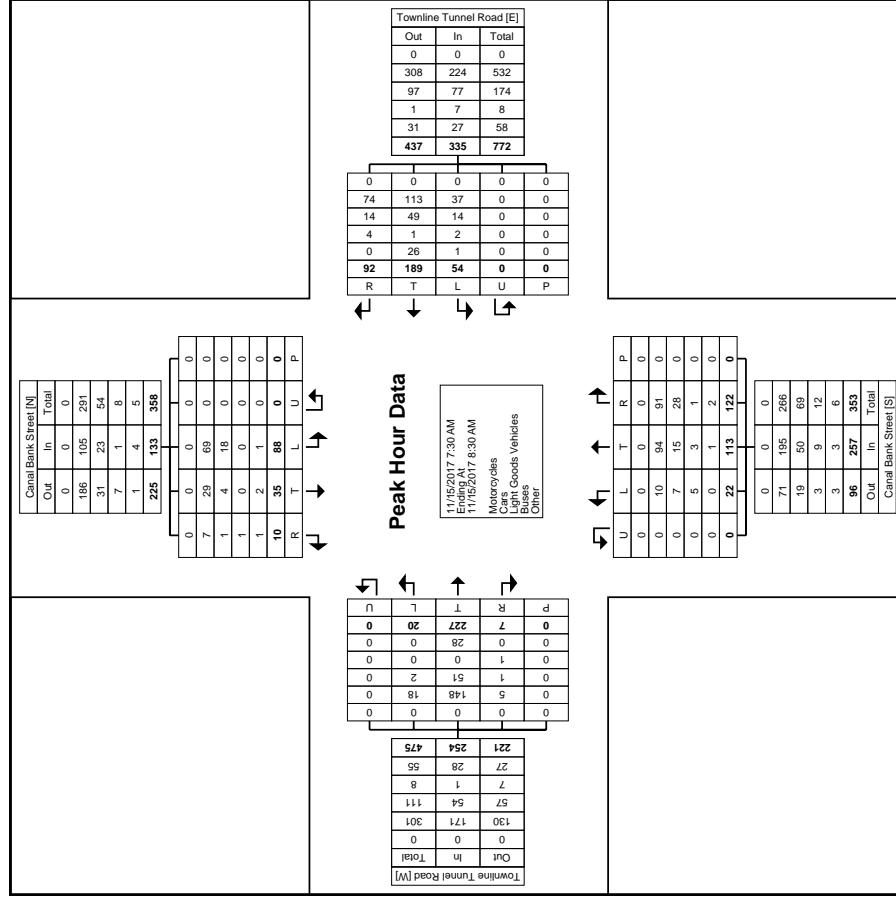
Turning Movement Peak Hour Data Plot (4:15 PM)



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22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
519-896-3163 cbowness@ptsi.com

Count Name: Townline Tunnel Rd & Canal Bank
St
Site Code: 11/15/2017
Start Date: 11/15/2017
Page No: 5



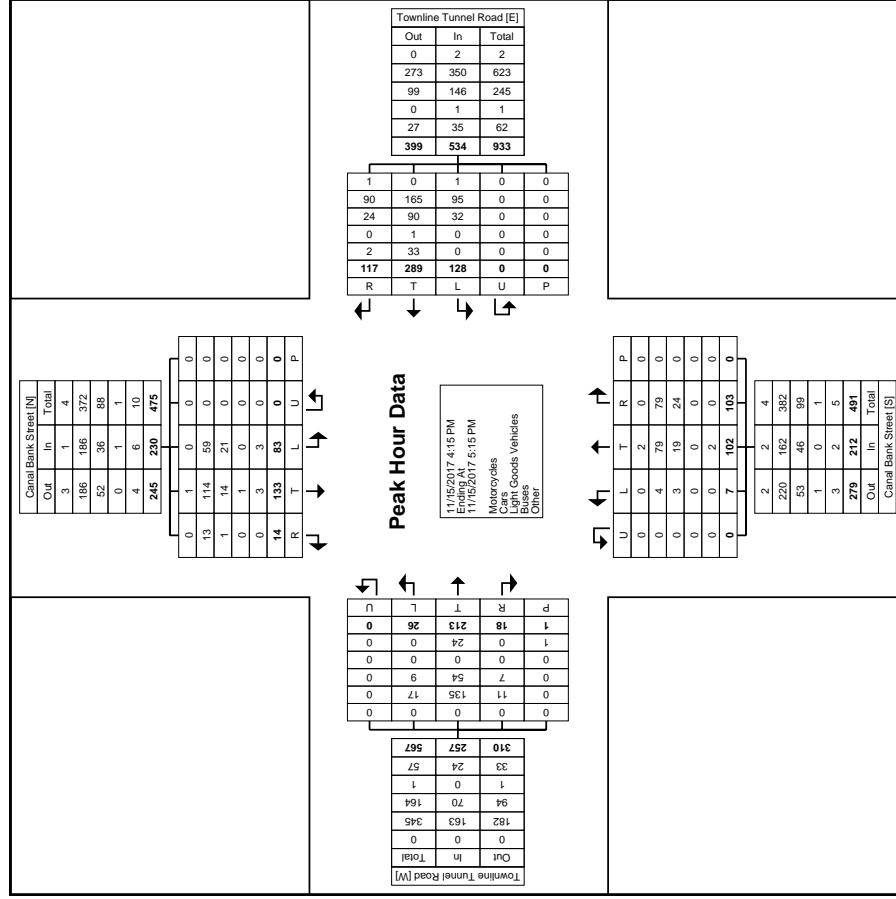
Turning Movement Peak Hour Data Plot (7:30 AM)



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Waterloo, Ontario, Canada N2J 1N8
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Count Name: Townline Tunnel Rd & Canal Bank
St.
Site Code: 11/15/2017
Start Date: 11/15/2017
Page No: 9



Turning Movement Peak Hour Data Plot (4:15 PM)



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Waterloo, Ontario, Canada N2J 1N8
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Count Name: Townline Tunnel Road & Westside Road
Site Code:
Start Date: 12/05/2017
Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

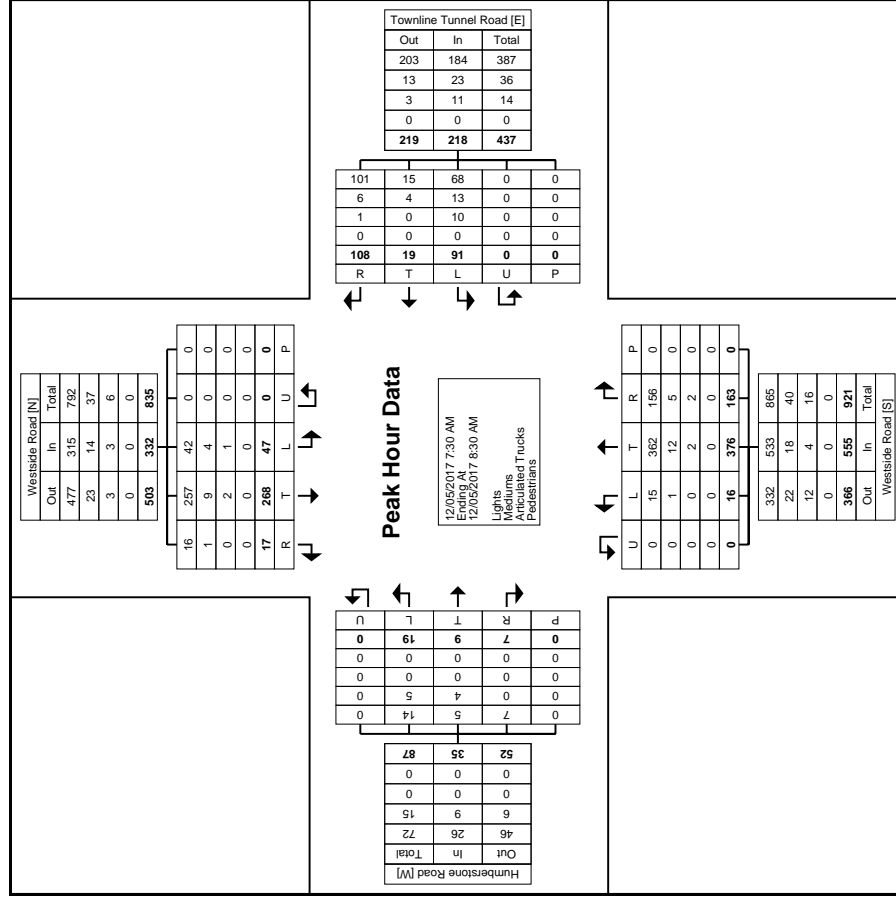
Start Time	Humberstone Road Eastbound						Townline Tunnel Road Westbound						Westside Road Northbound						Westside Road Southbound					
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total
7:30 AM	4	1	2	0	0	7	24	3	33	0	0	60	7	81	57	0	0	145	13	63	3	0	0	79
7:45 AM	4	1	1	0	0	6	30	3	41	0	0	74	5	107	39	0	0	151	11	64	7	0	0	82
8:00 AM	7	2	3	0	0	12	20	5	18	0	0	43	2	103	25	0	0	130	11	69	7	0	0	87
8:15 AM	4	5	1	0	0	10	17	8	16	0	0	41	2	85	42	0	0	129	12	72	0	0	0	84
Total	19	9	7	0	0	35	91	19	108	0	0	218	16	376	163	0	0	555	47	268	17	0	0	332
Approach %	54.3	25.7	20.0	0.0	-	-	41.7	8.7	49.5	0.0	-	-	2.9	67.7	29.4	0.0	-	-	14.2	80.7	5.1	0.0	-	-
Total %	1.7	0.8	0.6	0.0	-	3.1	8.0	1.7	9.5	0.0	-	19.1	1.4	33.0	14.3	0.0	-	48.7	4.1	23.5	1.5	0.0	-	29.1
PHF	0.679	0.450	0.583	0.000	-	0.729	0.758	0.594	0.659	0.000	-	0.736	0.571	0.879	0.715	0.000	-	0.919	0.904	0.931	0.607	0.000	-	0.954
Lights	14	5	7	0	0	26	68	15	101	0	0	184	15	362	156	0	0	533	42	257	16	0	0	315
% Lights	73.7	55.6	100.0	-	-	74.3	74.7	78.9	93.5	-	-	84.4	93.8	96.3	95.7	-	-	96.0	89.4	95.9	94.1	-	-	94.9
Mediums	5	4	0	0	0	9	13	4	6	0	0	23	1	12	5	0	0	18	4	9	1	0	0	14
% Mediums	26.3	44.4	0.0	-	-	25.7	14.3	21.1	5.6	-	-	10.6	6.3	3.2	3.1	-	-	3.2	8.5	3.4	5.9	-	-	4.2
Articulated Trucks	0	0	0	0	0	0	10	0	1	0	0	11	0	2	2	0	0	4	1	2	0	0	0	3
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	11.0	0.0	0.9	-	-	5.0	0.0	0.5	1.2	-	-	0.7	2.1	0.7	0.0	-	-	0.9
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Count Name: Townline Tunnel Road & Westside Road
Site Code:
Start Date: 12/05/2017
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



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Count Name: Townline Tunnel Road & Westside Road
Site Code:
Start Date: 12/05/2017
Page No: 8

Turning Movement Peak Hour Data (4:15 PM)

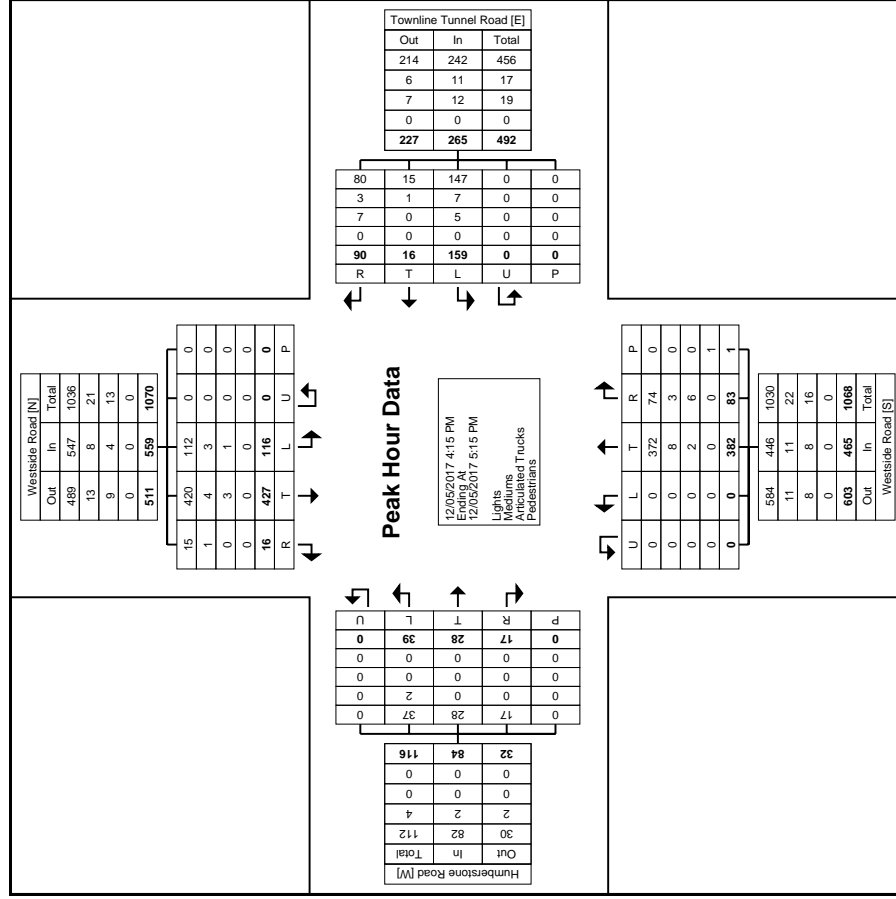
Start Time	Humberstone Road Eastbound						Townline Tunnel Road Westbound						Westside Road Northbound						Westside Road Southbound					
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total
4:15 PM	6	1	4	0	0	11	42	6	21	0	0	69	0	88	13	0	0	101	25	102	9	0	0	136
4:30 PM	13	7	5	0	0	25	37	4	23	0	0	64	0	107	19	0	1	126	33	114	4	0	0	151
4:45 PM	5	10	3	0	0	18	44	4	20	0	0	68	0	97	22	0	0	119	25	97	3	0	0	125
5:00 PM	15	10	5	0	0	30	36	2	26	0	0	64	0	90	29	0	0	119	33	114	0	0	0	147
Total	39	28	17	0	0	84	159	16	90	0	0	285	0	382	83	0	1	485	116	427	16	0	0	559
Approach %	46.4	33.3	20.2	0.0	-	-	60.0	6.0	34.0	0.0	-	-	0.0	82.2	17.8	0.0	-	-	20.8	76.4	2.9	0.0	-	-
Total %	2.8	2.0	1.2	0.0	-	6.1	11.6	1.2	6.6	0.0	-	19.3	0.0	27.8	6.0	0.0	-	33.9	8.4	31.1	1.2	0.0	-	40.7
PHF	0.650	0.700	0.850	0.000	-	0.700	0.903	0.667	0.865	0.000	-	0.960	0.000	0.893	0.716	0.000	-	0.923	0.879	0.936	0.444	0.000	-	0.925
Lights	37	28	17	0	0	82	147	15	80	0	0	242	0	372	74	0	0	446	112	420	15	0	0	547
% Lights	94.9	100.0	100.0	-	-	97.6	92.5	93.8	88.9	-	-	91.3	-	97.4	89.2	-	-	95.9	96.6	98.4	93.8	-	-	97.9
Mediums	2	0	0	0	0	2	7	1	3	0	0	11	0	8	3	0	0	11	3	4	1	0	0	8
% Mediums	5.1	0.0	0.0	-	-	2.4	4.4	6.3	3.3	-	-	4.2	-	2.1	3.6	-	-	2.4	2.6	0.9	6.3	-	-	1.4
Articulated Trucks	0	0	0	0	0	0	5	0	7	0	0	12	0	2	6	0	0	8	1	3	0	0	0	4
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	3.1	0.0	7.8	-	-	4.5	-	0.5	7.2	-	-	1.7	0.9	0.7	0.0	-	-	0.7
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Page No: 9



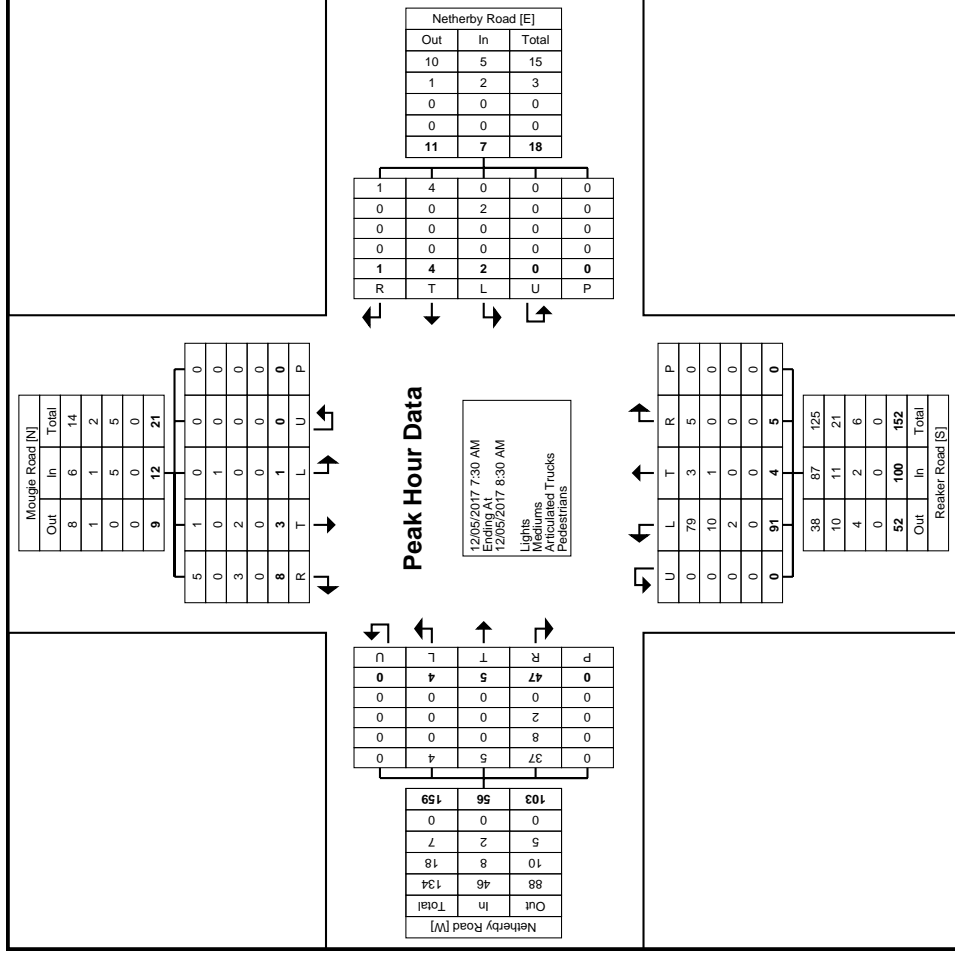
Turning Movement Peak Hour Data Plot (4:15 PM)



Paradigm Transportation Solutions Limited
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Count Name: Reaker Road & Netherby Road
Site Code:
Start Date: 12/05/2017
Page No: 5



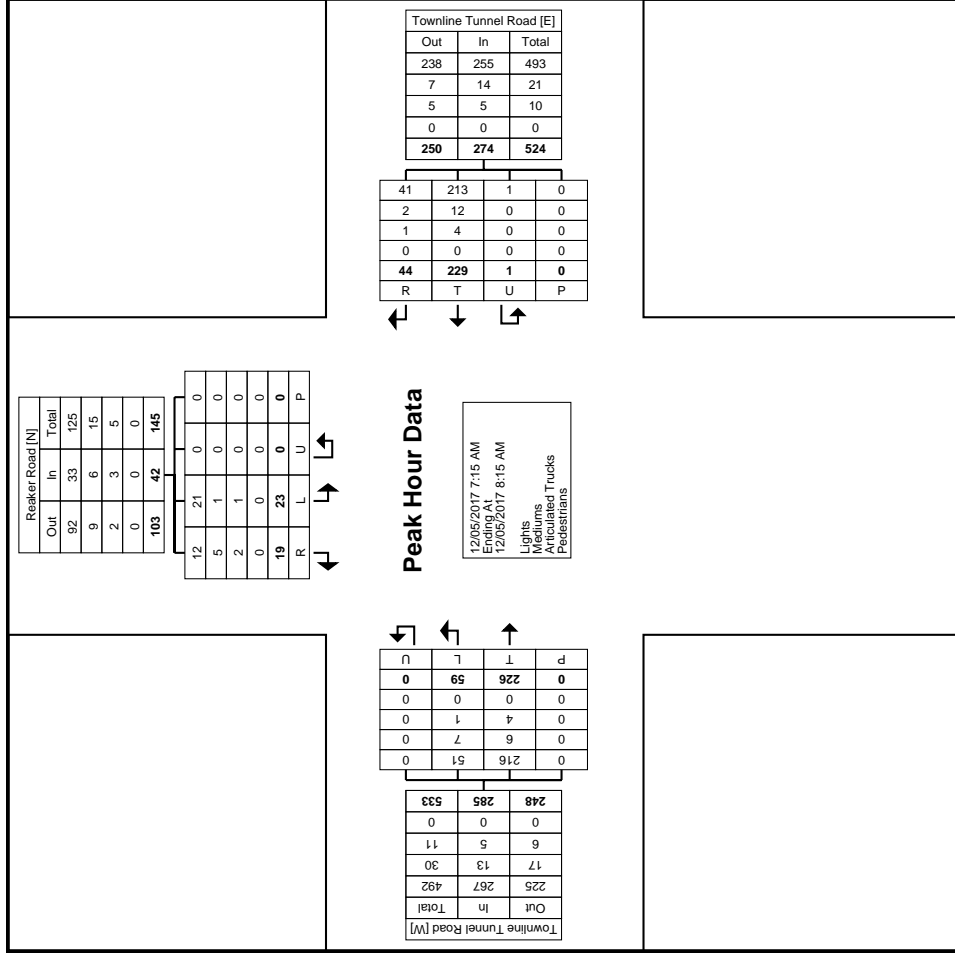
Turning Movement Peak Hour Data Plot (7:30 AM)



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Count Name: Townline Tunnel Road & Reaker Road
Site Code:
Start Date: 12/05/2017
Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)

A-2 2017

***REDISTRIBUTION OF
NON-LOCAL TRAFFIC***

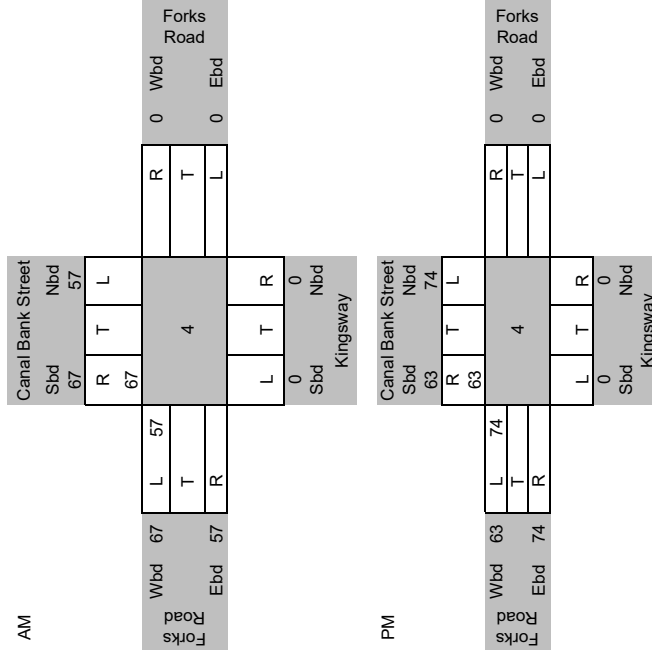
Local Developments Accessible North of Forks Road at Kingsway	Site Component	Unit
Convenience Store	162	sq.m
Restaurant (2)	389.75	sq.m
Gas Station with Garage	126	sq.m
Houses	100	units
Oil Refineries	1761	sq.m

(only includes buildings)

Trip Generation:

Site Component	Source	Site Component	Item	AM Peak Hour		PM Peak Hour		Total
				In	Out	In	Out	
Single Detached Housing	ITE LUC 210	100	Directional Distribution	25%	75%	63%	37%	100%
			Trip Rate	T=0.74X	T=0.98X			
			Trips	18	56	62	37	99
Convenience Market	ITE LUC 851	1,744	Directional Distribution	50%	50%	51%	49%	100%
			Trip Rate	T=62.54X	T=49.11X			
			Trips	55	55	44	42	86
High-Turnover (Sit-Down) Restaurant	ITE LUC 932	4,195	Directional Distribution	55%	45%	62%	38%	100%
			Trip Rate	T=9.94X	T=9.97X			
			Trips	23	19	26	16	42
Gas Station	ITE LUC 942	1,356	Directional Distribution	50%	50%	50%	50%	100%
			Trip Rate	T=84.55X	T=109.27X			
			Trips	57	58	74	75	149
Manufacturing	ITE LUC 140	18,965	Directional Distribution	77%	23%	31%	69%	100%
			Trip Rate	T=0.62X	T=0.67X			
			Trips	9	3	4	9	13
Total Trips				162	191	210	179	389

Assuming the distribution of 35% to/from the Forks Road Bridge, local Traffic is:



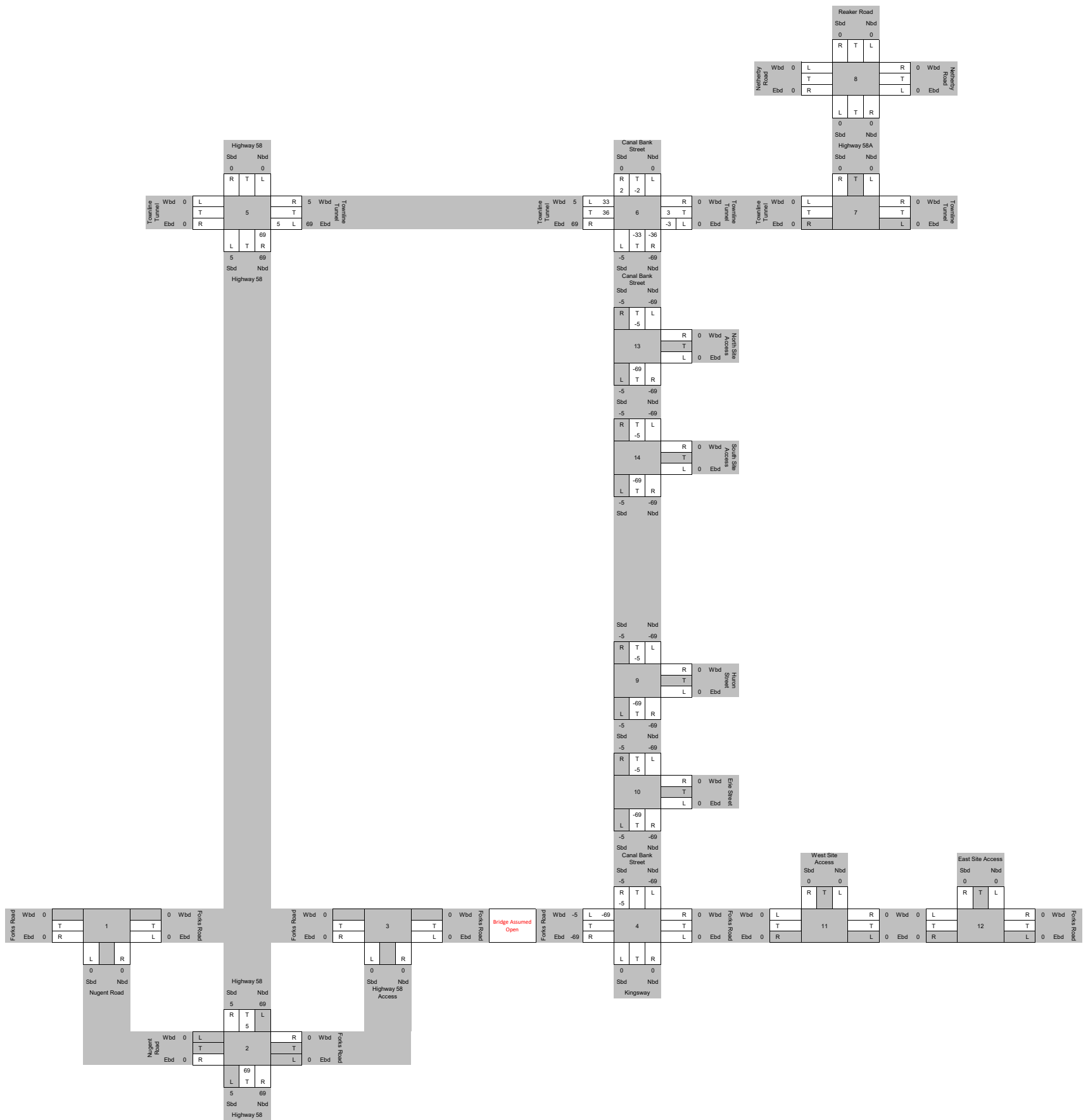
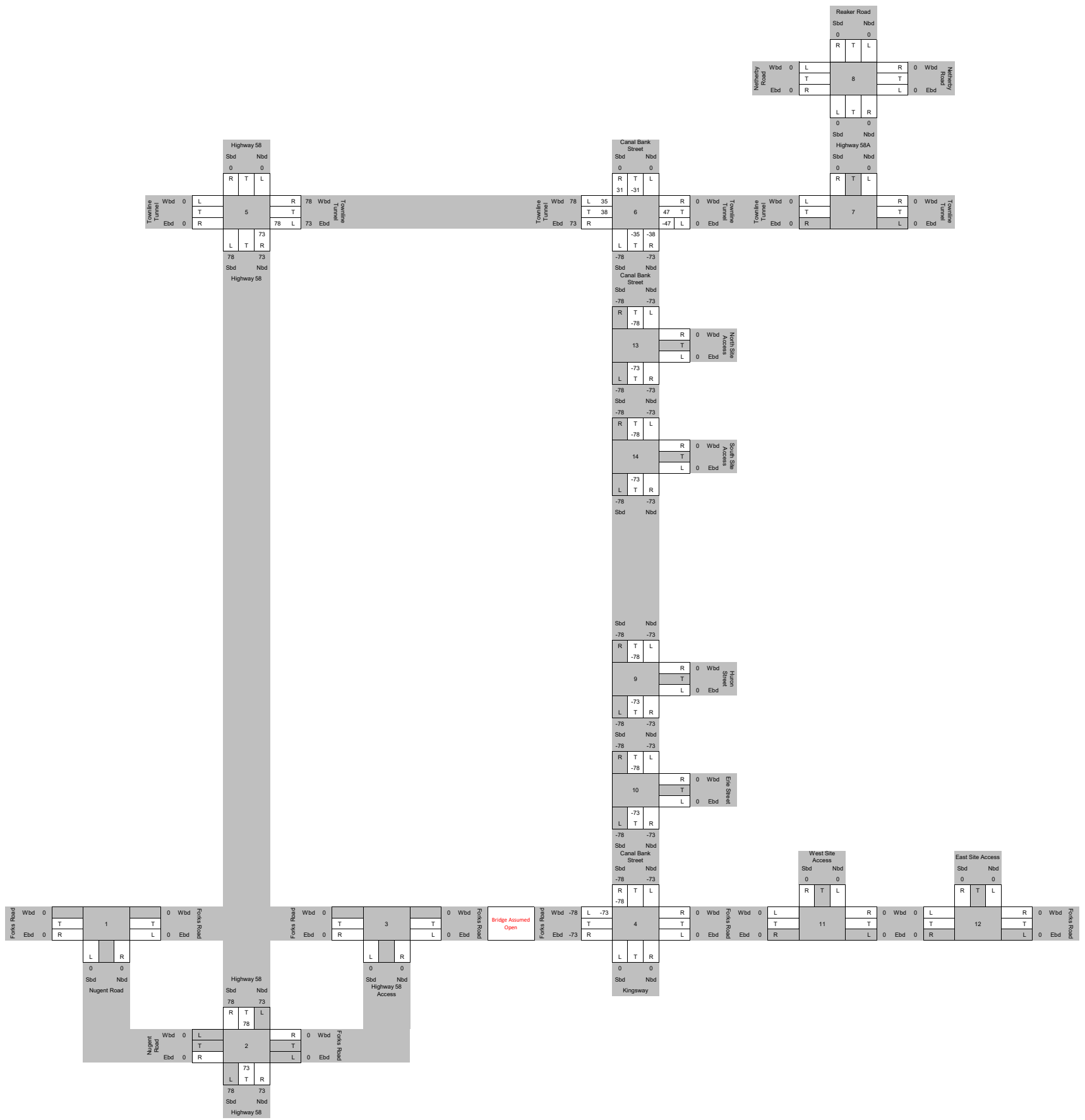


Figure X
 Non-Local Traffic Redistribution Based on 2017 Surveyed Data - AM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Non-local eastbound left traffic from the bridge assumed to be generated via Elm Street, to be redistribution to Highway 58.



Scale: NTS

Figure X

Non-Local Traffic Redistribution Based on 2017 Surveyed Data - PM Peak Hour
 401 Canal Bank Street Draft Plan of Subdivision, Welland - Transportation Study

Non-local eastbound left traffic from the bridge assumed to be generated via Elm Street, to be redistribution to Highway 58.



A-3 *AADT DATA*

A-4 2020 TMC DATA



Horizon Data Services Ltd

318 Simonston Boulevard
 Thornhill ON L3T 4T5
 (416) 840-6619

"We do not estimate...we count"

File Name : Forks Road at Highway 58 access
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 3

Start Time	Southbound						Forks Rd Westbound						Hwy 58 Access Northbound						Forks Rd E Eastbound											
	Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total							
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																														
Peak Hour for Entire Intersection Begins at 07:30 AM																														
07:30 AM	0	0	0	0	0		0	4	7	0	11		1	0	0	0	16		0	0	15	0	15		26	6	0	0	32	
07:45 AM	0	0	0	0	0		0	5	10	0	15		1	0	0	0	12		0	0	11	0	11		29	10	0	0	39	
08:00 AM	0	0	0	0	0		0	1	6	0	7		2	0	0	0	16		0	0	14	0	14		21	11	0	0	32	
08:15 AM	0	0	0	0	0		0	5	16	0	21		0	0	0	0	13		0	0	13	0	13		34	12	0	0	46	
Total Volume	0	0	0	0	0		0	15	39	0	54		4	0	0	0	57		0	0	53	0	53		110	39	0	0	149	
% App. Total	0	0	0	0	0		0	27.8	72.2	0	93		7	0	0	0	73.8		0	0	93	0	93		73.8	26.2	0	0	100	
PHF	.000	.000	.000	.000	.000		.750	.609	.000	.643	.500		.500	.000	.883	.000	.891		.809	.813	.000	.000	.810		.813	.810	.000	.000	.813	
Cars	0	0	0	0	0		0	15	35	0	50		3	0	0	0	49		0	0	46	0	46		100	34	0	0	134	
% Cars	0	0	0	0	0		0	100	89.7	0	92.6		75.0	0	0	0	86.0		0	0	86.8	0	86.0		90.9	87.2	0	0	89.9	
Trucks	0	0	0	0	0		0	0	2	0	2		1	0	0	0	4		0	0	3	0	3		1	1	0	0	2	
% Trucks	0	0	0	0	0		0	0	5.1	0	3.7		25.0	0	0	0	7.0		0	0	5.7	0	5.7		0.9	2.6	0	0	1.3	
Heavys	0	0	0	0	0		0	0	2	0	2		0	0	0	0	4		0	0	4	0	4		9	4	0	0	13	
% Heavys	0	0	0	0	0		0	0	5.1	0	3.7		0	0	0	0	7.0		0	0	7.5	0	7.0		8.2	10.3	0	0	8.7	
Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
% Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	

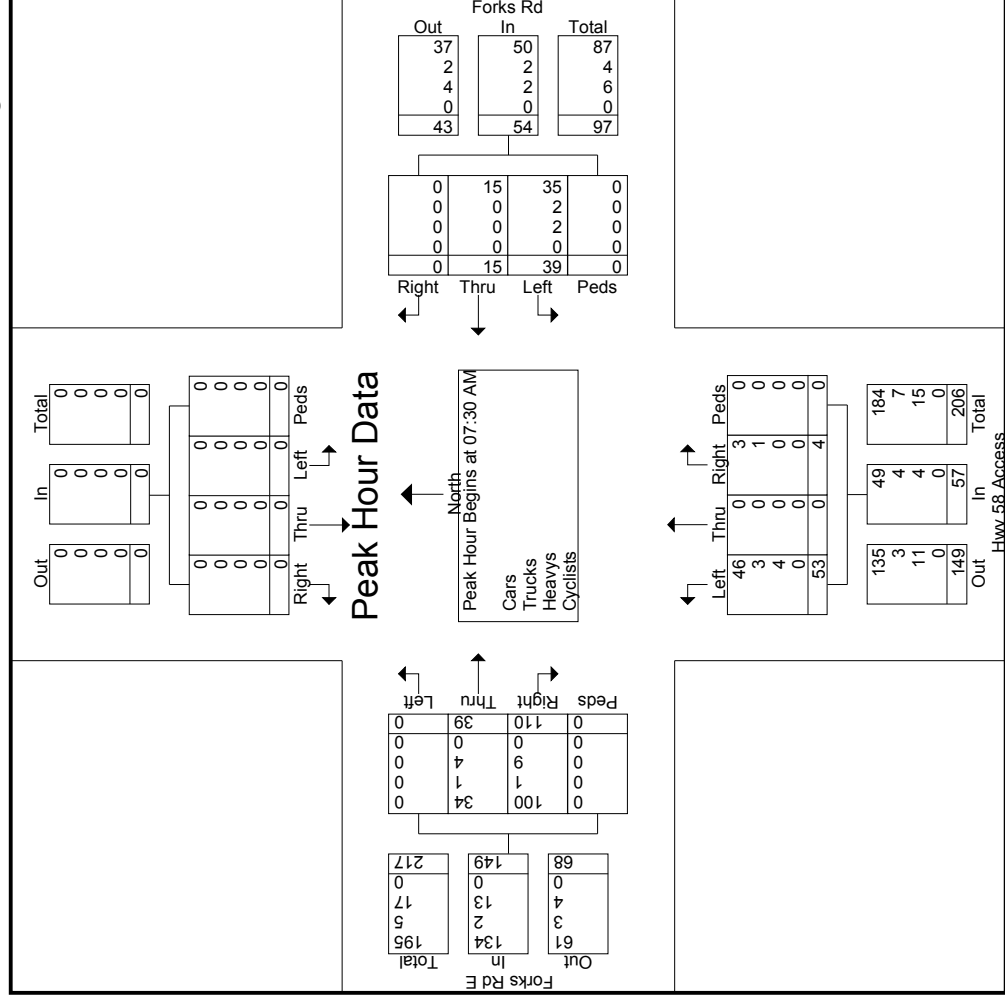


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(416) 840-6619

"We do not estimate...we count"

File Name : Forks Road at Highway 58 access
Site Code : 00000000
Start Date : 2020-03-12
Page No : 4



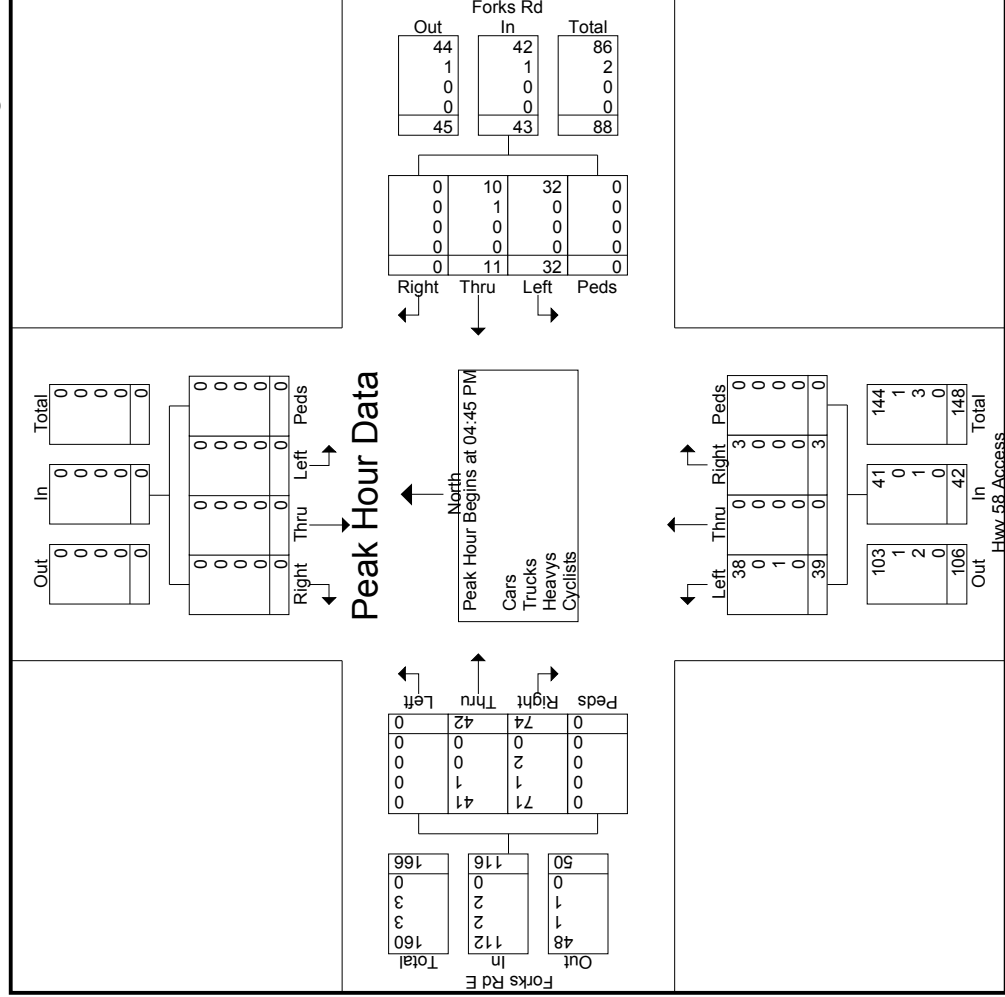


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"We do not estimate...we count"

File Name : Forks Road at Highway 58 access
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7





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 (416) 840-6619

"We do not estimate...we count"

File Name : Highway 58 at Nugent Road-Forks Road accesses
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 3

Start Time	Hwy 58 Southbound						Forks Rd Access Westbound						Hwy 58 Northbound						Nugent Rd Access Eastbound											
	Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total							
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																														
Peak Hour for Entire Intersection Begins at 07:45 AM																														
07:45 AM	14	103	1	0	118		38	0	0	0	38		11	116	0	0	127		19	0	0	0	19		0	0	0	0	0	
08:00 AM	18	73	0	0	91		27	0	1	0	28		16	110	0	0	126		5	0	0	0	5		0	0	0	0	0	
08:15 AM	21	83	0	0	104		47	0	0	0	47		15	145	0	0	160		12	0	0	0	12		0	0	0	0	0	
08:30 AM	18	76	0	0	94		26	0	0	0	26		14	123	0	0	137		12	0	0	0	12		0	0	0	0	0	
Total Volume	71	335	1	0	407		138	0	1	0	139		56	494	0	0	550		48	0	0	0	48		0	0	0	0	0	
% App. Total	17.4	82.3	0.2	0			99.3	0	0.7	0			10.2	89.8	0	0			100	0	0	0			0	0	0	0		
PHF	.845	.813	.250	.000	.862		.734	.000	.250	.000	.739		.875	.852	.000	.000	.859		.632	.000	.000	.000	.632		.885					
Cars	58	316	1	0	375		128	0	1	0	129		46	464	0	0	510		38	0	0	0	38		0	0	0	0	0	
% Cars	81.7	94.3	100	0	92.1		92.8	0	100	0	92.8		82.1	93.9	0	0	92.7		79.2	0	0	0	79.2		0	0	0	0	0	
Trucks	5	6	0	0	11		2	0	0	0	2		4	9	0	0	13		4	0	0	0	4		0	0	0	0	0	
% Trucks	7.0	1.8	0	0	2.7		1.4	0	0	0	1.4		7.1	1.8	0	0	2.4		8.3	0	0	0	8.3		0	0	0	0	0	
Heavys	8	13	0	0	21		8	0	0	0	8		6	21	0	0	27		6	0	0	0	6		0	0	0	0	0	
% Heavys	11.3	3.9	0	0	5.2		5.8	0	0	0	5.8		10.7	4.3	0	0	4.9		12.5	0	0	0	12.5		0	0	0	0	0	
Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
% Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	

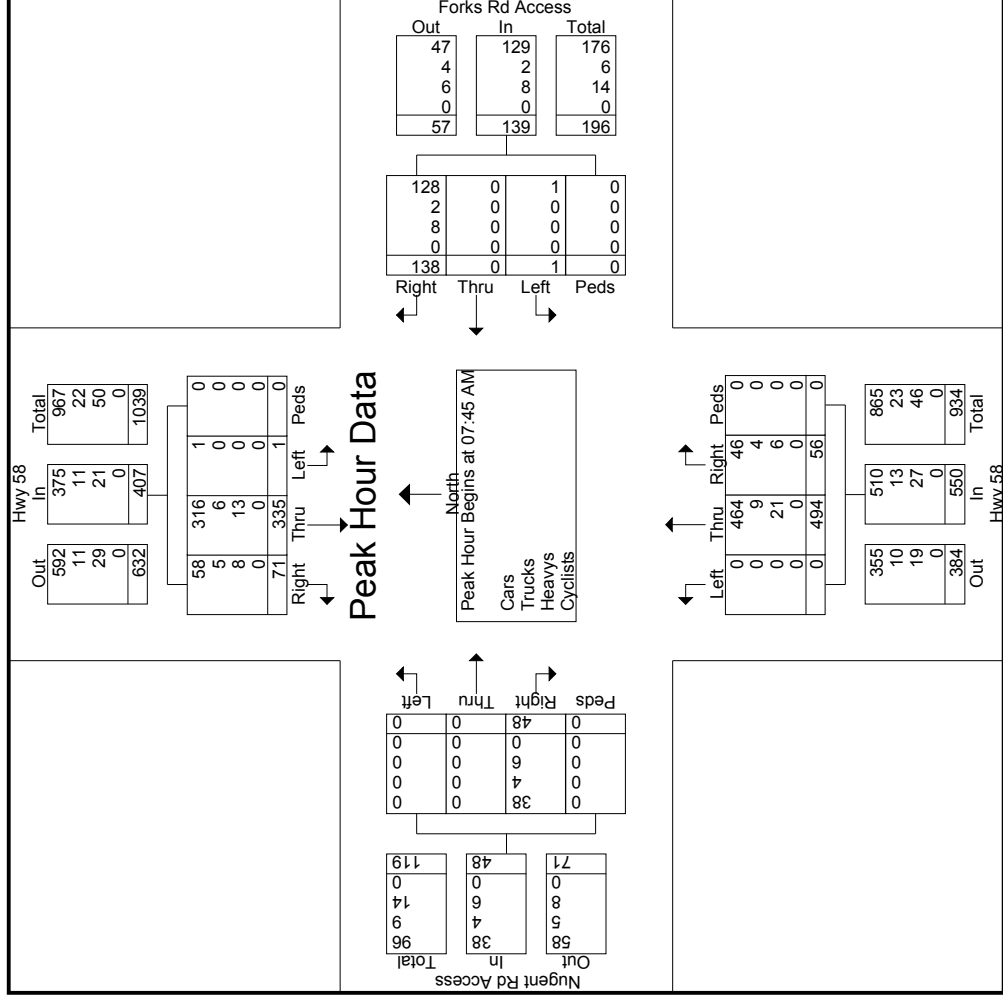


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"We do not estimate...we count"

File Name : Highway 58 at Nugent Road-Forks Road accesses
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4





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"We do not estimate...we count"

File Name : Highway 58 at Nugent Road-Forks Road accesses
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 6

Start Time	Hwy 58 Southbound						Forks Rd Access Westbound						Hwy 58 Northbound						Nugent Rd Access Eastbound											
	Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total							
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																														
Peak Hour for Entire Intersection Begins at 04:00 PM																														
04:00 PM	18	126	0	0	144		30	0	0	0	30		11	111	0	0	122		20	1	0	0	21		22	0	0	0	22	
04:15 PM	22	124	0	0	146		23	0	0	0	23		6	106	0	0	112		19	0	0	0	19		19	0	0	0	19	
04:30 PM	21	139	1	0	161		19	0	0	0	19		13	107	0	0	120		10	0	0	0	10		10	0	0	0	10	
04:45 PM	18	143	1	0	162		27	0	0	0	27		9	99	0	0	108		71	1	1	0	73		10	0	0	0	10	
Total Volume	79	532	2	0	613		99	0	0	0	99		39	423	0	0	462		97.3	1.4	1.4	0	99.7		71	1	1	0	73	
% App. Total	12.9	86.8	0.3	0	100		100	0	0	0	100		8.4	91.6	0	0	90		97.3	1.4	1.4	0	99.7		97.3	1.4	1.4	0	99.7	
PHF	.898	.930	.500	.000	.946		.825	.000	.000	.000	.825		.750	.953	.000	.000	.947		.807	.250	.250	.000	.830		.807	.250	.250	.000	.830	
Cars	76	522	2	0	600		93	0	0	0	93		30	414	0	0	444		65	1	0	0	67		65	1	0	0	67	
% Cars	96.2	98.1	100	0	97.9		93.9	0	0	0	93.9		76.9	97.9	0	0	96.1		91.5	100	100	0	91.8		91.5	100	100	0	91.8	
Trucks	1	6	0	0	7		4	0	0	0	4		2	3	0	0	5		2	0	0	0	2		2	0	0	0	2	
% Trucks	1.3	1.1	0	0	1.1		4.0	0	0	0	4.0		5.1	0.7	0	0	1.1		2.8	0	0	0	2.7		2.8	0	0	0	2.7	
Heavys	2	4	0	0	6		2	0	0	0	2		7	6	0	0	13		4	0	0	0	4		4	0	0	0	4	
% Heavys	2.5	0.8	0	0	1.0		2.0	0	0	0	2.0		17.9	1.4	0	0	2.8		5.6	0	0	0	5.5		5.6	0	0	0	5.5	
Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
% Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	

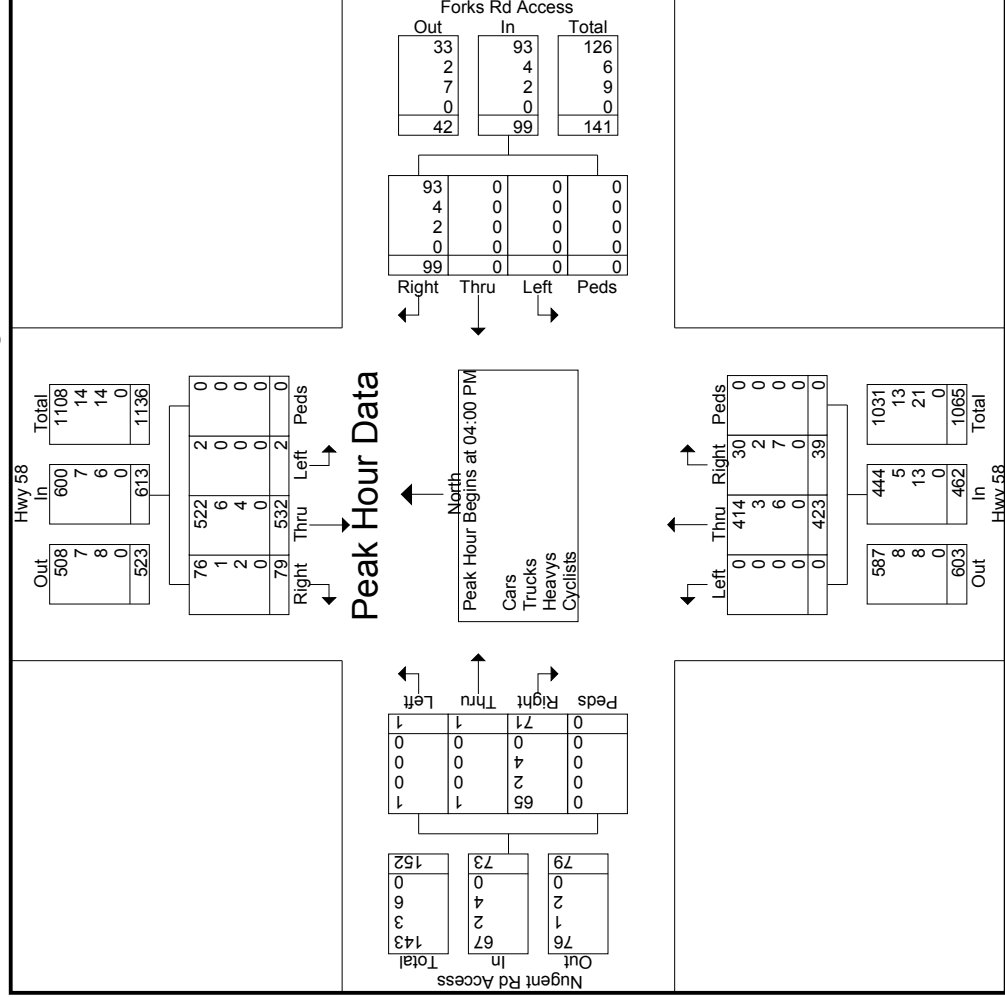


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"We do not estimate...we count"

File Name : Highway 58 at Nugent Road-Forks Road accesses
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7





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"We do not estimate...we count"

File Name : highway 58 at townline tunnel road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 3

Start Time	Prince Charles Dr S Southbound					Townline Tunnel Rd Westbound					Hwy 58 Northbound					Humberstone Rd Eastbound				
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total
	Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Entire Intersection Begins at 07:45 AM																			
07:45 AM	6	71	19	0	96	41	6	44	0	91	49	111	6	0	166	1	1	2	0	4
08:00 AM	8	74	22	0	104	32	8	28	0	68	60	75	8	0	143	2	3	2	0	7
08:15 AM	2	68	10	0	80	16	11	35	0	62	67	123	5	0	195	1	3	4	0	8
08:30 AM	4	72	29	0	105	20	4	26	0	50	55	97	4	0	156	3	2	3	0	8
Total Volume	20	285	80	0	385	109	29	133	0	271	231	406	23	0	660	7	9	11	0	27
% App. Total	5.2	74	20.8	0	40.2	10.7	49.1	35	0	61.5	35	61.5	3.5	0	40.7	25.9	33.3	40.7	0	134.3
PHF	.625	.963	.690	.000	.917	.665	.659	.756	.000	.745	.862	.825	.719	.000	.846	.583	.750	.688	.000	.844
Cars	20	268	75	0	363	101	28	119	0	248	207	392	21	0	620	7	6	9	0	22
% Cars	100	94.0	93.8	0	94.3	92.7	96.6	89.5	0	91.5	89.6	96.6	91.3	0	93.9	100	66.7	81.8	0	81.5
Trucks	0	8	3	0	11	3	1	3	0	7	3	7	1	0	11	0	2	1	0	3
% Trucks	0	2.8	3.8	0	2.9	2.8	3.4	2.3	0	2.6	1.3	1.7	4.3	0	1.7	0	22.2	9.1	0	11.1
Heavys	0	9	2	0	11	5	0	11	0	16	21	7	1	0	29	0	1	1	0	2
% Heavys	0	3.2	2.5	0	2.9	4.6	0	8.3	0	5.9	9.1	1.7	4.3	0	4.4	0	11.1	9.1	0	7.4
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

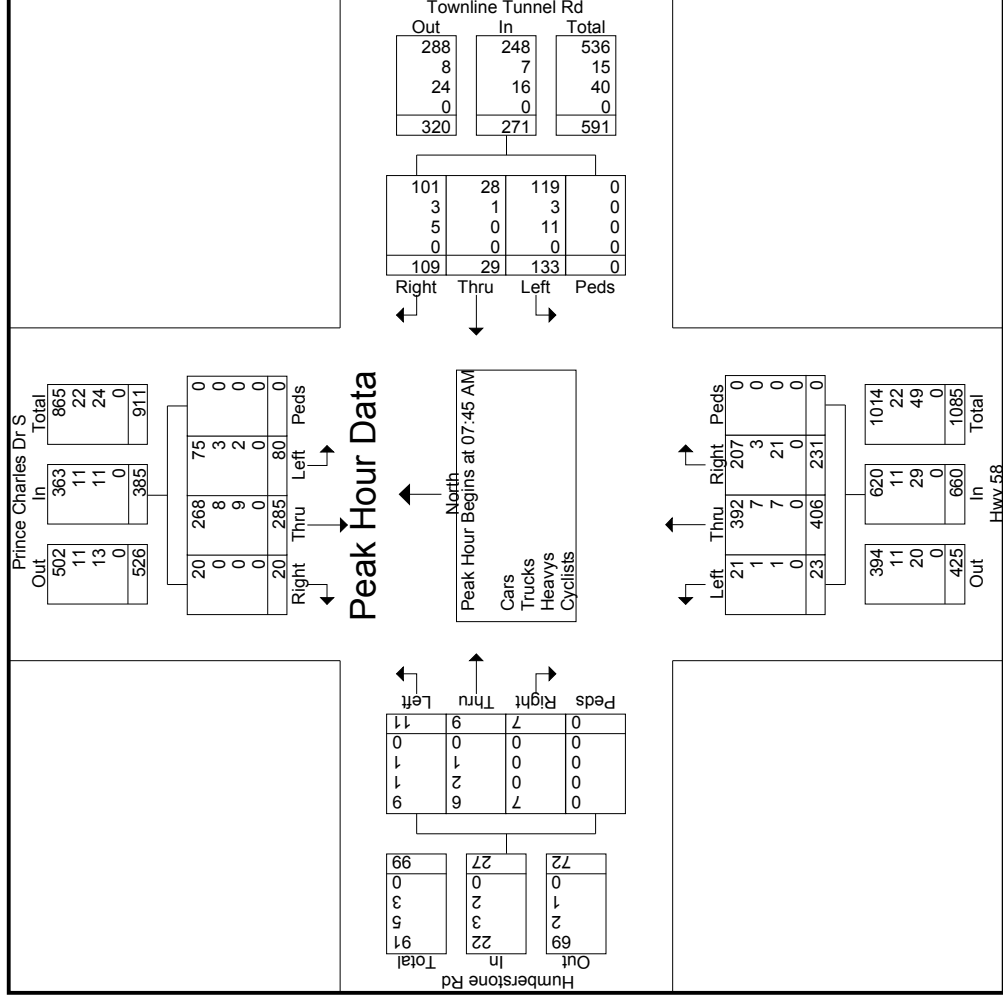


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"We do not estimate...we count"

File Name : highway 58 at townline tunnel road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4



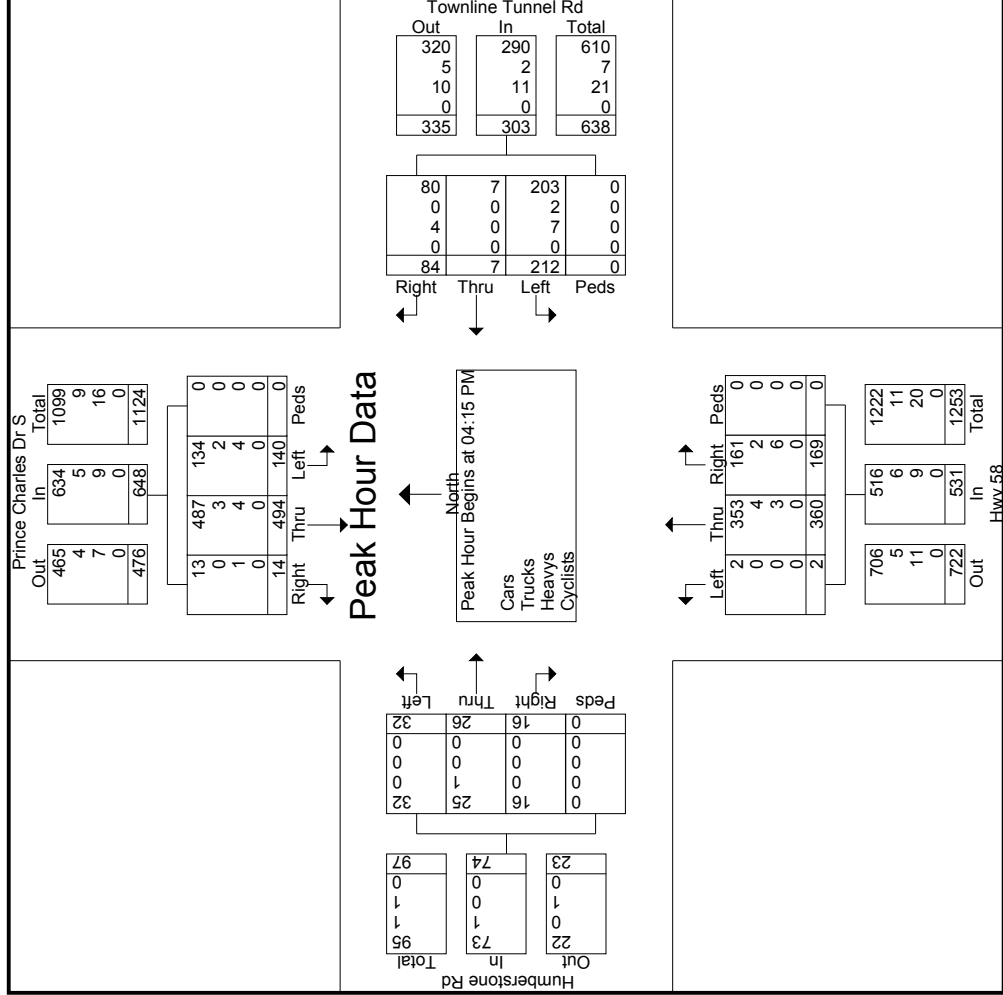


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"We do not estimate...we count"

File Name : highway 58 at townline tunnel road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7





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"We do not estimate...we count"

File Name : Kingsway at Forks Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 3

Start Time	Kingsway Southbound						Forks Rd Westbound						Kingsway Northbound						Forks Rd Eastbound													
	Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total									
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																
Peak Hour for Entire Intersection Begins at 07:15 AM																																
07:15 AM	0	6	3	0	9		9	0	0	0	9		0	18	0	0	18		0	0	0	0	0	0		0	0	0	0	0	0	
07:30 AM	2	6	5	0	13		12	0	0	1	13		0	28	1	1	30		0	0	0	0	0	0		0	0	0	0	0	0	
07:45 AM	0	6	4	0	10		21	0	0	0	21		1	23	0	1	25		1	0	2	0	0	3		0	0	0	0	0	0	
08:00 AM	0	7	10	0	17		10	0	0	4	14		1	24	0	0	25		0	0	0	0	0	0		0	0	0	0	0	0	
Total Volume	2	25	22	0	49		52	0	0	5	57		2	93	1	2	98		1	0	2	0	0	3		33.3	0	66.7	0	0	0	
% App. Total	4.1	51	44.9	0	8.8		91.2	0	0	8.8	113.3		2	94.9	1	2	100.0		2.50	0.00	2.50	0.00	2.50	0.00		33.3	0	66.7	0	0	0	
PHF	.250	.893	.550	.000	.721		.619	.000	.000	.313	.679		.500	.830	.250	.500	.817		.250	.000	.250	.000	.250	.000		.250	.000	.250	.000	.250	.000	
Cars	2	21	18	0	41		50	0	0	5	55		2	91	1	2	96		1	0	1	0	0	2		100	0	50.0	0	66.7	0	
% Cars	100	84.0	81.8	0	83.7		96.2	0	0	100	96.5		100	97.8	100	100	98.0		100	0	50.0	0	66.7	0		100	0	50.0	0	66.7	0	
Trucks	0	1	0	0	1		0	0	0	0	0		0	1	0	0	1		0	0	0	0	0	0		0	0	0	0	0	0	
% Trucks	0	4.0	0	0	2.0		0	0	0	0	0		0	1.1	0	0	1.0		0	0	0	0	0	0		0	0	0	0	0	0	
Heavys	0	3	4	0	7		2	0	0	0	2		0	1	0	0	1		0	0	1	0	0	1		0	0	1	0	0	1	
% Heavys	0	12.0	18.2	0	14.3		3.8	0	0	0	3.5		0	1.1	0	0	1.0		0	0	50.0	0	33.3	0		0	0	50.0	0	33.3	0	
Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	
% Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	

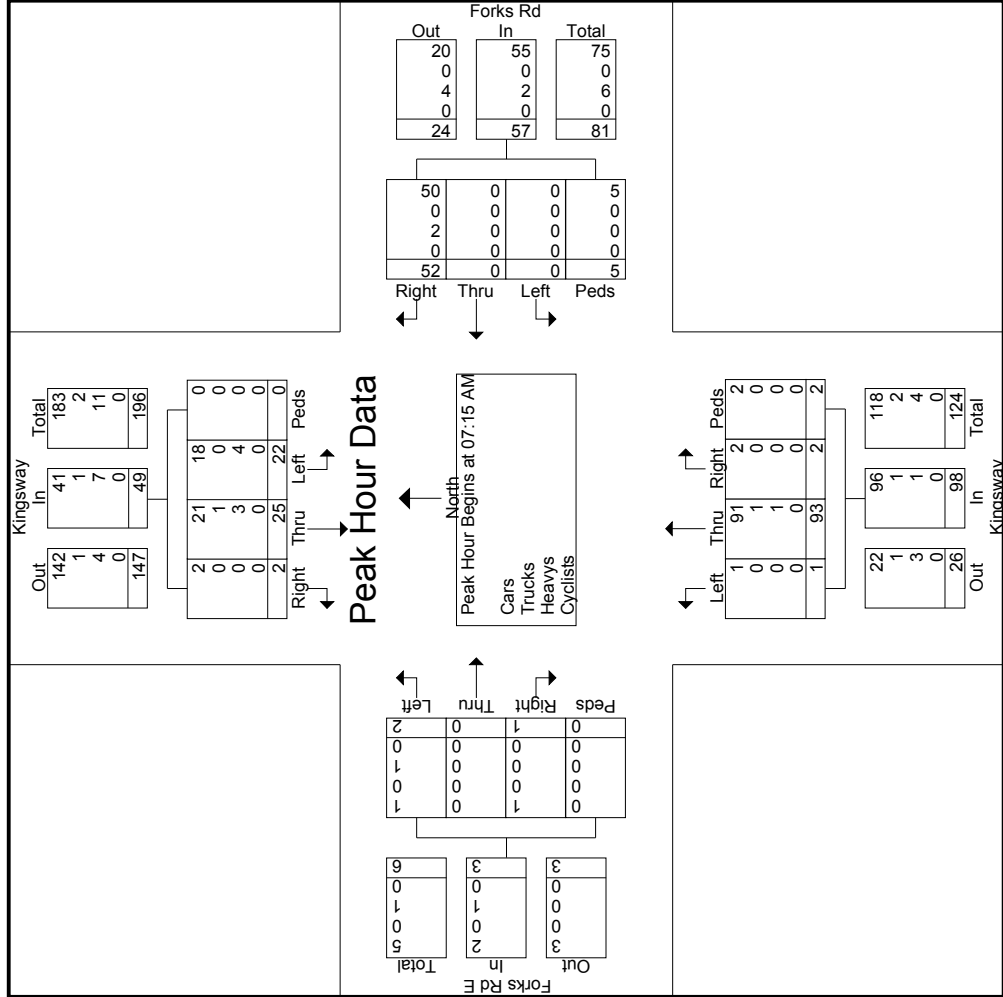


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"We do not estimate...we count"

File Name : Kingsway at Forks Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4



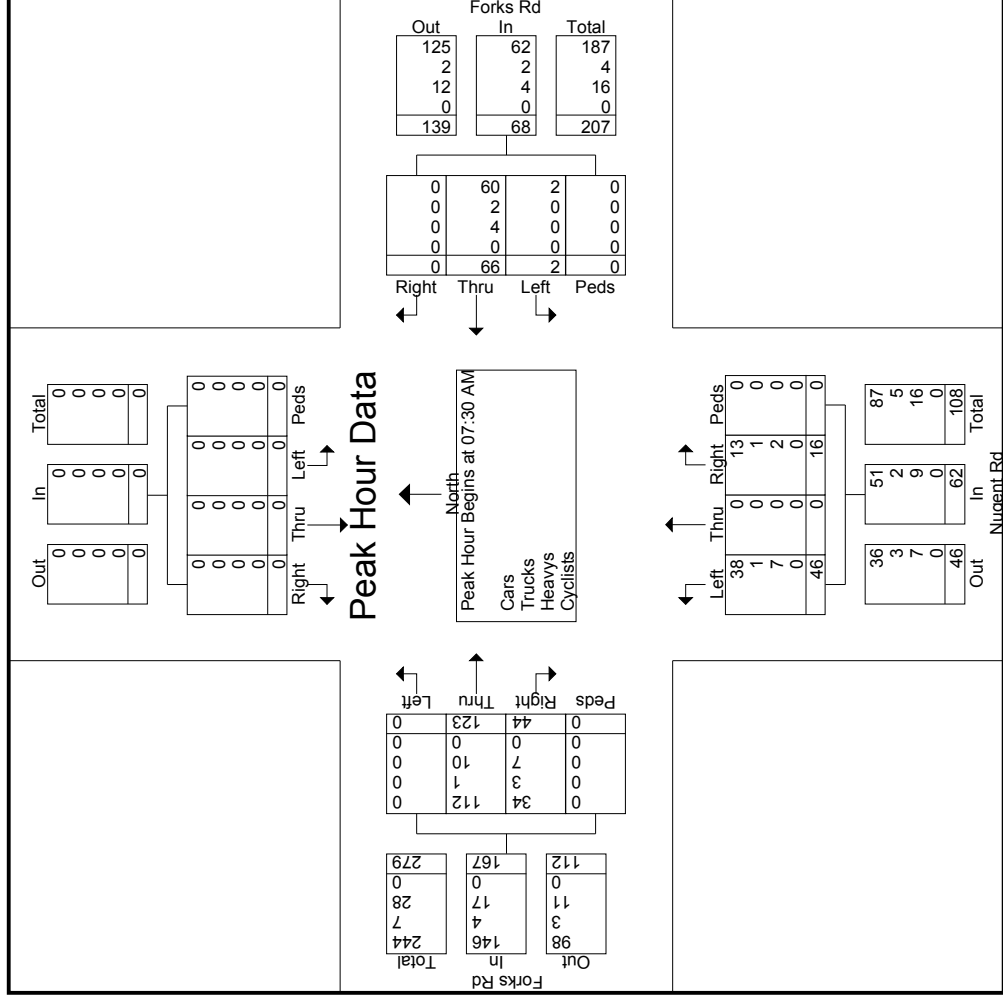


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"We do not estimate...we count"

File Name : Nugent Road at Forks Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4



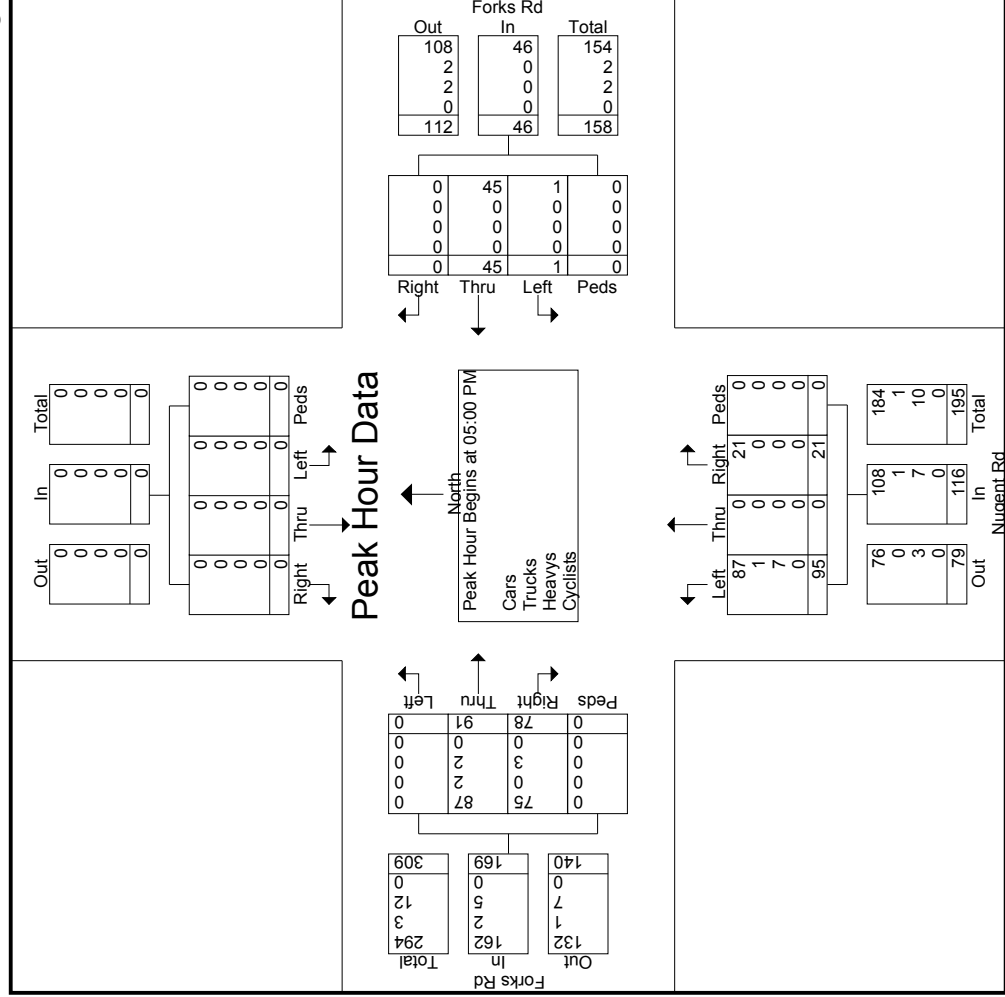


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"We do not estimate...we count"

File Name : Nugent Road at Forks Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7



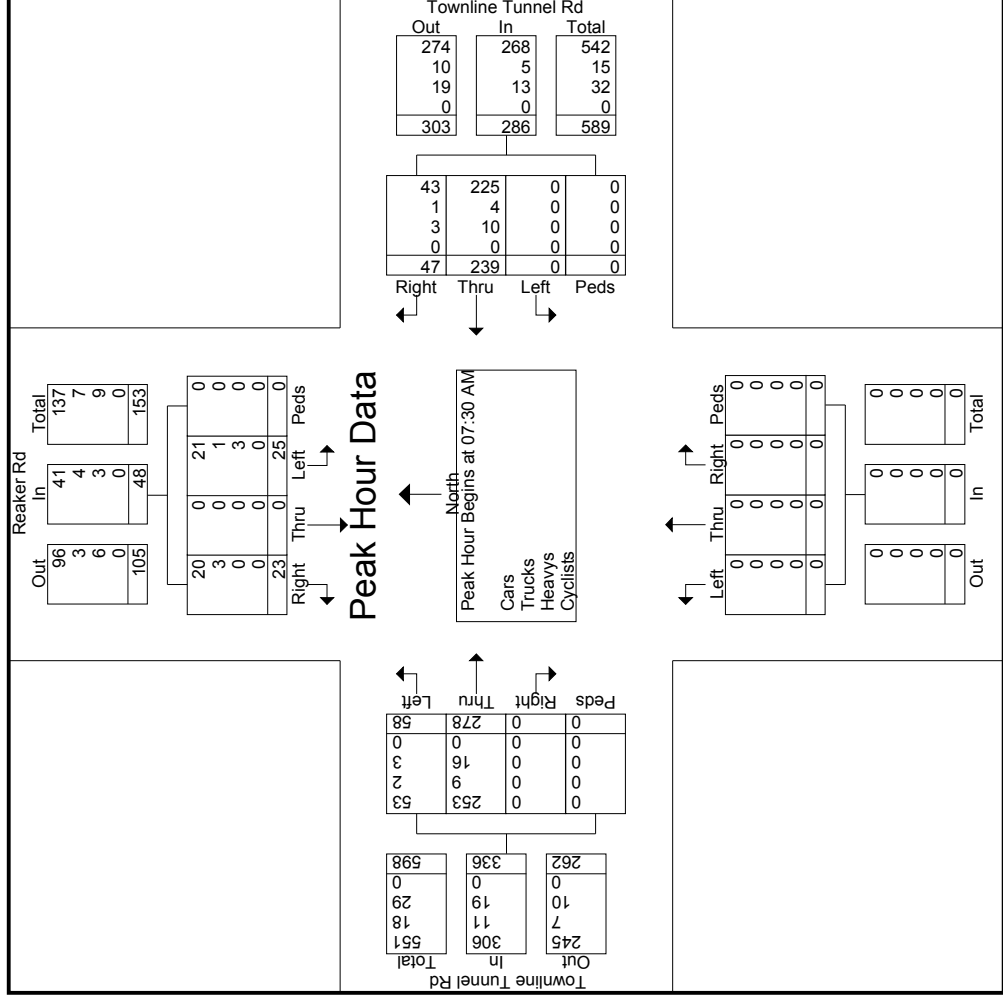


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"We do not estimate...we count"

File Name : Reaker Road at Highway 58A
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4



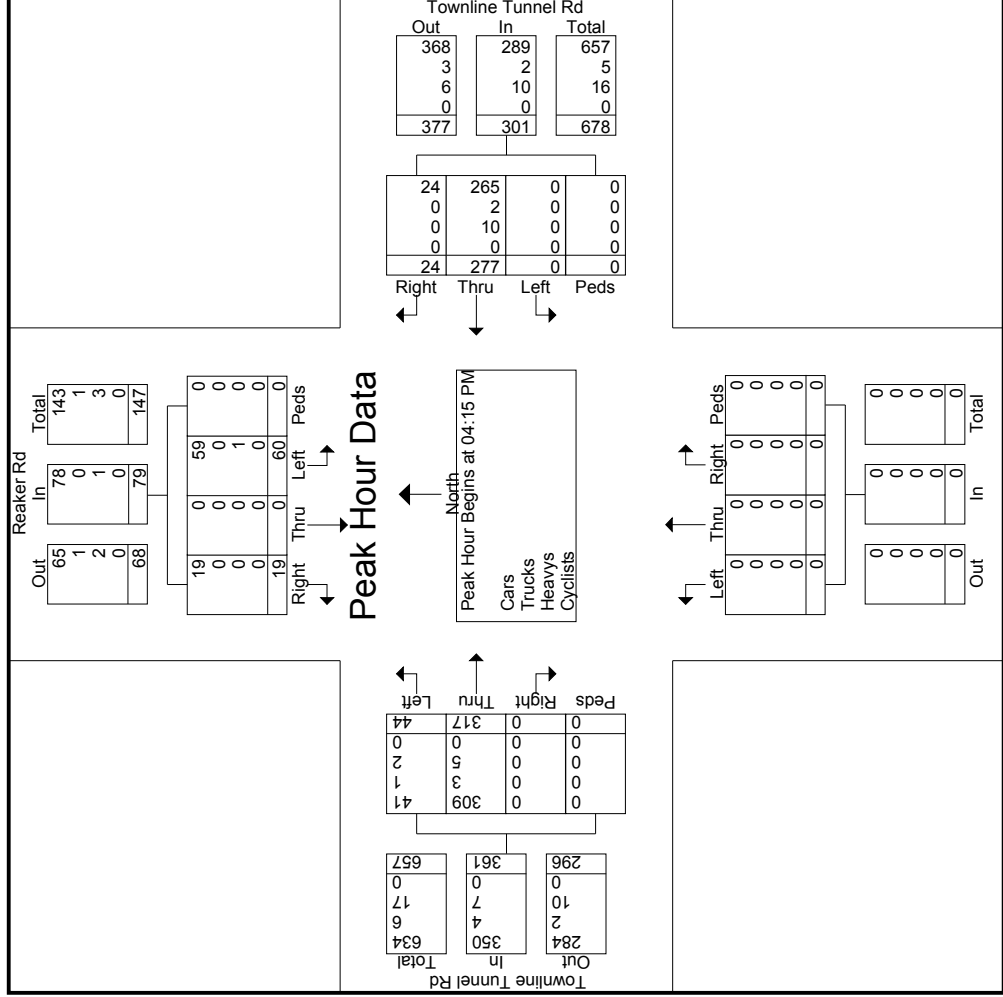


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"We do not estimate...we count"

File Name : Reaker Road at Highway 58A
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7



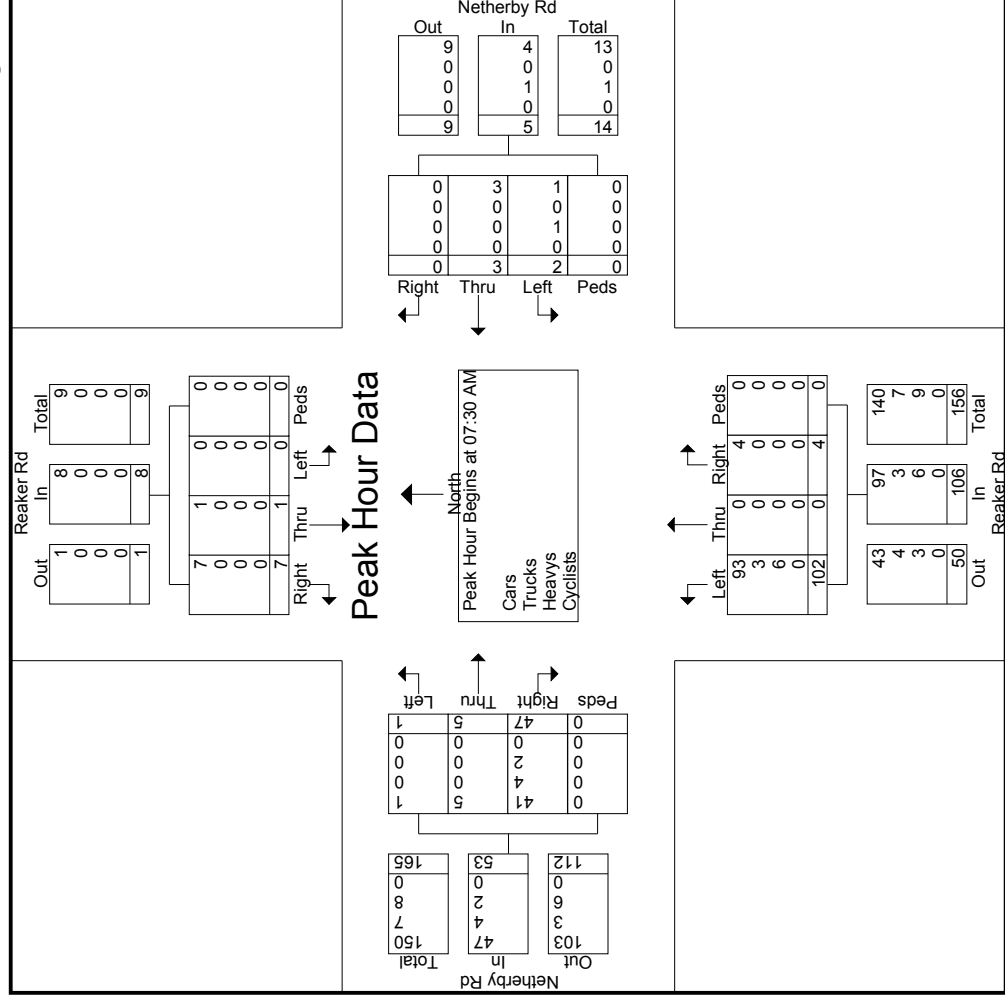


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"We do not estimate...we count"

File Name : Reaker Road at Netherby Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 4



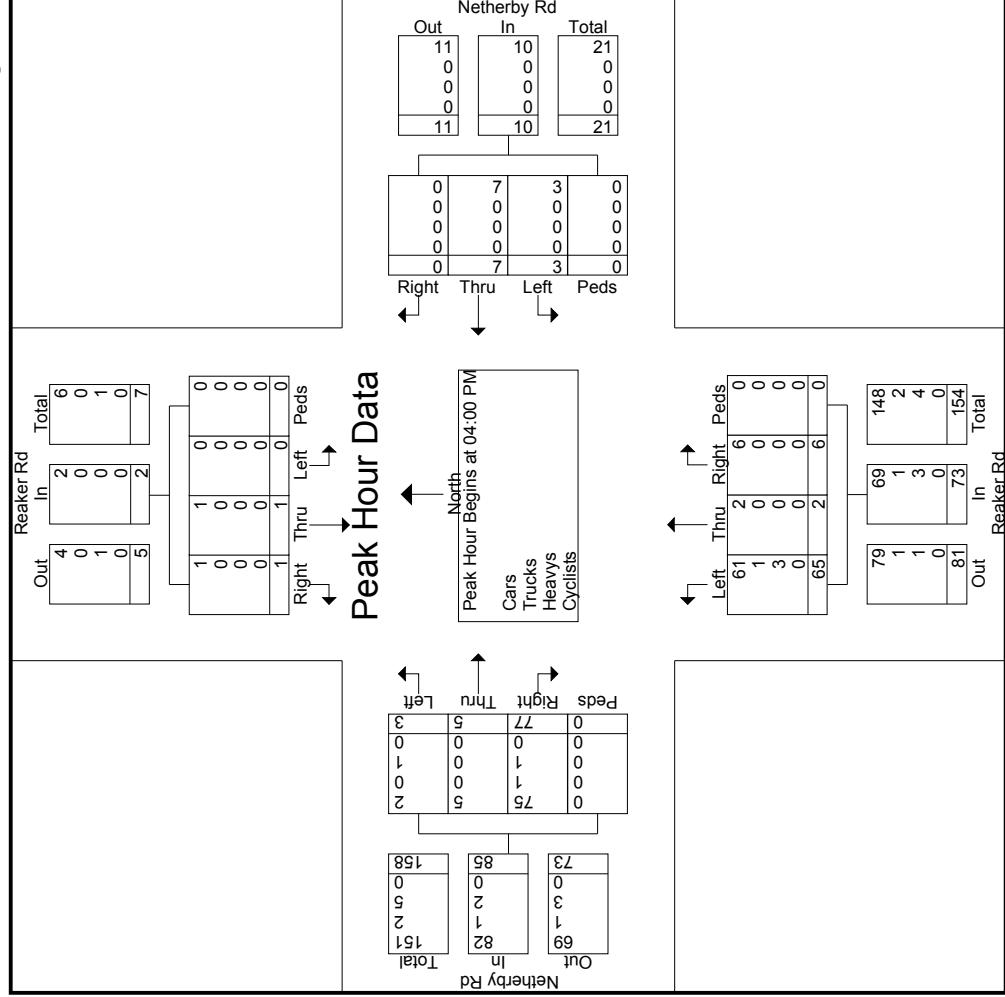


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"We do not estimate...we count"

File Name : Reaker Road at Netherby Road
 Site Code : 00000000
 Start Date : 2020-03-12
 Page No : 7





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"We do not estimate...we count"

File Name : Townline Tunnel Road at Canal Bank Street
 Site Code : 00000000
 Start Date : 2020-03-17
 Page No : 3

Start Time	Canal Bank St Southbound						Townline Tunnel Rd Westbound						Canal Bank St Northbound						Townline Tunnel Rd Eastbound						
	Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		Right	Thru	Left	Peds	App. Total		
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	2	3	11	0	16		14	33	6	0	53		11	14	6	0	31		2	54	3	0	59		
07:15 AM	3	3	16	0	22		12	40	7	0	59		9	7	1	0	17		1	48	3	0	52		
07:30 AM	2	3	17	0	22		18	41	6	0	65		5	14	7	0	26		3	52	2	0	57		
07:45 AM	2	9	13	0	24		23	59	8	0	90		12	9	5	0	26		2	38	9	0	49		
Total Volume	9	18	57	0	84		67	173	27	0	267		37	44	19	0	100		8	192	17	0	217		
% App. Total	10.7	21.4	67.9	0			25.1	64.8	10.1	0			37	44	19	0			3.7	88.5	7.8	0			
PHF	.750	.500	.838	.000	.875		.728	.733	.844	.000	.742		.771	.786	.679	.000	.806		.667	.889	.472	.000	.919		
Cars	8	18	57	0	83		66	149	25	0	240		37	42	18	0	97		6	173	16	0	195		
% Cars	88.9	100	100	0	98.8		98.5	86.1	92.6	0	89.9		100	95.5	94.7	0	97.0		75.0	90.1	94.1	0	89.9		
Trucks	0	0	0	0	0		1	2	1	0	4		0	1	1	0	2		2	5	0	0	7		
% Trucks	0	0	0	0	0		1.5	1.2	3.7	0	1.5		0	2.3	5.3	0	2.0		25.0	2.6	0	0	3.2		
Heavys	1	0	0	0	1		0	22	1	0	23		0	1	0	0	1		0	14	1	0	15		
% Heavys	11.1	0	0	0	1.2		0	12.7	3.7	0	8.6		0	2.3	0	0	1.0		0	7.3	5.9	0	6.9		
Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
% Cyclists	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		

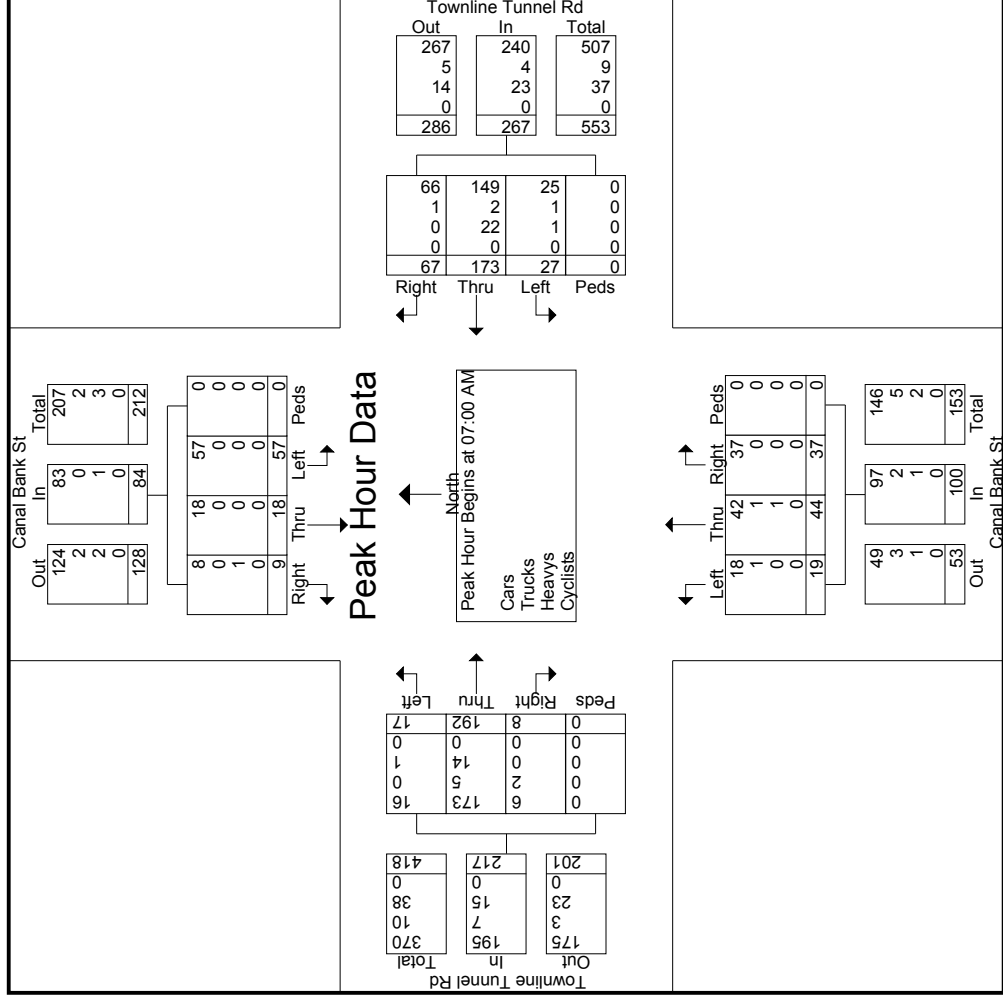


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"We do not estimate...we count"

File Name : Townline Tunnel Road at Canal Bank Street
 Site Code : 00000000
 Start Date : 2020-03-17
 Page No : 4



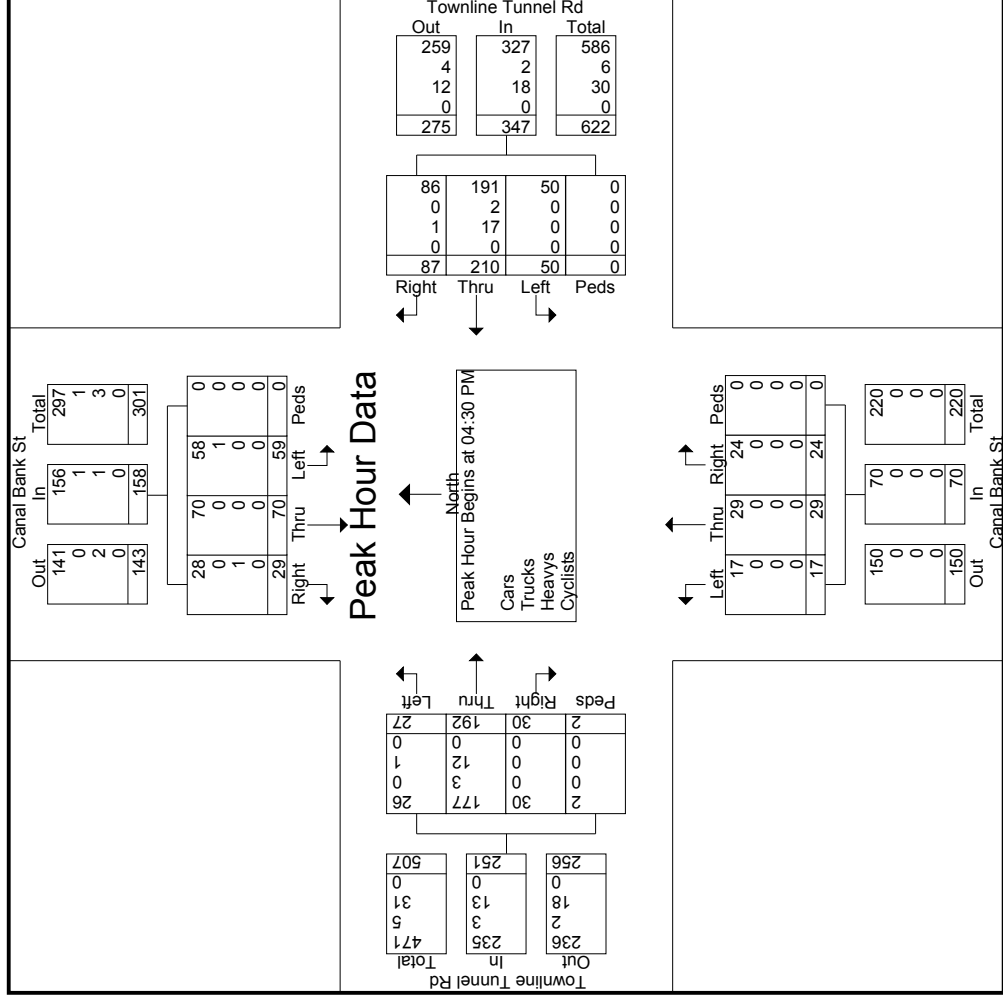


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"We do not estimate...we count"

File Name : Townline Tunnel Road at Canal Bank Street
 Site Code : 00000000
 Start Date : 2020-03-17
 Page No : 7



A-5 *STP*

Signal Code: H58CNL						
Intersection: Highway 58A & Canal Bank Rd.						
Municipality: welland						
Owner: MTO						
Last Modified: 11/22/2017 9:16:42 AM						
Timing Parameters	EBD & WBD THR HWY 58A	NBD & SBD THRU CANAL BANK RD.	n/a	n/a	n/a	n/a
Min Green	20	10	0	0	0	0
Walk	9	8	0	0	0	0
Ped Clearance	14	13	0	0	0	0
Vehicle Ext.	5	3	0	0	0	0
Max Green	40	30	0	0	0	0
Yellow	5	4	0	0	0	0
All Red	2	2	0	0	0	0

		Offset
Minimum Cycle	43	0
Pedestrian Cycle	57	
Maximum Cycle	83	0
Operation	FA	

Installed On:

--/--/----

Count Date:

--/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

***Note: you need to change the paper orientation from Portrait to Landscape**

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Signal Code: 033H58						
Intersection: RR33(Humberstone Rd.) & Hwy 58/Hwy 58A/Humberstone Rd.						
Municipality: welland						
Owner: mto						
Last Modified: 4/16/2019 12:02:41 PM						
Timing Parameters	SBD ADV PRINCE CHARLES DR.	NBD & SBD HWY 58/PRINCE CHARLES DR.	EBD & WBD HWY 58/HUMBERSTONE RD.	n/a	n/a	n/a
Min Green	5	20	20	0	0	0
Walk	0	9	9	0	0	0
Ped Clearance	0	15	15	0	0	0
Vehicle Ext.	2.5	4	3	0	0	0
Max Green	10	50	25	0	0	0
Yellow	3	5.7	5	0	0	0
All Red	0	2	2	0	0	0

		Offset
Minimum Cycle	54.7	0
Pedestrian Cycle	62.7	
Maximum Cycle	102.7	0
Operation	FA	

Installed On:

6/17/2016

Count Date:

--/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

***Note: you need to change the paper orientation from Portrait to Landscape**

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APPENDIX

B

LOS DEFINITIONS



LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS⁽¹⁾

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 and ≤ 20
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	> 20 and ≤ 35
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35 and ≤ 55
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	> 55 and ≤ 80
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS⁽¹⁾

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

APPENDIX

C SYNCHRO RESULTS SUMMARY



C-1 2020 EXISTING SCT

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2020 Existing Sc1> AM Peak Hour
 06/17/2020





















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶		
Traffic Volume (veh/h)	107	60	11	87	35	10
Future Volume (Veh/h)	107	60	11	87	35	10
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)	116	65	12	95	38	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			181		268	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			181		268	148
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			99		95	99
cM capacity (veh/h)			1407		701	904
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	181	107	49			
Volume Left	0	12	38			
Volume Right	65	0	11			
cSH	1700	1407	738			
Volume to Capacity	0.11	0.01	0.07			
Queue Length 95th (m)	0.0	0.2	1.6			
Control Delay (s)	0.0	0.9	10.2			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.9	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			25.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2020 Existing Sc1> AM Peak Hour

06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	65	0	0	67	0	569	68	0	335	38
Future Volume (Veh/h)	0	0	65	0	0	67	0	569	68	0	335	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	71	0	0	73	0	618	74	0	364	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)												
pX, platoon unblocked												
vC, conflicting volume	1055	1056	364	982	982	618	364			692		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1055	1056	364	982	982	618	364			692		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	89	100	100	85	100			100		
cM capacity (veh/h)	175	227	661	205	251	487	1206			912		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	71	73	618	74	364	41						
Volume Left	0	0	0	0	0	0						
Volume Right	71	73	0	74	0	41						
cSH	661	487	1700	1700	1700	1700						
Volume to Capacity	0.11	0.15	0.36	0.04	0.21	0.02						
Queue Length 95th (m)	2.7	4.0	0.0	0.0	0.0	0.0						
Control Delay (s)	11.1	13.7	0.0	0.0	0.0	0.0						
Lane LOS	B	B										
Approach Delay (s)	11.1	13.7	0.0		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			43.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2020 Existing Sc1> AM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	57	63	5	32	67	8
Future Volume (Veh/h)	57	63	5	32	67	8
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	68	5	35	73	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			130		141	96
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		141	96
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		91	99
cM capacity (veh/h)			1468		840	966
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	130	40	82			
Volume Left	0	5	73			
Volume Right	68	0	9			
cSH	1700	1468	852			
Volume to Capacity	0.08	0.00	0.10			
Queue Length 95th (m)	0.0	0.1	2.4			
Control Delay (s)	0.0	1.0	9.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.0	9.7			
Approach LOS			A			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			18.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2020 Existing Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	6	7	0	14	48	24	66	0	7	29	67
Future Volume (vph)	57	6	7	0	14	48	24	66	0	7	29	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	7	8	0	15	52	26	72	0	8	32	73
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	77	67	98	113								
Volume Left (vph)	62	0	26	8								
Volume Right (vph)	8	52	0	73								
Hadj (s)	0.18	-0.36	0.09	-0.31								
Departure Headway (s)	4.6	4.1	4.4	4.0								
Degree Utilization, x	0.10	0.08	0.12	0.13								
Capacity (veh/h)	741	819	775	856								
Control Delay (s)	8.1	7.4	8.0	7.6								
Approach Delay (s)	8.1	7.4	8.0	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.8									
Level of Service			A									
Intersection Capacity Utilization			29.6%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2020 Existing Sc1> AM Peak Hour

























06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	19	9	7	102	19	115	16	399	246	50	284	17	
Future Volume (vph)	19	9	7	102	19	115	16	399	246	50	284	17	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Fr _t	1.00	0.93		1.00	0.87		1.00	1.00	0.85	1.00	0.99		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1615		1411	1496		1552	1713	1375	1521	1700		
Fl _t Permitted	0.58	1.00		0.75	1.00		0.56	1.00	1.00	0.41	1.00		
Satd. Flow (perm)	953	1615		1107	1496		919	1713	1375	657	1700		
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)	21	10	8	111	21	125	17	434	267	54	309	18	
RTOR Reduction (vph)	0	6	0	0	96	0	0	0	106	0	2	0	
Lane Group Flow (vph)	21	12	0	111	50	0	17	434	161	54	325	0	
Heavy Vehicles (%)	0%	0%	0%	10%	0%	1%	0%	1%	1%	2%	1%	0%	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2		2	6			
Actuated Green, G (s)	20.5	20.5		20.5	20.5		57.2	57.2	57.2	65.9	65.9		
Effective Green, g (s)	23.5	23.5		23.5	23.5		60.9	60.9	60.9	65.9	69.6		
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.60	0.60	0.60	0.65	0.69		
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	221	375		257	347		553	1031	828	476	1170		
v/s Ratio Prot		0.01			0.03			c0.25		0.01	c0.19		
v/s Ratio Perm	0.02			c0.10			0.02		0.12	0.07			
v/c Ratio	0.10	0.03		0.43	0.14		0.03	0.42	0.19	0.11	0.28		
Uniform Delay, d ₁	30.5	30.0		33.1	30.8		8.1	10.7	9.1	7.1	6.1		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	0.2	0.0		1.2	0.2		0.1	1.3	0.5	0.1	0.6		
Delay (s)	30.6	30.0		34.3	31.0		8.2	12.0	9.6	7.2	6.7		
Level of Service	C	C		C	C		A	B	A	A	A		
Approach Delay (s)		30.4			32.4			11.0			6.7		
Approach LOS		C			C			B			A		
Intersection Summary													
HCM 2000 Control Delay			14.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.42										
Actuated Cycle Length (s)			101.1									Sum of lost time (s)	11.0
Intersection Capacity Utilization			61.2%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2020 Existing Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	279	7	51	204	98	22	89	86	93	33	13
Future Volume (vph)	56	279	7	51	204	98	22	89	86	93	33	13
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1644	1573	1290	1551	1531	1414	1337	1664	1428	1628	1528	
Flt Permitted	0.62	1.00	1.00	0.58	1.00	1.00	0.72	1.00	1.00	0.69	1.00	
Satd. Flow (perm)	1072	1573	1290	939	1531	1414	1019	1664	1428	1189	1528	
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)	61	303	8	55	222	107	24	97	93	101	36	14
RTOR Reduction (vph)	0	0	2	0	0	32	0	0	77	0	12	0
Lane Group Flow (vph)	61	303	6	55	222	75	24	97	16	101	38	0
Heavy Vehicles (%)	0%	10%	14%	6%	13%	4%	23%	4%	3%	1%	6%	15%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	43.2	43.2	43.2	43.2	43.2	43.2	9.6	9.6	9.6	9.6	9.6	
Effective Green, g (s)	46.2	46.2	46.2	46.2	46.2	46.2	11.6	11.6	11.6	11.6	11.6	
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.18	0.18	0.18	0.18	0.18	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	752	1104	905	659	1074	992	179	293	251	209	269	
v/s Ratio Prot		c0.19			0.14			0.06				0.03
v/s Ratio Perm	0.06		0.00	0.06		0.05	0.02		0.01	c0.08		
v/c Ratio	0.08	0.27	0.01	0.08	0.21	0.08	0.13	0.33	0.07	0.48	0.14	
Uniform Delay, d1	3.1	3.6	2.9	3.1	3.4	3.1	22.9	23.7	22.6	24.4	22.9	
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	0.2	0.6	0.0	0.2	0.4	0.1	0.3	0.7	0.1	1.8	0.2	
Delay (s)	3.3	4.2	2.9	3.3	3.9	3.2	23.2	24.4	22.7	26.2	23.1	
Level of Service	A	A	A	A	A	A	C	C	C	C	C	
Approach Delay (s)		4.1			3.6			23.5			25.2	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			10.5				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.32									
Actuated Cycle Length (s)			65.8				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			55.6%				ICU Level of Service				B	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2020 Existing Sc1> AM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	240	243	47	24	20
Future Volume (Veh/h)	63	240	243	47	24	20
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	261	264	51	26	22
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	315				661	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	315				661	264
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	95				94	97
cM capacity (veh/h)	1245				407	756
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	68	261	264	51	26	22
Volume Left	68	0	0	0	26	0
Volume Right	0	0	0	51	0	22
cSH	1245	1700	1700	1700	407	756
Volume to Capacity	0.05	0.15	0.16	0.03	0.06	0.03
Queue Length 95th (m)	1.3	0.0	0.0	0.0	1.5	0.7
Control Delay (s)	8.1	0.0	0.0	0.0	14.4	9.9
Lane LOS	A				B	A
Approach Delay (s)	1.7		0.0		12.4	
Approach LOS					B	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			31.0%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2020 Existing Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	4	5	50	2	4	1	97	4	5	1	3	8
Future Volume (Veh/h)	4	5	50	2	4	1	97	4	5	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	5	54	2	4	1	105	4	5	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	5			59			59	49	32	56	76	4
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5			59			59	49	32	56	76	4
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			89	100	100	100	100	99
cM capacity (veh/h)	1630			1558			923	843	1048	936	703	983
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	63	7	114	13								
Volume Left	4	2	105	1								
Volume Right	54	1	5	9								
cSH	1630	1558	925	897								
Volume to Capacity	0.00	0.00	0.12	0.01								
Queue Length 95th (m)	0.1	0.0	3.2	0.3								
Control Delay (s)	0.5	2.1	9.4	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.5	2.1	9.4	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			23.8%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2020 Existing Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	180	4	5	86
Future Volume (Veh/h)	11	17	180	4	5	86
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	18	196	4	5	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	301	198			200	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	301	198			200	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	692	848			1384	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	200	98			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	778	1700	1384			
Volume to Capacity	0.04	0.12	0.00			
Queue Length 95th (m)	0.9	0.0	0.1			
Control Delay (s)	9.8	0.0	0.4			
Lane LOS	A		A			
Approach Delay (s)	9.8	0.0	0.4			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			20.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2020 Existing Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	167	4	5	92
Future Volume (Veh/h)	11	17	167	4	5	92
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)	12	18	182	4	5	100
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	294	184			186	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	294	184			186	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	699	864			1401	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	186	105			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	789	1700	1401			
Volume to Capacity	0.04	0.11	0.00			
Queue Length 95th (m)	0.9	0.0	0.1			
Control Delay (s)	9.7	0.0	0.4			
Lane LOS	A		A			
Approach Delay (s)	9.7	0.0	0.4			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			19.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2020 Existing Sc1> PM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	115	74	10	85	84	8
Future Volume (Veh/h)	115	74	10	85	84	8
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)	125	80	11	92	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			205		279	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			205		279	165
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		87	99
cM capacity (veh/h)			1378		701	885
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	205	103	100			
Volume Left	0	11	91			
Volume Right	80	0	9			
cSH	1700	1378	714			
Volume to Capacity	0.12	0.01	0.14			
Queue Length 95th (m)	0.0	0.2	3.7			
Control Delay (s)	0.0	0.9	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.9	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			26.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access

<2020 Existing Sc1> PM Peak Hour
 06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	76	0	0	70	0	483	51	0	591	86
Future Volume (Veh/h)	0	0	76	0	0	70	0	483	51	0	591	86
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	83	0	0	76	0	525	55	0	642	93
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1243	1222	642	1167	1167	525	642			580		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1243	1222	642	1167	1167	525	642			580		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	83	100	100	86	100			100		
cM capacity (veh/h)	131	181	478	142	195	545	952			1004		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	83	76	525	55	642	93						
Volume Left	0	0	0	0	0	0						
Volume Right	83	76	0	55	0	93						
cSH	478	545	1700	1700	1700	1700						
Volume to Capacity	0.17	0.14	0.31	0.03	0.38	0.05						
Queue Length 95th (m)	4.7	3.7	0.0	0.0	0.0	0.0						
Control Delay (s)	14.1	12.7	0.0	0.0	0.0	0.0						
Lane LOS	B	B										
Approach Delay (s)	14.1	12.7	0.0		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			45.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2020 Existing Sc1> PM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶	↷	
Traffic Volume (veh/h)	69	55	17	49	46	11
Future Volume (Veh/h)	69	55	17	49	46	11
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)	75	60	18	53	50	12
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			135		194	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			135		194	105
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			99		94	99
cM capacity (veh/h)			1462		770	955
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	135	71	62			
Volume Left	0	18	50			
Volume Right	60	0	12			
cSH	1700	1462	800			
Volume to Capacity	0.08	0.01	0.08			
Queue Length 95th (m)	0.0	0.3	1.9			
Control Delay (s)	0.0	2.0	9.9			
Lane LOS			A			
Approach Delay (s)	0.0	2.0	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			24.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road

<2020 Existing Sc1> PM Peak Hour
 06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	74	14	23	0	11	32	13	39	0	48	68	63
Future Volume (vph)	74	14	23	0	11	32	13	39	0	48	68	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	15	25	0	12	35	14	42	0	52	74	68
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	120	47	56	194								
Volume Left (vph)	80	0	14	52								
Volume Right (vph)	25	35	0	68								
Hadj (s)	0.02	-0.45	0.08	-0.14								
Departure Headway (s)	4.5	4.2	4.6	4.2								
Degree Utilization, x	0.15	0.05	0.07	0.23								
Capacity (veh/h)	743	797	742	812								
Control Delay (s)	8.3	7.4	7.9	8.5								
Approach Delay (s)	8.3	7.4	7.9	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.2									
Level of Service			A									
Intersection Capacity Utilization			35.1%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2020 Existing Sc1> PM Peak Hour
06/17/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	28	17	252	16	96	0	405	166	123	453	16
Future Volume (vph)	39	28	17	252	16	96	0	405	166	123	453	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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	1.00	
Frt	1.00	0.94		1.00	0.87			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1620		1518	1422			1731	1335	1536	1705	
Flt Permitted	0.64	1.00		0.73	1.00			1.00	1.00	0.38	1.00	
Satd. Flow (perm)	1053	1620		1160	1422			1731	1335	609	1705	
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)	42	30	18	274	17	104	0	440	180	134	492	17
RTOR Reduction (vph)	0	13	0	0	76	0	0	0	82	0	1	0
Lane Group Flow (vph)	42	35	0	274	45	0	0	440	98	134	508	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	0%	2%	0%	7%	0%	0%	4%	1%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			51.5	51.5	63.0	63.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			55.2	55.2	63.0	66.7	
Actuated g/C Ratio	0.27	0.27		0.27	0.27			0.54	0.54	0.62	0.66	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	279	430		307	377			939	724	454	1118	
v/s Ratio Prot		0.02			0.03			0.25		0.02	c0.30	
v/s Ratio Perm	0.04			c0.24					0.07	0.16		
v/c Ratio	0.15	0.08		0.89	0.12			0.47	0.13	0.30	0.45	
Uniform Delay, d1	28.6	28.0		36.0	28.3			14.3	11.5	9.2	8.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		26.1	0.1			1.7	0.4	0.4	1.3	
Delay (s)	28.8	28.1		62.0	28.5			15.9	11.9	9.6	9.9	
Level of Service	C	C		E	C			B	B	A	A	
Approach Delay (s)		28.4			51.7			14.8			9.8	
Approach LOS		C			D			B			A	
Intersection Summary												
HCM 2000 Control Delay			22.0									C
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			101.7							11.0		
Intersection Capacity Utilization			75.4%									D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2020 Existing Sc1> PM Peak Hour

06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	65	266	18	81	357	124	7	71	65	88	102	48	
Future Volume (vph)	65	266	18	81	357	124	7	71	65	88	102	48	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0		
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		
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		
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	1.00	0.85	1.00	0.95		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1588	1471	1644	1573	1442	1642	1680	1471	1596	1593		
Flt Permitted	0.39	1.00	1.00	0.50	1.00	1.00	0.65	1.00	1.00	0.71	1.00		
Satd. Flow (perm)	678	1588	1471	869	1573	1442	1130	1680	1471	1188	1593		
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)	71	289	20	88	388	135	8	77	71	96	111	52	
RTOR Reduction (vph)	0	0	12	0	0	81	0	0	39	0	17	0	
Lane Group Flow (vph)	71	289	8	88	388	54	8	77	32	96	146	0	
Confl. Peds. (#/hr)							1					1	
Heavy Vehicles (%)	0%	9%	0%	0%	10%	2%	0%	3%	0%	3%	4%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	23.7	23.7	23.7	23.7	23.7	23.7	30.2	30.2	30.2	30.2	30.2		
Effective Green, g (s)	26.7	26.7	26.7	26.7	26.7	26.7	32.2	32.2	30.2	32.2	32.2		
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.48	0.48	0.45	0.48	0.48		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	270	633	587	346	627	575	543	808	664	571	766		
v/s Ratio Prot		0.18			c0.25			0.05			c0.09		
v/s Ratio Perm	0.10		0.01	0.10		0.04	0.01		0.02	0.08			
v/c Ratio	0.26	0.46	0.01	0.25	0.62	0.09	0.01	0.10	0.05	0.17	0.19		
Uniform Delay, d1	13.5	14.8	12.1	13.4	16.0	12.5	9.1	9.4	10.3	9.8	9.9		
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	0.5	0.5	0.0	0.4	1.8	0.1	0.0	0.2	0.1	0.6	0.6		
Delay (s)	14.0	15.3	12.2	13.8	17.9	12.6	9.1	9.7	10.4	10.4	10.5		
Level of Service	B	B	B	B	B	B	A	A	B	B	B		
Approach Delay (s)		14.9			16.1			10.0			10.4		
Approach LOS		B			B			A			B		
Intersection Summary													
HCM 2000 Control Delay			14.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.38										
Actuated Cycle Length (s)			66.9									Sum of lost time (s)	8.0
Intersection Capacity Utilization			64.6%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2020 Existing Sc1> PM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	270	283	35	71	20
Future Volume (Veh/h)	40	270	283	35	71	20
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)	43	293	308	38	77	22
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	346				687	308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	346				687	308
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				81	97
cM capacity (veh/h)	1207				401	737
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	43	293	308	38	77	22
Volume Left	43	0	0	0	77	0
Volume Right	0	0	0	38	0	22
cSH	1207	1700	1700	1700	401	737
Volume to Capacity	0.04	0.17	0.18	0.02	0.19	0.03
Queue Length 95th (m)	0.8	0.0	0.0	0.0	5.3	0.7
Control Delay (s)	8.1	0.0	0.0	0.0	16.1	10.0
Lane LOS	A				C	B
Approach Delay (s)	1.0		0.0		14.8	
Approach LOS					B	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			33.8%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2020 Existing Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	2	7	82	6	11	0	71	0	5	1	3	6
Future Volume (Veh/h)	2	7	82	6	11	0	71	0	5	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	8	89	7	12	0	77	0	5	1	3	7
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	12			97			91	82	52	88	127	12
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	12			97			91	82	52	88	127	12
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			91	100	100	100	100	99
cM capacity (veh/h)	1620			1509			876	807	1021	894	763	1074
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	99	19	82	11								
Volume Left	2	7	77	1								
Volume Right	89	0	5	7								
cSH	1620	1509	884	951								
Volume to Capacity	0.00	0.00	0.09	0.01								
Queue Length 95th (m)	0.0	0.1	2.3	0.3								
Control Delay (s)	0.2	2.7	9.5	8.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.2	2.7	9.5	8.8								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			24.0%	ICU Level of Service	A							
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2020 Existing Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	132	12	19	182
Future Volume (Veh/h)	8	11	132	12	19	182
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)	9	12	143	13	21	198
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	390	150			156	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	390	150			156	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	609	902			1436	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	156	219			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	748	1700	1436			
Volume to Capacity	0.03	0.09	0.01			
Queue Length 95th (m)	0.7	0.0	0.3			
Control Delay (s)	10.0	0.0	0.8			
Lane LOS	A		A			
Approach Delay (s)	10.0	0.0	0.8			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			33.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

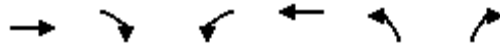
<2020 Existing Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	133	12	19	171
Future Volume (Veh/h)	8	11	133	12	19	171
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)	9	12	145	13	21	186
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	380	152			158	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380	152			158	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	617	900			1434	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	158	207			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	752	1700	1434			
Volume to Capacity	0.03	0.09	0.01			
Queue Length 95th (m)	0.7	0.0	0.3			
Control Delay (s)	9.9	0.0	0.9			
Lane LOS	A		A			
Approach Delay (s)	9.9	0.0	0.9			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			32.6%	ICU Level of Service		A
Analysis Period (min)			15			

C-2 2020 EXISTING SC2

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2020 Existing Sc2> AM Peak Hour
 05/28/2020





















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	123	44	2	66	46	16
Future Volume (Veh/h)	123	44	2	66	46	16
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)	134	48	2	72	50	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			182		234	158
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			182		234	158
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			100		93	98
cM capacity (veh/h)			1405		725	859
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	182	74	67			
Volume Left	0	2	50			
Volume Right	48	0	17			
cSH	1700	1405	755			
Volume to Capacity	0.11	0.00	0.09			
Queue Length 95th (m)	0.0	0.0	2.2			
Control Delay (s)	0.0	0.2	10.2			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.2	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			20.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2020 Existing Sc2> AM Peak Hour

05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	48	0	0	138	0	494	56	0	335	71
Future Volume (Veh/h)	0	0	48	0	0	138	0	494	56	0	335	71
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	52	0	0	150	0	537	61	0	364	77
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	1051	962	364	901	901	537	364			598		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1051	962	364	901	901	537	364			598		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	92	100	100	72	100			100		
cM capacity (veh/h)	149	258	657	240	280	536	1206			989		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	52	150	537	61	364	77						
Volume Left	0	0	0	0	0	0						
Volume Right	52	150	0	61	0	77						
cSH	657	536	1700	1700	1700	1700						
Volume to Capacity	0.08	0.28	0.32	0.04	0.21	0.05						
Queue Length 95th (m)	2.0	8.7	0.0	0.0	0.0	0.0						
Control Delay (s)	10.9	14.3	0.0	0.0	0.0	0.0						
Lane LOS	B	B										
Approach Delay (s)	10.9	14.3	0.0		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			44.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2020 Existing Sc2> AM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗		
Traffic Volume (veh/h)	39	110	39	15	53	4
Future Volume (Veh/h)	39	110	39	15	53	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)	42	120	42	16	58	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			162		202	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			162		202	102
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			97		92	100
cM capacity (veh/h)			1399		750	959
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	162	58	62			
Volume Left	0	42	58			
Volume Right	120	0	4			
cSH	1700	1399	761			
Volume to Capacity	0.10	0.03	0.08			
Queue Length 95th (m)	0.0	0.7	2.0			
Control Delay (s)	0.0	5.6	10.2			
Lane LOS			A	B		
Approach Delay (s)	0.0	5.6	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			26.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road























<2020 Existing Sc2> AM Peak Hour
 05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	0	1	0	0	52	1	93	2	22	59	2
Future Volume (vph)	2	0	1	0	0	52	1	93	2	22	59	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	1	0	0	57	1	101	2	24	64	2
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	3	57	104	90								
Volume Left (vph)	2	0	1	24								
Volume Right (vph)	1	57	2	2								
Hadj (s)	0.50	-0.53	0.01	0.18								
Departure Headway (s)	4.9	3.8	4.1	4.3								
Degree Utilization, x	0.00	0.06	0.12	0.11								
Capacity (veh/h)	701	899	849	818								
Control Delay (s)	7.9	7.0	7.7	7.8								
Approach Delay (s)	7.9	7.0	7.7	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			22.1%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2020 Existing Sc2> AM Peak Hour

05/28/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	9	7	133	29	109	23	406	231	80	285	20
Future Volume (vph)	11	9	7	133	29	109	23	406	231	80	285	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1522		1437	1469		1492	1697	1274	1506	1667	
Fl _t Permitted	0.58	1.00		0.75	1.00		0.56	1.00	1.00	0.40	1.00	
Satd. Flow (perm)	872	1522		1128	1469		880	1697	1274	631	1667	
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	10	8	145	32	118	25	441	251	87	310	22
RTOR Reduction (vph)	0	6	0	0	90	0	0	0	104	0	2	0
Lane Group Flow (vph)	12	12	0	145	60	0	25	441	147	87	330	0
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	21.2	21.2		21.2	21.2		55.0	55.0	55.0	64.3	64.3	
Effective Green, g (s)	24.2	24.2		24.2	24.2		58.7	58.7	58.7	64.3	68.0	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.59	0.59	0.59	0.64	0.68	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	210	367		272	354		515	994	746	459	1131	
v/s Ratio Prot		0.01			0.04			c0.26		0.01	c0.20	
v/s Ratio Perm	0.01			c0.13			0.03		0.12	0.11		
v/c Ratio	0.06	0.03		0.53	0.17		0.05	0.44	0.20	0.19	0.29	
Uniform Delay, d ₁	29.2	29.1		33.1	30.1		8.8	11.6	9.7	7.7	6.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		2.0	0.2		0.2	1.4	0.6	0.2	0.7	
Delay (s)	29.3	29.1		35.1	30.3		9.0	13.0	10.3	7.9	7.1	
Level of Service	C	C		D	C		A	B	B	A	A	
Approach Delay (s)		29.2			32.6			11.9			7.3	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.1				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			100.2				Sum of lost time (s)				11.0	
Intersection Capacity Utilization			60.9%				ICU Level of Service				B	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2020 Existing Sc2> AM Peak Hour

05/28/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	23	257	11	36	232	90	25	98	50	76	24	12	
Future Volume (vph)	23	257	11	36	232	90	25	98	50	76	24	12	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0		
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	1.00	0.85	1.00	0.95		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1581	1648	1471	1596	1588	1471	1644	1713	1471	1644	1601		
Flt Permitted	0.54	1.00	1.00	0.50	1.00	1.00	0.73	1.00	1.00	0.69	1.00		
Satd. Flow (perm)	895	1648	1471	846	1588	1471	1266	1713	1471	1191	1601		
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)	25	279	12	39	252	98	27	107	54	83	26	13	
RTOR Reduction (vph)	0	0	8	0	0	62	0	0	28	0	6	0	
Lane Group Flow (vph)	25	279	4	39	252	36	27	107	26	83	33	0	
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	20.2	20.2	20.2	20.2	20.2	20.2	30.0	30.0	30.0	30.0	30.0		
Effective Green, g (s)	23.2	23.2	23.2	23.2	23.2	23.2	32.0	32.0	30.0	32.0	32.0		
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.37	0.37	0.51	0.51	0.47	0.51	0.51		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	328	604	539	310	582	539	641	867	698	603	810		
v/s Ratio Prot		c0.17			0.16			0.06			0.02		
v/s Ratio Perm	0.03		0.00	0.05		0.02	0.02		0.02	c0.07			
v/c Ratio	0.08	0.46	0.01	0.13	0.43	0.07	0.04	0.12	0.04	0.14	0.04		
Uniform Delay, d1	13.0	15.2	12.7	13.3	15.1	13.0	7.9	8.2	8.9	8.3	7.9		
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	0.1	0.6	0.0	0.2	0.5	0.1	0.1	0.3	0.1	0.5	0.1		
Delay (s)	13.1	15.8	12.7	13.5	15.6	13.0	8.0	8.5	9.0	8.8	8.0		
Level of Service	B	B	B	B	B	B	A	A	A	A	A		
Approach Delay (s)		15.5			14.7			8.6			8.5		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay			13.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.27										
Actuated Cycle Length (s)			63.2									Sum of lost time (s)	8.0
Intersection Capacity Utilization			51.7%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2020 Existing Sc2> AM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	58	278	239	47	25	23
Future Volume (Veh/h)	58	278	239	47	25	23
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)	63	302	260	51	27	25
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	311				688	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	311				688	260
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	95				93	97
cM capacity (veh/h)	1233				377	784
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	63	302	260	51	27	25
Volume Left	63	0	0	0	27	0
Volume Right	0	0	0	51	0	25
cSH	1233	1700	1700	1700	377	784
Volume to Capacity	0.05	0.18	0.15	0.03	0.07	0.03
Queue Length 95th (m)	1.2	0.0	0.0	0.0	1.7	0.8
Control Delay (s)	8.1	0.0	0.0	0.0	15.3	9.7
Lane LOS	A				C	A
Approach Delay (s)	1.4		0.0		12.6	
Approach LOS					B	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			30.5%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2020 Existing Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	5	47	2	3	0	102	0	4	0	1	7
Future Volume (Veh/h)	1	5	47	2	3	0	102	0	4	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	5	51	2	3	0	111	0	4	0	1	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	3			56			48	40	30	44	65	3
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			56			48	40	30	44	65	3
tC, single (s)	4.1			4.6			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			88	100	100	100	100	99
cM capacity (veh/h)	1632			1291			933	855	1050	959	828	1087
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	57	5	115	9								
Volume Left	1	2	111	0								
Volume Right	51	0	4	8								
cSH	1632	1291	937	1050								
Volume to Capacity	0.00	0.00	0.12	0.01								
Queue Length 95th (m)	0.0	0.0	3.2	0.2								
Control Delay (s)	0.1	3.1	9.4	8.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	3.1	9.4	8.5								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			23.2%	ICU Level of Service	A							
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2020 Existing Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	156	4	5	66
Future Volume (Veh/h)	11	17	156	4	5	66
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)	12	18	170	4	5	72
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	254	172			174	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	254	172			174	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	736	877			1415	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	174	77			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	815	1700	1415			
Volume to Capacity	0.04	0.10	0.00			
Queue Length 95th (m)	0.9	0.0	0.1			
Control Delay (s)	9.6	0.0	0.5			
Lane LOS	A		A			
Approach Delay (s)	9.6	0.0	0.5			
Approach LOS	A					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2020 Existing Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	143	4	5	72
Future Volume (Veh/h)	11	17	143	4	5	72
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)	12	18	155	4	5	78
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	245	157			159	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	245	157			159	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	745	894			1433	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	159	83			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	828	1700	1433			
Volume to Capacity	0.04	0.09	0.00			
Queue Length 95th (m)	0.9	0.0	0.1			
Control Delay (s)	9.5	0.0	0.5			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	0.5			
Approach LOS	A					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			18.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2020 Existing Sc2> PM Peak Hour
05/28/2020





















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (veh/h)	91	78	1	45	95	21
Future Volume (Veh/h)	91	78	1	45	95	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)	99	85	1	49	103	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			184		192	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			184		192	142
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		87	97
cM capacity (veh/h)			1403		785	912
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	184	50	126			
Volume Left	0	1	103			
Volume Right	85	0	23			
cSH	1700	1403	805			
Volume to Capacity	0.11	0.00	0.16			
Queue Length 95th (m)	0.0	0.0	4.2			
Control Delay (s)	0.0	0.2	10.3			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.2	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			24.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2020 Existing Sc2> PM Peak Hour

05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	71	0	0	99	0	423	39	0	532	79
Future Volume (Veh/h)	0	0	71	0	0	99	0	423	39	0	532	79
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	77	0	0	108	0	460	42	0	578	86
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	1146	1080	578	1038	1038	460	578			502		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1146	1080	578	1038	1038	460	578			502		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	85	100	100	82	100			100		
cM capacity (veh/h)	146	220	508	179	233	601	1006			1073		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	77	108	460	42	578	86						
Volume Left	0	0	0	0	0	0						
Volume Right	77	108	0	42	0	86						
cSH	508	601	1700	1700	1700	1700						
Volume to Capacity	0.15	0.18	0.27	0.02	0.34	0.05						
Queue Length 95th (m)	4.0	4.9	0.0	0.0	0.0	0.0						
Control Delay (s)	13.3	12.3	0.0	0.0	0.0	0.0						
Lane LOS	B	B										
Approach Delay (s)	13.3	12.3	0.0		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			41.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

















<2020 Existing Sc2> PM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	42	74	32	11	39	3
Future Volume (Veh/h)	42	74	32	11	39	3
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)	46	80	35	12	42	3
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			126		168	86
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			126		168	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 %			98		95	100
cM capacity (veh/h)			1473		801	978
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	126	47	45			
Volume Left	0	35	42			
Volume Right	80	0	3			
cSH	1700	1473	810			
Volume to Capacity	0.07	0.02	0.06			
Queue Length 95th (m)	0.0	0.6	1.3			
Control Delay (s)	0.0	5.6	9.7			
Lane LOS			A			
Approach Delay (s)	0.0	5.6	9.7			
Approach LOS			A			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			























HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2020 Existing Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	0	0	0	0	37	0	58	1	44	134	1
Future Volume (vph)	1	0	0	0	0	37	0	58	1	44	134	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	0	0	40	0	63	1	48	146	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	1	40	64	195								
Volume Left (vph)	1	0	0	48								
Volume Right (vph)	0	40	1	1								
Hadj (s)	0.20	-0.46	-0.01	0.05								
Departure Headway (s)	4.7	4.0	4.2	4.1								
Degree Utilization, x	0.00	0.04	0.07	0.22								
Capacity (veh/h)	709	844	839	866								
Control Delay (s)	7.7	7.2	7.5	8.3								
Approach Delay (s)	7.7	7.2	7.5	8.3								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.0									
Level of Service			A									
Intersection Capacity Utilization			27.4%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2020 Existing Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	26	16	212	7	84	2	360	169	140	494	14
Future Volume (vph)	32	26	16	212	7	84	2	360	169	140	494	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.94		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1632		1506	1426		1552	1713	1335	1506	1704	
Flt Permitted	0.68	1.00		0.73	1.00		0.46	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	1117	1632		1154	1426		747	1713	1335	659	1704	
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)	35	28	17	230	8	91	2	391	184	152	537	15
RTOR Reduction (vph)	0	13	0	0	67	0	0	0	84	0	1	0
Lane Group Flow (vph)	35	32	0	230	32	0	2	391	100	152	551	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.2	23.2		23.2	23.2		51.2	51.2	51.2	63.0	63.0	
Effective Green, g (s)	26.2	26.2		26.2	26.2		54.9	54.9	54.9	63.0	66.7	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.54	0.54	0.54	0.62	0.66	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	290	423		299	370		406	932	726	485	1126	
v/s Ratio Prot		0.02			0.02			0.23		0.03	c0.32	
v/s Ratio Perm	0.03			c0.20			0.00		0.07	0.17		
v/c Ratio	0.12	0.08		0.77	0.09		0.00	0.42	0.14	0.31	0.49	
Uniform Delay, d1	28.5	28.2		34.6	28.3		10.5	13.6	11.3	8.8	8.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1		11.3	0.1		0.0	1.4	0.4	0.4	1.5	
Delay (s)	28.7	28.3		45.8	28.4		10.5	15.0	11.7	9.1	10.1	
Level of Service	C	C		D	C		B	B	B	A	B	
Approach Delay (s)		28.5			40.6			13.9			9.9	
Approach LOS		C			D			B			A	

























Intersection Summary		
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.59	B
Actuated Cycle Length (s)	100.9	Sum of lost time (s)
Intersection Capacity Utilization	75.2%	11.0
Analysis Period (min)	15	ICU Level of Service
		D

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2020 Existing Sc2> PM Peak Hour

05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	257	40	67	281	116	23	39	32	79	94	39
Future Volume (vph)	36	257	40	67	281	116	23	39	32	79	94	39
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	0.96
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1596	1648	1471	1644	1633	1456	1640	1731	1471	1644	1629	1629
Flt Permitted	0.47	1.00	1.00	0.51	1.00	1.00	0.67	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	797	1648	1471	876	1633	1456	1148	1731	1471	1263	1629	1629
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)	39	279	43	73	305	126	25	42	35	86	102	42
RTOR Reduction (vph)	0	0	27	0	0	79	0	0	17	0	14	0
Lane Group Flow (vph)	39	279	16	73	305	47	25	42	18	86	130	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	20.9	20.9	20.9	20.9	20.9	20.9	30.0	30.0	30.0	30.0	30.0	30.0
Effective Green, g (s)	23.9	23.9	23.9	23.9	23.9	23.9	32.0	32.0	32.0	32.0	32.0	32.0
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.37	0.37	0.50	0.50	0.50	0.50	0.50	0.50
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	616	550	327	610	544	574	866	736	632	815	815
v/s Ratio Prot		0.17			c0.19			0.02				c0.08
v/s Ratio Perm	0.05		0.01	0.08		0.03	0.02		0.01	0.07		
v/c Ratio	0.13	0.45	0.03	0.22	0.50	0.09	0.04	0.05	0.02	0.14	0.16	0.16
Uniform Delay, d1	13.2	15.1	12.7	13.7	15.4	12.9	8.1	8.2	8.1	8.5	8.7	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.5	0.0	0.3	0.6	0.1	0.1	0.1	0.1	0.4	0.4	0.4
Delay (s)	13.4	15.6	12.7	14.0	16.0	13.0	8.3	8.3	8.1	9.0	9.1	9.1
Level of Service	B	B	B	B	B	B	A	A	A	A	A	A
Approach Delay (s)		15.0			15.0			8.2			9.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			13.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			63.9			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			64.1%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2020 Existing Sc2> PM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	44	317	277	24	60	19
Future Volume (Veh/h)	44	317	277	24	60	19
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)	48	345	301	26	65	21
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	327				742	301
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	327				742	301
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				82	97
cM capacity (veh/h)	1216				368	743
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	48	345	301	26	65	21
Volume Left	48	0	0	0	65	0
Volume Right	0	0	0	26	0	21
cSH	1216	1700	1700	1700	368	743
Volume to Capacity	0.04	0.20	0.18	0.02	0.18	0.03
Queue Length 95th (m)	0.9	0.0	0.0	0.0	4.8	0.7
Control Delay (s)	8.1	0.0	0.0	0.0	16.9	10.0
Lane LOS	A				C	A
Approach Delay (s)	1.0		0.0		15.2	
Approach LOS					C	
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			32.8%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2020 Existing Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	5	77	3	7	0	65	2	6	0	1	1
Future Volume (Veh/h)	3	5	77	3	7	0	65	2	6	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	84	3	8	0	71	2	7	0	1	1
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	8			89			68	67	47	75	109	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			89			68	67	47	75	109	8
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			92	100	99	100	100	100
cM capacity (veh/h)	1432			1519			912	824	1028	909	782	1080
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	92	11	80	2								
Volume Left	3	3	71	0								
Volume Right	84	0	7	1								
cSH	1432	1519	919	907								
Volume to Capacity	0.00	0.00	0.09	0.00								
Queue Length 95th (m)	0.0	0.0	2.2	0.1								
Control Delay (s)	0.3	2.0	9.3	9.0								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.3	2.0	9.3	9.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			23.5%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2020 Existing Sc2> PM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	83	12	19	182
Future Volume (Veh/h)	8	11	83	12	19	182
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)	9	12	90	13	21	198
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	336	96			103	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	336	96			103	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	654	965			1502	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	103	219			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	802	1700	1502			
Volume to Capacity	0.03	0.06	0.01			
Queue Length 95th (m)	0.6	0.0	0.3			
Control Delay (s)	9.6	0.0	0.8			
Lane LOS	A		A			
Approach Delay (s)	9.6	0.0	0.8			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization		28.2%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2020 Existing Sc2> PM Peak Hour
05/28/2020











						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	84	12	19	171
Future Volume (Veh/h)	8	11	84	12	19	171
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)	9	12	91	13	21	186
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	326	98			104	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	326	98			104	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	663	964			1500	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	104	207			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	807	1700	1500			
Volume to Capacity	0.03	0.06	0.01			
Queue Length 95th (m)	0.6	0.0	0.3			
Control Delay (s)	9.6	0.0	0.9			
Lane LOS	A		A			
Approach Delay (s)	9.6	0.0	0.9			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			27.6%	ICU Level of Service		A
Analysis Period (min)			15			

C-3 *2027 FUTURE*

BACKGROUND SCT



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2027 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	123	69	19	100	40	14
Future Volume (Veh/h)	123	69	19	100	40	14
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)	134	75	21	109	43	15
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			209		322	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			209		322	172
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		93	98
cM capacity (veh/h)			1374		649	877
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	209	130	58			
Volume Left	0	21	43			
Volume Right	75	0	15			
cSH	1700	1374	696			
Volume to Capacity	0.12	0.02	0.08			
Queue Length 95th (m)	0.0	0.4	2.1			
Control Delay (s)	0.0	1.3	10.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.3	10.6			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			31.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	81	0	0	85	0	654	79	0	385	47
Future Volume (Veh/h)	0	0	81	0	0	85	0	654	79	0	385	47
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	88	0	0	92	0	711	86	0	418	51
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	1221	1215	418	1129	1129	711	418			797		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1221	1215	418	1129	1129	711	418			797		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	86	100	100	79	100			100		
cM capacity (veh/h)	125	183	620	157	206	433	1152			834		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	88	92	711	86	418	51						
Volume Left	0	0	0	0	0	0						
Volume Right	88	92	0	86	0	51						
cSH	620	433	1700	1700	1700	1700						
Volume to Capacity	0.14	0.21	0.42	0.05	0.25	0.03						
Queue Length 95th (m)	3.7	6.0	0.0	0.0	0.0	0.0						
Control Delay (s)	11.8	15.5	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	11.8	15.5	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			49.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road













<2027 FB Sc1> AM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	68	72	14	43	77	10
Future Volume (Veh/h)	68	72	14	43	77	10
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)	74	78	15	47	84	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		190	113
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		190	113
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		89	99
cM capacity (veh/h)			1441		784	945
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	152	62	95			
Volume Left	0	15	84			
Volume Right	78	0	11			
cSH	1700	1441	800			
Volume to Capacity	0.09	0.01	0.12			
Queue Length 95th (m)	0.0	0.2	3.1			
Control Delay (s)	0.0	1.9	10.1			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.9	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			27.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Future Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	10	21	0	28	84	64	161	0	20	61	73
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	93	112	225	154								
Volume Left (vph)	62	0	64	20								
Volume Right (vph)	21	84	0	73								
Hadj (s)	0.06	-0.39	0.07	-0.21								
Departure Headway (s)	5.0	4.5	4.7	4.5								
Degree Utilization, x	0.13	0.14	0.29	0.19								
Capacity (veh/h)	654	721	737	753								
Control Delay (s)	8.7	8.3	9.6	8.5								
Approach Delay (s)	8.7	8.3	9.6	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.9									
Level of Service			A									
Intersection Capacity Utilization			41.4%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FB Sc1> AM Peak Hour

06/17/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	9	7	117	19	132	16	466	283	57	329	17
Future Volume (vph)	19	9	7	117	19	132	16	466	283	57	329	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.93		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1615		1424	1491		1552	1731	1375	1521	1702	
Flt Permitted	0.55	1.00		0.75	1.00		0.54	1.00	1.00	0.36	1.00	
Satd. Flow (perm)	904	1615		1117	1491		879	1731	1375	571	1702	
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)	21	10	8	127	21	143	17	507	308	62	358	18
RTOR Reduction (vph)	0	6	0	0	109	0	0	0	125	0	2	0
Lane Group Flow (vph)	21	12	0	127	55	0	17	507	183	62	374	0
Heavy Vehicles (%)	0%	0%	0%	9%	0%	1%	0%	0%	1%	2%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	20.9	20.9		20.9	20.9		56.0	56.0	56.0	64.7	64.7	
Effective Green, g (s)	23.9	23.9		23.9	23.9		59.7	59.7	59.7	64.7	68.4	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.60	0.60	0.60	0.65	0.68	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	215	384		266	355		523	1030	818	422	1160	
v/s Ratio Prot		0.01			0.04			c0.29		0.01	c0.22	
v/s Ratio Perm	0.02			c0.11			0.02		0.13	0.09		
v/c Ratio	0.10	0.03		0.48	0.16		0.03	0.49	0.22	0.15	0.32	
Uniform Delay, d1	29.8	29.3		32.8	30.2		8.4	11.6	9.5	7.8	6.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.0		1.4	0.2		0.1	1.7	0.6	0.2	0.7	
Delay (s)	30.0	29.3		34.2	30.4		8.5	13.3	10.1	8.0	7.2	
Level of Service	C	C		C	C		A	B	B	A	A	
Approach Delay (s)		29.7			32.1			12.0			7.3	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.8				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			100.3			Sum of lost time (s)				11.0		
Intersection Capacity Utilization			63.7%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FB Sc1> AM Peak Hour

06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	64	320	7	69	234	113	22	139	147	107	53	15	
Future Volume (vph)	64	320	7	69	234	113	22	139	147	107	53	15	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1588	1290	1581	1545	1414	1337	1680	1442	1628	1580		
Flt Permitted	0.54	1.00	1.00	0.43	1.00	1.00	0.71	1.00	1.00	0.66	1.00		
Satd. Flow (perm)	932	1588	1290	710	1545	1414	997	1680	1442	1133	1580		
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)	70	348	8	75	254	123	24	151	160	116	58	16	
RTOR Reduction (vph)	0	0	5	0	0	76	0	0	81	0	8	0	
Lane Group Flow (vph)	70	348	3	75	254	47	24	151	79	116	66	0	
Heavy Vehicles (%)	0%	9%	14%	4%	12%	4%	23%	3%	2%	1%	4%	13%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	21.7	21.7	21.7	21.7	21.7	21.7	30.1	30.1	30.1	30.1	30.1		
Effective Green, g (s)	24.7	24.7	24.7	24.7	24.7	24.7	32.1	32.1	32.1	32.1	32.1		
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.50	0.50	0.50	0.50		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	355	605	491	270	588	538	493	832	714	561	782		
v/s Ratio Prot		c0.22			0.16			0.09			0.04		
v/s Ratio Perm	0.08		0.00	0.11		0.03	0.02		0.05	c0.10			
v/c Ratio	0.20	0.58	0.01	0.28	0.43	0.09	0.05	0.18	0.11	0.21	0.08		
Uniform Delay, d1	13.4	15.9	12.4	13.9	14.9	12.8	8.5	9.1	8.7	9.2	8.6		
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	0.3	1.3	0.0	0.6	0.5	0.1	0.2	0.5	0.3	0.8	0.2		
Delay (s)	13.7	17.2	12.4	14.4	15.4	12.9	8.6	9.5	9.0	10.0	8.8		
Level of Service	B	B	B	B	B	B	A	A	A	B	A		
Approach Delay (s)		16.6			14.5			9.2			9.6		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay			13.2									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.37										
Actuated Cycle Length (s)			64.8									Sum of lost time (s)	8.0
Intersection Capacity Utilization			65.0%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FB Sc1> AM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	102	307	288	54	28	32
Future Volume (Veh/h)	102	307	288	54	28	32
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)	111	334	313	59	30	35
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	372				869	313
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	372				869	313
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	91				90	95
cM capacity (veh/h)	1192				295	718
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	111	334	313	59	30	35
Volume Left	111	0	0	0	30	0
Volume Right	0	0	0	59	0	35
cSH	1192	1700	1700	1700	295	718
Volume to Capacity	0.09	0.20	0.18	0.03	0.10	0.05
Queue Length 95th (m)	2.3	0.0	0.0	0.0	2.6	1.2
Control Delay (s)	8.3	0.0	0.0	0.0	18.6	10.3
Lane LOS	A				C	B
Approach Delay (s)	2.1		0.0		14.1	
Approach LOS					B	
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			35.9%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	66	2	5	1	141	4	6	1	3	8
Future Volume (Veh/h)	4	6	66	2	5	1	141	4	6	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	72	2	5	1	153	4	7	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			79			71	61	43	70	96	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			79			71	61	43	70	96	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			83	100	99	100	100	99
cM capacity (veh/h)	1628			1532			909	831	1033	915	683	981
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	83	8	164	13								
Volume Left	4	2	153	1								
Volume Right	72	1	7	9								
cSH	1628	1532	911	887								
Volume to Capacity	0.00	0.00	0.18	0.01								
Queue Length 95th (m)	0.1	0.0	5.0	0.3								
Control Delay (s)	0.4	1.8	9.8	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.4	1.8	9.8	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.6									
Intersection Capacity Utilization			27.7%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	291	4	5	124
Future Volume (Veh/h)	11	17	291	4	5	124
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)	12	18	316	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	463	318			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	463	318			320	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	559	727			1251	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	320	140			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	649	1700	1251			
Volume to Capacity	0.05	0.19	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.8	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			26.9%	ICU Level of Service		A
Analysis Period (min)			15			

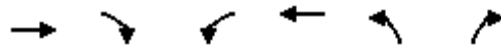
HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2027 FB Sc1> AM Peak Hour
06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	278	4	5	130
Future Volume (Veh/h)	11	17	278	4	5	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)	12	18	302	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	455	304			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	455	304			306	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	565	740			1266	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	306	146			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	658	1700	1266			
Volume to Capacity	0.05	0.18	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.7	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.7	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			26.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road



















<2027 FB Sc1> PM Peak Hour
06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶		
Traffic Volume (veh/h)	132	85	15	98	96	20
Future Volume (Veh/h)	132	85	15	98	96	20
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)	143	92	16	107	104	22
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			235		328	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			235		328	189
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		84	97
cM capacity (veh/h)			1344		656	858
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	235	123	126			
Volume Left	0	16	104			
Volume Right	92	0	22			
cSH	1700	1344	685			
Volume to Capacity	0.14	0.01	0.18			
Queue Length 95th (m)	0.0	0.3	5.1			
Control Delay (s)	0.0	1.1	11.4			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.1	11.4			
Approach LOS			B			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			33.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	91	0	0	85	0	555	62	0	679	110
Future Volume (Veh/h)	0	0	91	0	0	85	0	555	62	0	679	110
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	99	0	0	92	0	603	67	0	738	120
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	1433	1408	738	1341	1341	603	738			670		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1433	1408	738	1341	1341	603	738			670		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	76	100	100	81	100			100		
cM capacity (veh/h)	92	140	421	100	154	493	877			930		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	99	92	603	67	738	120						
Volume Left	0	0	0	0	0	0						
Volume Right	99	92	0	67	0	120						
cSH	421	493	1700	1700	1700	1700						
Volume to Capacity	0.24	0.19	0.35	0.04	0.43	0.07						
Queue Length 95th (m)	6.9	5.2	0.0	0.0	0.0	0.0						
Control Delay (s)	16.2	14.0	0.0	0.0	0.0	0.0						
Lane LOS	C	B										
Approach Delay (s)	16.2	14.0	0.0		0.0							
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			51.6%		ICU Level of Service				A			
Analysis Period (min)			15									













HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2027 FB Sc1> PM Peak Hour
 06/17/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (veh/h)	90	63	25	60	53	16
Future Volume (Veh/h)	90	63	25	60	53	16
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)	98	68	27	65	58	17
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			166			251 132
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			166			251 132
tC, single (s)			4.1			6.5 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.6 3.3
p0 queue free %			98			92 98
cM capacity (veh/h)			1424			711 923
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	166	92	75			
Volume Left	0	27	58			
Volume Right	68	0	17			
cSH	1700	1424	750			
Volume to Capacity	0.10	0.02	0.10			
Queue Length 95th (m)	0.0	0.4	2.5			
Control Delay (s)	0.0	2.3	10.3			
Lane LOS			A	B		
Approach Delay (s)	0.0	2.3	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			28.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Future Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	29	65	0	21	54	38	98	0	86	167	68
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	174	75	136	321								
Volume Left (vph)	80	0	38	86								
Volume Right (vph)	65	54	0	68								
Hadj (s)	-0.12	-0.43	0.07	-0.06								
Departure Headway (s)	5.0	4.9	5.0	4.7								
Degree Utilization, x	0.24	0.10	0.19	0.42								
Capacity (veh/h)	658	655	666	733								
Control Delay (s)	9.6	8.4	9.2	11.0								
Approach Delay (s)	9.6	8.4	9.2	11.0								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			10.0									
Level of Service			B									
Intersection Capacity Utilization			46.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FB Sc1> PM Peak Hour

























06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	28	17	289	16	110	0	470	191	141	531	16
Future Volume (vph)	39	28	17	289	16	110	0	470	191	141	531	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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	1.00	
Frt	1.00	0.94		1.00	0.87			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1620		1518	1428			1731	1348	1536	1707	
Flt Permitted	0.64	1.00		0.73	1.00			1.00	1.00	0.29	1.00	
Satd. Flow (perm)	1050	1620		1160	1428			1731	1348	474	1707	
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)	42	30	18	314	17	120	0	511	208	153	577	17
RTOR Reduction (vph)	0	12	0	0	80	0	0	0	104	0	1	0
Lane Group Flow (vph)	42	36	0	314	57	0	0	511	104	153	593	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	0%	2%	0%	6%	0%	0%	3%	1%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	29.5	29.5		29.5	29.5			44.5	44.5	52.5	52.5	
Effective Green, g (s)	32.5	32.5		32.5	32.5			48.2	48.2	52.5	56.2	
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.50	0.50	0.54	0.58	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	352	544		389	479			862	671	312	992	
v/s Ratio Prot		0.02			0.04			0.30		0.03	c0.35	
v/s Ratio Perm	0.04			c0.27					0.08	0.24		
v/c Ratio	0.12	0.07		0.81	0.12			0.59	0.15	0.49	0.60	
Uniform Delay, d1	22.2	21.8		29.2	22.2			17.3	13.2	13.4	13.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1		11.6	0.1			3.0	0.5	1.2	2.7	
Delay (s)	22.4	21.8		40.9	22.3			20.3	13.7	14.6	15.7	
Level of Service	C	C		D	C			C	B	B	B	
Approach Delay (s)		22.1			35.2			18.3			15.4	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			21.2									C
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			96.7							11.0		
Intersection Capacity Utilization			93.2%									F
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FB Sc1> PM Peak Hour

06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	306	18	145	410	142	7	102	103	101	155	55
Future Volume (vph)	75	306	18	145	410	142	7	102	103	101	155	55
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1644	1602	1471	1644	1602	1456	1642	1697	1471	1596	1617	1617
Flt Permitted	0.34	1.00	1.00	0.46	1.00	1.00	0.59	1.00	1.00	0.69	1.00	1.00
Satd. Flow (perm)	594	1602	1471	797	1602	1456	1020	1697	1471	1152	1617	1617
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)	82	333	20	158	446	154	8	111	112	110	168	60
RTOR Reduction (vph)	0	0	12	0	0	90	0	0	60	0	13	0
Lane Group Flow (vph)	82	333	8	158	446	64	8	111	52	110	215	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	8%	0%	0%	8%	1%	0%	2%	0%	3%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	26.0	26.0	26.0	26.0	26.0	26.0	30.3	30.3	30.3	30.3	30.3	30.3
Effective Green, g (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.3	32.3	32.3	32.3	32.3	32.3
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42	0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	248	670	615	333	670	609	475	790	685	536	753	753
v/s Ratio Prot		0.21			c0.28			0.07				c0.13
v/s Ratio Perm	0.14		0.01	0.20		0.04	0.01		0.04	0.10		
v/c Ratio	0.33	0.50	0.01	0.47	0.67	0.11	0.02	0.14	0.08	0.21	0.29	0.29
Uniform Delay, d1	13.6	14.8	11.8	14.6	16.2	12.3	10.0	10.6	10.2	10.9	11.4	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.6	0.0	1.1	2.5	0.1	0.1	0.4	0.2	0.9	1.0	1.0
Delay (s)	14.4	15.4	11.8	15.7	18.7	12.3	10.0	10.9	10.5	11.8	12.3	12.3
Level of Service	B	B	B	B	B	B	B	B	B	B	B	B
Approach Delay (s)		15.0			16.8			10.7				12.2
Approach LOS		B			B			B				B
Intersection Summary												
HCM 2000 Control Delay			14.7									B
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			69.3							8.0		
Intersection Capacity Utilization			67.6%									C
ICU Level of Service												
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FB Sc1> PM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	329	357	40	82	55
Future Volume (Veh/h)	65	329	357	40	82	55
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)	71	358	388	43	89	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)						
pX, platoon unblocked						
vC, conflicting volume	431				888	388
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	431				888	388
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				70	91
cM capacity (veh/h)	1129				297	665
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	71	358	388	43	89	60
Volume Left	71	0	0	0	89	0
Volume Right	0	0	0	43	0	60
cSH	1129	1700	1700	1700	297	665
Volume to Capacity	0.06	0.21	0.23	0.03	0.30	0.09
Queue Length 95th (m)	1.5	0.0	0.0	0.0	9.3	2.3
Control Delay (s)	8.4	0.0	0.0	0.0	22.2	11.0
Lane LOS	A				C	B
Approach Delay (s)	1.4		0.0		17.7	
Approach LOS					C	
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			39.2%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	8	126	7	13	0	101	0	6	1	3	6
Future Volume (Veh/h)	2	8	126	7	13	0	101	0	6	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	9	137	8	14	0	110	0	7	1	3	7
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	14			146			120	112	78	118	180	14
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			146			120	112	78	118	180	14
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			87	100	99	100	100	99
cM capacity (veh/h)	1617			1448			840	777	989	852	713	1072
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	148	22	117	11								
Volume Left	2	8	110	1								
Volume Right	137	0	7	7								
cSH	1617	1448	848	923								
Volume to Capacity	0.00	0.01	0.14	0.01								
Queue Length 95th (m)	0.0	0.1	3.6	0.3								
Control Delay (s)	0.1	2.8	9.9	8.9								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	2.8	9.9	8.9								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			28.9%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	201	12	19	299
Future Volume (Veh/h)	8	11	201	12	19	299
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)	9	12	218	13	21	325
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	592	224			231	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	592	224			231	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	465	820			1349	
Direction, Lane #						
	WB 1	NB 1	SB 1			
Volume Total	21	231	346			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	618	1700	1349			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			43.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2027 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	202	12	19	288
Future Volume (Veh/h)	8	11	202	12	19	288
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)	9	12	220	13	21	313
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	582	226			233	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	226			233	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	471	818			1346	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	233	334			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	622	1700	1346			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		43.3%		ICU Level of Service		A
Analysis Period (min)		15				

***C-4 2027 FUTURE
BACKGROUND SC2***

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2027 FB Sc2> AM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (veh/h)	141	51	2	76	53	51
Future Volume (Veh/h)	141	51	2	76	53	51
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)	153	55	2	83	58	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			208		268	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			208		268	180
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		92	94
cM capacity (veh/h)			1375		698	857
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	208	85	113			
Volume Left	0	2	58			
Volume Right	55	0	55			
cSH	1700	1375	767			
Volume to Capacity	0.12	0.00	0.15			
Queue Length 95th (m)	0.0	0.0	3.9			
Control Delay (s)	0.0	0.2	10.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.2	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	55	0	0	170	0	568	64	0	391	115
Future Volume (Veh/h)	0	0	55	0	0	170	0	568	64	0	391	115
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	60	0	0	185	0	617	70	0	425	125
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	1227	1112	425	1042	1042	617	425			687		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1227	1112	425	1042	1042	617	425			687		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	90	100	100	62	100			100		
cM capacity (veh/h)	97	211	610	189	232	484	1145			916		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	60	185	617	70	425	125						
Volume Left	0	0	0	0	0	0						
Volume Right	60	185	0	70	0	125						
cSH	610	484	1700	1700	1700	1700						
Volume to Capacity	0.10	0.38	0.36	0.04	0.25	0.07						
Queue Length 95th (m)	2.5	13.4	0.0	0.0	0.0	0.0						
Control Delay (s)	11.5	16.9	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	11.5	16.9	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			50.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

















<2027 FB Sc2> AM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	78	126	56	17	61	5
Future Volume (Veh/h)	78	126	56	17	61	5
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)	85	137	61	18	66	5
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			222		294	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			222		294	154
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			95		90	99
cM capacity (veh/h)			1335		656	898
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	222	79	71			
Volume Left	0	61	66			
Volume Right	137	0	5			
cSH	1700	1335	668			
Volume to Capacity	0.13	0.05	0.11			
Queue Length 95th (m)	0.0	1.1	2.7			
Control Delay (s)	0.0	6.1	11.0			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.1	11.0			
Approach LOS			B			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			31.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road























<2027 FB Sc2> AM Peak Hour
 05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	0	1	0	0	93	1	210	2	36	98	2
Future Volume (vph)	2	0	1	0	0	93	1	210	2	36	98	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	1	0	0	101	1	228	2	39	107	2
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	3	101	231	148								
Volume Left (vph)	2	0	1	39								
Volume Right (vph)	1	101	2	2								
Hadj (s)	0.50	-0.57	0.00	0.13								
Departure Headway (s)	5.4	4.2	4.3	4.5								
Degree Utilization, x	0.00	0.12	0.28	0.19								
Capacity (veh/h)	608	784	812	764								
Control Delay (s)	8.4	7.7	8.9	8.5								
Approach Delay (s)	8.4	7.7	8.9	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			36.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FB Sc2> AM Peak Hour

05/28/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	9	7	192	29	133	23	466	277	95	327	20
Future Volume (vph)	11	9	7	192	29	133	23	466	277	95	327	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1522		1464	1470		1492	1697	1285	1521	1668	
Fl _t Permitted	0.54	1.00		0.75	1.00		0.54	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	808	1522		1149	1470		845	1697	1285	550	1668	
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	10	8	209	32	145	25	507	301	103	355	22
RTOR Reduction (vph)	0	6	0	0	108	0	0	0	129	0	2	0
Lane Group Flow (vph)	12	12	0	209	69	0	25	507	172	103	375	0
Heavy Vehicles (%)	9%	11%	0%	6%	0%	4%	4%	2%	8%	2%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.6	22.6		22.6	22.6		54.0	54.0	54.0	63.7	63.7	
Effective Green, g (s)	25.6	25.6		25.6	25.6		57.7	57.7	57.7	63.7	67.4	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.57	0.57	0.57	0.63	0.67	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	204	385		291	372		482	969	734	411	1113	
v/s Ratio Prot		0.01			0.05			c0.30		0.02	c0.22	
v/s Ratio Perm	0.01			c0.18			0.03		0.13	0.14		
v/c Ratio	0.06	0.03		0.72	0.18		0.05	0.52	0.23	0.25	0.34	
Uniform Delay, d ₁	28.6	28.4		34.4	29.5		9.6	13.2	10.7	8.8	7.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		8.2	0.2		0.2	2.0	0.7	0.3	0.8	
Delay (s)	28.7	28.4		42.6	29.8		9.8	15.3	11.5	9.2	8.0	
Level of Service	C	C		D	C		A	B	B	A	A	
Approach Delay (s)		28.5			36.7			13.7			8.3	
Approach LOS		C			D			B			A	
Intersection Summary												
HCM 2000 Control Delay			17.6									B
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			101.0								11.0	
Intersection Capacity Utilization			64.9%									C
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FB Sc2> AM Peak Hour

05/28/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	26	295	28	59	266	103	76	163	118	87	48	14	
Future Volume (vph)	26	295	28	59	266	103	76	163	118	87	48	14	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1581	1648	1471	1612	1602	1471	1644	1713	1471	1644	1647		
Flt Permitted	0.49	1.00	1.00	0.46	1.00	1.00	0.71	1.00	1.00	0.65	1.00		
Satd. Flow (perm)	822	1648	1471	772	1602	1471	1234	1713	1471	1117	1647		
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)	28	321	30	64	289	112	83	177	128	95	52	15	
RTOR Reduction (vph)	0	0	19	0	0	70	0	0	64	0	7	0	
Lane Group Flow (vph)	28	321	11	64	289	42	83	177	64	95	60	0	
Heavy Vehicles (%)	4%	5%	0%	2%	8%	0%	0%	1%	0%	0%	0%	7%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2				6	
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	20.9	20.9	20.9	20.9	20.9	20.9	30.0	30.0	30.0	30.0	30.0	30.0	
Effective Green, g (s)	23.9	23.9	23.9	23.9	23.9	23.9	32.0	32.0	32.0	32.0	32.0	32.0	
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.37	0.37	0.50	0.50	0.50	0.50	0.50	0.50	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	307	616	550	288	599	550	617	857	736	559	824		
v/s Ratio Prot		c0.19			0.18			c0.10				0.04	
v/s Ratio Perm	0.03		0.01	0.08		0.03	0.07		0.04	0.09			
v/c Ratio	0.09	0.52	0.02	0.22	0.48	0.08	0.13	0.21	0.09	0.17	0.07		
Uniform Delay, d1	13.0	15.6	12.6	13.7	15.3	12.9	8.5	8.9	8.3	8.7	8.3		
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	0.1	0.8	0.0	0.4	0.6	0.1	0.5	0.5	0.2	0.7	0.2		
Delay (s)	13.1	16.3	12.6	14.0	15.9	12.9	9.0	9.4	8.6	9.4	8.4		
Level of Service	B	B	B	B	B	B	A	A	A	A	A		
Approach Delay (s)		15.8			14.9			9.0			9.0		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay			12.8									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.34										
Actuated Cycle Length (s)			63.9									Sum of lost time (s)	8.0
Intersection Capacity Utilization			64.5%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2027 FB Sc2> AM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	97	350	284	54	29	35
Future Volume (Veh/h)	97	350	284	54	29	35
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)	105	380	309	59	32	38
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	368				899	309
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368				899	309
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	91				88	95
cM capacity (veh/h)	1185				273	736
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	105	380	309	59	32	38
Volume Left	105	0	0	0	32	0
Volume Right	0	0	0	59	0	38
cSH	1185	1700	1700	1700	273	736
Volume to Capacity	0.09	0.22	0.18	0.03	0.12	0.05
Queue Length 95th (m)	2.2	0.0	0.0	0.0	3.0	1.2
Control Delay (s)	8.3	0.0	0.0	0.0	19.9	10.2
Lane LOS	A				C	B
Approach Delay (s)	1.8		0.0		14.6	
Approach LOS					B	
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			35.4%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	6	63	2	3	0	147	0	5	0	1	7
Future Volume (Veh/h)	1	6	63	2	3	0	147	0	5	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	7	68	2	3	0	160	0	5	0	1	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	3			75			58	50	41	55	84	3
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			75			58	50	41	55	84	3
tC, single (s)	4.1			4.6			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			83	100	100	100	100	99
cM capacity (veh/h)	1632			1269			924	844	1036	942	808	1087
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	5	165	9								
Volume Left	1	2	160	0								
Volume Right	68	0	5	8								
cSH	1632	1269	927	1047								
Volume to Capacity	0.00	0.00	0.18	0.01								
Queue Length 95th (m)	0.0	0.0	4.9	0.2								
Control Delay (s)	0.1	3.1	9.7	8.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	3.1	9.7	8.5								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			27.1%	ICU Level of Service	A							
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	337	4	5	129
Future Volume (Veh/h)	11	17	337	4	5	129
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)	12	18	366	4	5	140
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	518	368			370	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518	368			370	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			100	
cM capacity (veh/h)	519	682			1200	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	370	145			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	606	1700	1200			
Volume to Capacity	0.05	0.22	0.00			
Queue Length 95th (m)	1.2	0.0	0.1			
Control Delay (s)	11.3	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.3	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			29.5%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2027 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	322	4	5	136
Future Volume (Veh/h)	11	17	322	4	5	136
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)	12	18	350	4	5	148
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	510	352			354	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510	352			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 %	98	97			100	
cM capacity (veh/h)	525	696			1216	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	354	153			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	616	1700	1216			
Volume to Capacity	0.05	0.21	0.00			
Queue Length 95th (m)	1.2	0.0	0.1			
Control Delay (s)	11.1	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.1	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			28.7%		ICU Level of Service	A
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2027 FB Sc2> PM Peak Hour
 05/28/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	105	90	1	52	109	45
Future Volume (Veh/h)	105	90	1	52	109	45
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)	114	98	1	57	118	49
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			212		222	163
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			212		222	163
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		84	94
cM capacity (veh/h)			1370		757	887
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	212	58	167			
Volume Left	0	1	118			
Volume Right	98	0	49			
cSH	1700	1370	791			
Volume to Capacity	0.12	0.00	0.21			
Queue Length 95th (m)	0.0	0.0	6.0			
Control Delay (s)	0.0	0.1	10.8			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.1	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			28.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	82	0	0	150	0	489	45	0	615	112
Future Volume (Veh/h)	0	0	82	0	0	150	0	489	45	0	615	112
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	89	0	0	163	0	532	49	0	668	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)												
pX, platoon unblocked												
vC, conflicting volume	1363	1249	668	1200	1200	532	668			581		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1363	1249	668	1200	1200	532	668			581		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	80	100	100	70	100			100		
cM capacity (veh/h)	89	175	453	131	187	549	931			1003		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	89	163	532	49	668	122						
Volume Left	0	0	0	0	0	0						
Volume Right	89	163	0	49	0	122						
cSH	453	549	1700	1700	1700	1700						
Volume to Capacity	0.20	0.30	0.31	0.03	0.39	0.07						
Queue Length 95th (m)	5.5	9.4	0.0	0.0	0.0	0.0						
Control Delay (s)	14.9	14.3	0.0	0.0	0.0	0.0						
Lane LOS	B	B										
Approach Delay (s)	14.9	14.3	0.0		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			47.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

















<2027 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (veh/h)	69	85	73	13	45	3
Future Volume (Veh/h)	69	85	73	13	45	3
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)	75	92	79	14	49	3
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			167		293	121
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			167		293	121
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		93	100
cM capacity (veh/h)			1423		659	936
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	167	93	52			
Volume Left	0	79	49			
Volume Right	92	0	3			
cSH	1700	1423	671			
Volume to Capacity	0.10	0.06	0.08			
Queue Length 95th (m)	0.0	1.3	1.9			
Control Delay (s)	0.0	6.6	10.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	6.6	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			28.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Future Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	0	0	68	0	142	1	96	279	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	1	68	143	376								
Volume Left (vph)	1	0	0	96								
Volume Right (vph)	0	68	1	1								
Hadj (s)	0.20	-0.52	0.00	0.05								
Departure Headway (s)	5.4	4.5	4.4	4.3								
Degree Utilization, x	0.00	0.09	0.18	0.45								
Capacity (veh/h)	598	709	779	822								
Control Delay (s)	8.4	8.0	8.4	10.7								
Approach Delay (s)	8.4	8.0	8.4	10.7								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			9.8									
Level of Service			A									
Intersection Capacity Utilization			42.2%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FB Sc2> PM Peak Hour

05/28/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	26	16	269	7	101	2	414	233	172	567	14
Future Volume (vph)	32	26	16	269	7	101	2	414	233	172	567	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.94		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1632		1506	1435		1552	1713	1348	1521	1705	
Fl _t Permitted	0.67	1.00		0.73	1.00		0.38	1.00	1.00	0.30	1.00	
Satd. Flow (perm)	1099	1632		1154	1435		625	1713	1348	478	1705	
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)	35	28	17	292	8	110	2	450	253	187	616	15
RTOR Reduction (vph)	0	11	0	0	73	0	0	0	142	0	1	0
Lane Group Flow (vph)	35	34	0	292	45	0	2	450	111	187	630	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	4%	0%	1%	3%	2%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	28.3	28.3		28.3	28.3		37.5	37.5	37.5	50.6	50.6	
Effective Green, g (s)	31.3	31.3		31.3	31.3		41.2	41.2	41.2	50.6	54.3	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.44	0.44	0.44	0.54	0.58	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	367	545		385	479		275	754	593	370	989	
v/s Ratio Prot		0.02			0.03			0.26		0.05	c0.37	
v/s Ratio Perm	0.03			c0.25			0.00		0.08	0.22		
v/c Ratio	0.10	0.06		0.76	0.09		0.01	0.60	0.19	0.51	0.64	
Uniform Delay, d ₁	21.4	21.2		27.8	21.4		14.7	19.9	16.0	13.1	13.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		8.3	0.1		0.0	3.5	0.7	1.1	3.1	
Delay (s)	21.5	21.2		36.1	21.5		14.8	23.4	16.7	14.2	16.2	
Level of Service	C	C		D	C		B	C	B	B	B	
Approach Delay (s)		21.4			31.9			20.9			15.8	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			21.1									C
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			93.6							11.0		
Intersection Capacity Utilization			82.8%									E
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FB Sc2> PM Peak Hour

05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	295	96	141	323	133	56	76	75	91	161	45
Future Volume (vph)	41	295	96	141	323	133	56	76	75	91	161	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1612	1664	1471	1644	1648	1456	1640	1731	1471	1644	1658	1658
Flt Permitted	0.43	1.00	1.00	0.46	1.00	1.00	0.60	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	722	1664	1471	797	1648	1456	1044	1731	1471	1217	1658	1658
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)	45	321	104	153	351	145	61	83	82	99	175	49
RTOR Reduction (vph)	0	0	64	0	0	89	0	0	42	0	10	0
Lane Group Flow (vph)	45	321	40	153	351	56	61	83	40	99	214	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	2%	4%	0%	0%	5%	1%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	Perm	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	22.2	22.2	22.2	22.2	22.2	22.2	30.1	30.1	30.1	30.1	30.1	30.1
Effective Green, g (s)	25.2	25.2	25.2	25.2	25.2	25.2	32.1	32.1	32.1	32.1	32.1	32.1
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.49	0.49	0.49	0.49	0.49	0.49
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	278	642	567	307	635	561	513	850	723	598	815	815
v/s Ratio Prot		0.19			c0.21			0.05				c0.13
v/s Ratio Perm	0.06		0.03	0.19		0.04	0.06		0.03	0.08		
v/c Ratio	0.16	0.50	0.07	0.50	0.55	0.10	0.12	0.10	0.06	0.17	0.26	0.26
Uniform Delay, d1	13.1	15.3	12.7	15.2	15.7	12.8	9.0	8.9	8.7	9.2	9.7	9.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.6	0.1	1.3	1.0	0.1	0.5	0.2	0.1	0.6	0.8	0.8
Delay (s)	13.4	15.9	12.7	16.5	16.7	12.9	9.4	9.1	8.8	9.8	10.5	10.5
Level of Service	B	B	B	B	B	B	A	A	A	A	B	B
Approach Delay (s)		14.9			15.8			9.1			10.3	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			13.6									B
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			65.3							8.0		
Intersection Capacity Utilization			74.3%									D
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷	↷	↶	↷
Traffic Volume (veh/h)	70	383	350	28	69	54
Future Volume (Veh/h)	70	383	350	28	69	54
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	416	380	30	75	59
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	410				948	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410				948	380
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				72	91
cM capacity (veh/h)	1143				271	671
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	76	416	380	30	75	59
Volume Left	76	0	0	0	75	0
Volume Right	0	0	0	30	0	59
cSH	1143	1700	1700	1700	271	671
Volume to Capacity	0.07	0.24	0.22	0.02	0.28	0.09
Queue Length 95th (m)	1.6	0.0	0.0	0.0	8.3	2.2
Control Delay (s)	8.4	0.0	0.0	0.0	23.3	10.9
Lane LOS	A				C	B
Approach Delay (s)	1.3		0.0		17.8	
Approach LOS					C	
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			38.4%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	6	120	3	8	0	94	2	7	0	1	1
Future Volume (Veh/h)	3	6	120	3	8	0	94	2	7	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	130	3	9	0	102	2	8	0	1	1
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	9			137			94	93	72	102	158	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			137			94	93	72	102	158	9
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			88	100	99	100	100	100
cM capacity (veh/h)	1430			1459			882	798	996	872	735	1079
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	140	12	112	2								
Volume Left	3	3	102	0								
Volume Right	130	0	8	1								
cSH	1430	1459	887	874								
Volume to Capacity	0.00	0.00	0.13	0.00								
Queue Length 95th (m)	0.0	0.0	3.3	0.1								
Control Delay (s)	0.2	1.9	9.6	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.2	1.9	9.6	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			28.3%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FB Sc2> PM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	194	12	19	376
Future Volume (Veh/h)	8	11	194	12	19	376
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)	9	12	211	13	21	409
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	668	218			224	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	668	218			224	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	420	827			1357	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	224	430			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	584	1700	1357			
Volume to Capacity	0.04	0.13	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.4	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.4	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			47.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2027 FB Sc2> PM Peak Hour
05/28/2020










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	195	12	19	363
Future Volume (Veh/h)	8	11	195	12	19	363
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)	9	12	212	13	21	395
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	656	218			225	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	656	218			225	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	427	826			1356	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	225	416			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	590	1700	1356			
Volume to Capacity	0.04	0.13	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.3	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.3	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			47.1%	ICU Level of Service	A	
Analysis Period (min)			15			

C-5 2032 FUTURE

BACKGROUND SCT



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2032 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	136	76	20	110	44	16
Future Volume (Veh/h)	136	76	20	110	44	16
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)	148	83	22	120	48	17
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			231		354	190
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			231		354	190
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		92	98
cM capacity (veh/h)			1349		624	857
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	231	142	65			
Volume Left	0	22	48			
Volume Right	83	0	17			
cSH	1700	1349	672			
Volume to Capacity	0.14	0.02	0.10			
Queue Length 95th (m)	0.0	0.4	2.4			
Control Delay (s)	0.0	1.3	10.9			
Lane LOS			A		B	
Approach Delay (s)	0.0	1.3	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			34.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	88	0	0	93	0	722	87	0	425	51
Future Volume (Veh/h)	0	0	88	0	0	93	0	722	87	0	425	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	96	0	0	101	0	785	95	0	462	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1348	1342	462	1247	1247	785	462			880		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1348	1342	462	1247	1247	785	462			880		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	84	100	100	74	100			100		
cM capacity (veh/h)	96	154	587	127	175	393	1110			777		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	96	101	785	95	462	55						
Volume Left	0	0	0	0	0	0						
Volume Right	96	101	0	95	0	55						
cSH	587	393	1700	1700	1700	1700						
Volume to Capacity	0.16	0.26	0.46	0.06	0.27	0.03						
Queue Length 95th (m)	4.4	7.7	0.0	0.0	0.0	0.0						
Control Delay (s)	12.3	17.3	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	12.3	17.3	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			1.8									
Intersection Capacity Utilization			54.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road













<2032 FB Sc1> AM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	75	80	14	47	85	11
Future Volume (Veh/h)	75	80	14	47	85	11
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)	82	87	15	51	92	12
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			169		206	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			169		206	126
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		88	99
cM capacity (veh/h)			1421		767	930
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	169	66	104			
Volume Left	0	15	92			
Volume Right	87	0	12			
cSH	1700	1421	783			
Volume to Capacity	0.10	0.01	0.13			
Queue Length 95th (m)	0.0	0.2	3.5			
Control Delay (s)	0.0	1.8	10.3			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.8	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			28.4%	ICU Level of Service		A
Analysis Period (min)			15			























HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road

<2032 FB Sc1> AM Peak Hour
 06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Future Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	10	21	0	28	84	64	161	0	20	61	73
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	93	112	225	154								
Volume Left (vph)	62	0	64	20								
Volume Right (vph)	21	84	0	73								
Hadj (s)	0.06	-0.39	0.07	-0.21								
Departure Headway (s)	5.0	4.5	4.7	4.5								
Degree Utilization, x	0.13	0.14	0.29	0.19								
Capacity (veh/h)	654	721	737	753								
Control Delay (s)	8.7	8.3	9.6	8.5								
Approach Delay (s)	8.7	8.3	9.6	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.9									
Level of Service			A									
Intersection Capacity Utilization			41.4%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2032 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	9	7	129	19	146	16	514	312	63	363	17
Future Volume (vph)	19	9	7	129	19	146	16	514	312	63	363	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.93		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1615		1437	1488		1552	1731	1375	1521	1703	
Fl _t Permitted	0.53	1.00		0.75	1.00		0.52	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	859	1615		1128	1488		850	1731	1375	509	1703	
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)	21	10	8	140	21	159	17	559	339	68	395	18
RTOR Reduction (vph)	0	6	0	0	121	0	0	0	139	0	2	0
Lane Group Flow (vph)	21	12	0	140	59	0	17	559	200	68	411	0
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	0%	1%	2%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	21.1	21.1		21.1	21.1		55.1	55.1	55.1	64.0	64.0	
Effective Green, g (s)	24.1	24.1		24.1	24.1		58.8	58.8	58.8	64.0	67.7	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.59	0.59	0.59	0.64	0.68	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	389		272	359		500	1019	810	386	1155	
v/s Ratio Prot		0.01			0.04			c0.32		0.01	c0.24	
v/s Ratio Perm	0.02			c0.12			0.02		0.15	0.10		
v/c Ratio	0.10	0.03		0.51	0.17		0.03	0.55	0.25	0.18	0.36	
Uniform Delay, d ₁	29.4	28.9		32.8	29.9		8.6	12.4	9.9	8.4	6.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.2	0.0		1.6	0.2		0.1	2.1	0.7	0.2	0.9	
Delay (s)	29.6	29.0		34.4	30.1		8.7	14.6	10.6	8.6	7.7	
Level of Service	C	C		C	C		A	B	B	A	A	
Approach Delay (s)		29.3			32.0			13.0			7.8	
Approach LOS		C			C			B			A	

























Intersection Summary		
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.53	B
Actuated Cycle Length (s)	99.8	Sum of lost time (s)
Intersection Capacity Utilization	65.7%	11.0
Analysis Period (min)	15	ICU Level of Service
		C

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FB Sc1> AM Peak Hour

06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	71	354	7	69	259	124	22	139	147	118	53	16	
Future Volume (vph)	71	354	7	69	259	124	22	139	147	118	53	16	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1602	1290	1581	1573	1428	1337	1680	1442	1628	1576		
Flt Permitted	0.51	1.00	1.00	0.39	1.00	1.00	0.71	1.00	1.00	0.66	1.00		
Satd. Flow (perm)	879	1602	1290	650	1573	1428	996	1680	1442	1133	1576		
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)	77	385	8	75	282	135	24	151	160	128	58	17	
RTOR Reduction (vph)	0	0	5	0	0	82	0	0	82	0	9	0	
Lane Group Flow (vph)	77	385	3	75	282	53	24	151	78	128	66	0	
Heavy Vehicles (%)	0%	8%	14%	4%	10%	3%	23%	3%	2%	1%	4%	13%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	22.8	22.8	22.8	22.8	22.8	22.8	30.1	30.1	30.1	30.1	30.1		
Effective Green, g (s)	25.8	25.8	25.8	25.8	25.8	25.8	32.1	32.1	32.1	32.1	32.1		
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.49	0.49	0.49	0.49	0.49		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	344	627	505	254	615	559	485	818	702	551	767		
v/s Ratio Prot		c0.24			0.18			0.09			0.04		
v/s Ratio Perm	0.09		0.00	0.12		0.04	0.02		0.05	c0.11			
v/c Ratio	0.22	0.61	0.01	0.30	0.46	0.09	0.05	0.18	0.11	0.23	0.09		
Uniform Delay, d1	13.4	16.1	12.2	13.8	14.9	12.7	8.9	9.5	9.2	9.8	9.0		
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	0.3	1.8	0.0	0.7	0.5	0.1	0.2	0.5	0.3	1.0	0.2		
Delay (s)	13.7	17.9	12.2	14.4	15.4	12.7	9.1	10.0	9.5	10.8	9.3		
Level of Service	B	B	B	B	B	B	A	B	A	B	A		
Approach Delay (s)		17.1			14.5			9.7			10.2		
Approach LOS		B			B			A			B		
Intersection Summary													
HCM 2000 Control Delay			13.7									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.40										
Actuated Cycle Length (s)			65.9									Sum of lost time (s)	8.0
Intersection Capacity Utilization			66.9%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2032 FB Sc1> AM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	110	335	317	60	30	34
Future Volume (Veh/h)	110	335	317	60	30	34
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)	120	364	345	65	33	37
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	410				949	345
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410				949	345
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	90				87	95
cM capacity (veh/h)	1154				261	689
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	120	364	345	65	33	37
Volume Left	120	0	0	0	33	0
Volume Right	0	0	0	65	0	37
cSH	1154	1700	1700	1700	261	689
Volume to Capacity	0.10	0.21	0.20	0.04	0.13	0.05
Queue Length 95th (m)	2.6	0.0	0.0	0.0	3.2	1.3
Control Delay (s)	8.5	0.0	0.0	0.0	20.8	10.5
Lane LOS	A				C	B
Approach Delay (s)	2.1		0.0		15.4	
Approach LOS					C	
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			38.1%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2032 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	72	3	5	1	153	4	6	1	3	8
Future Volume (Veh/h)	4	6	72	3	5	1	153	4	6	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	78	3	5	1	166	4	7	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			85			76	66	46	74	104	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			85			76	66	46	74	104	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			82	100	99	100	100	99
cM capacity (veh/h)	1628			1524			902	825	1029	908	676	981
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	89	9	177	13								
Volume Left	4	3	166	1								
Volume Right	78	1	7	9								
cSH	1628	1524	904	884								
Volume to Capacity	0.00	0.00	0.20	0.01								
Queue Length 95th (m)	0.1	0.0	5.5	0.3								
Control Delay (s)	0.3	2.5	9.9	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.3	2.5	9.9	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			28.7%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2032 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	291	4	5	124
Future Volume (Veh/h)	11	17	291	4	5	124
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)	12	18	316	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	463	318			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	463	318			320	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	559	727			1251	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	320	140			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	649	1700	1251			
Volume to Capacity	0.05	0.19	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.8	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			26.9%		ICU Level of Service	A
Analysis Period (min)			15			

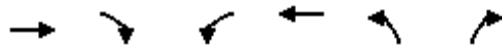
HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2032 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	278	4	5	130
Future Volume (Veh/h)	11	17	278	4	5	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)	12	18	302	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	455	304			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	455	304			306	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	565	740			1266	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	306	146			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	658	1700	1266			
Volume to Capacity	0.05	0.18	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.7	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.7	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			26.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road



















<2032 FB Sc1> PM Peak Hour
06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖		↘
Traffic Volume (veh/h)	146	94	17	108	107	21
Future Volume (Veh/h)	146	94	17	108	107	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)	159	102	18	117	116	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			261		363	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			261		363	210
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		81	97
cM capacity (veh/h)			1315		626	835
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	261	135	139			
Volume Left	0	18	116			
Volume Right	102	0	23			
cSH	1700	1315	653			
Volume to Capacity	0.15	0.01	0.21			
Queue Length 95th (m)	0.0	0.3	6.1			
Control Delay (s)	0.0	1.1	12.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.1	12.0			
Approach LOS			B			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			36.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	100	0	0	94	0	613	68	0	750	120
Future Volume (Veh/h)	0	0	100	0	0	94	0	613	68	0	750	120
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	109	0	0	102	0	666	74	0	815	130
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	1583	1555	815	1481	1481	666	815			740		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1583	1555	815	1481	1481	666	815			740		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	71	100	100	78	100			100		
cM capacity (veh/h)	69	114	381	75	127	456	821			876		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	109	102	666	74	815	130						
Volume Left	0	0	0	0	0	0						
Volume Right	109	102	0	74	0	130						
cSH	381	456	1700	1700	1700	1700						
Volume to Capacity	0.29	0.22	0.39	0.04	0.48	0.08						
Queue Length 95th (m)	8.8	6.4	0.0	0.0	0.0	0.0						
Control Delay (s)	18.2	15.2	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	18.2	15.2	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			56.2%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road













<2032 FB Sc1> PM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶		
Traffic Volume (veh/h)	99	70	27	66	58	17
Future Volume (Veh/h)	99	70	27	66	58	17
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)	108	76	29	72	63	18
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			184		276	146
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			184		276	146
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		91	98
cM capacity (veh/h)			1403		689	906
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	184	101	81			
Volume Left	0	29	63			
Volume Right	76	0	18			
cSH	1700	1403	727			
Volume to Capacity	0.11	0.02	0.11			
Queue Length 95th (m)	0.0	0.5	2.8			
Control Delay (s)	0.0	2.3	10.6			
Lane LOS			A	B		
Approach Delay (s)	0.0	2.3	10.6			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			30.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2032 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Future Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	29	65	0	21	54	38	98	0	86	167	68
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	174	75	136	321								
Volume Left (vph)	80	0	38	86								
Volume Right (vph)	65	54	0	68								
Hadj (s)	-0.12	-0.43	0.07	-0.06								
Departure Headway (s)	5.0	4.9	5.0	4.7								
Degree Utilization, x	0.24	0.10	0.19	0.42								
Capacity (veh/h)	658	655	666	733								
Control Delay (s)	9.6	8.4	9.2	11.0								
Approach Delay (s)	9.6	8.4	9.2	11.0								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			10.0									
Level of Service			B									
Intersection Capacity Utilization			46.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FB Sc1> PM Peak Hour

06/17/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	28	17	320	16	122	0	519	211	156	586	16		
Future Volume (vph)	39	28	17	320	16	122	0	519	211	156	586	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Fr _t	1.00	0.94		1.00	0.87			1.00	0.85	1.00	1.00			
Fl _t Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1620		1518	1425			1731	1348	1536	1707			
Fl _t Permitted	0.63	1.00		0.73	1.00			1.00	1.00	0.24	1.00			
Satd. Flow (perm)	1023	1620		1160	1425			1731	1348	392	1707			
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)	42	30	18	348	17	133	0	564	229	170	637	17		
RTOR Reduction (vph)	0	12	0	0	86	0	0	0	117	0	1	0		
Lane Group Flow (vph)	42	36	0	348	64	0	0	564	112	170	653	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	2%	0%	6%	0%	0%	3%	1%	1%	0%		
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2		2	6				
Actuated Green, G (s)	31.6	31.6		31.6	31.6			44.5	44.5	52.5	52.5			
Effective Green, g (s)	34.6	34.6		34.6	34.6			48.2	48.2	52.5	56.2			
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.49	0.49	0.53	0.57			
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	358	567		406	499			844	657	266	970			
v/s Ratio Prot		0.02			0.04			0.33		0.03	c0.38			
v/s Ratio Perm	0.04			c0.30					0.08	0.31				
v/c Ratio	0.12	0.06		0.86	0.13			0.67	0.17	0.64	0.67			
Uniform Delay, d ₁	21.8	21.3		29.8	21.8			19.2	14.1	17.2	14.9			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d ₂	0.1	0.0		16.2	0.1			4.2	0.6	5.0	3.7			
Delay (s)	21.9	21.4		46.0	21.9			23.4	14.7	22.2	18.6			
Level of Service	C	C		D	C			C	B	C	B			
Approach Delay (s)		21.6			38.7			20.9			19.4			
Approach LOS		C			D			C			B			
Intersection Summary														
HCM 2000 Control Delay			24.4									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.77											
Actuated Cycle Length (s)			98.8								11.0			
Intersection Capacity Utilization			96.4%										ICU Level of Service	F
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FB Sc1> PM Peak Hour
06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	82	337	18	145	453	157	7	102	103	112	155	61	
Future Volume (vph)	82	337	18	145	453	157	7	102	103	112	155	61	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	
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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1644	1617	1471	1644	1602	1456	1642	1697	1471	1596	1612	1612	
Flt Permitted	0.31	1.00	1.00	0.43	1.00	1.00	0.58	1.00	1.00	0.69	1.00	1.00	
Satd. Flow (perm)	539	1617	1471	751	1602	1456	998	1697	1471	1152	1612	1612	
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)	89	366	20	158	492	171	8	111	112	122	168	66	
RTOR Reduction (vph)	0	0	11	0	0	87	0	0	61	0	15	0	
Lane Group Flow (vph)	89	366	9	158	492	84	8	111	51	122	219	0	
Confl. Peds. (#/hr)							1					1	
Heavy Vehicles (%)	0%	7%	0%	0%	8%	1%	0%	2%	0%	3%	3%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	Perm	NA	
Protected Phases		4			8			2				6	
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	28.3	28.3	28.3	28.3	28.3	28.3	30.3	30.3	30.3	30.3	30.3	30.3	
Effective Green, g (s)	31.3	31.3	31.3	31.3	31.3	31.3	32.3	32.3	32.3	32.3	32.3	32.3	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.45	0.45	0.45	0.45	0.45	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	235	706	643	328	700	636	450	765	663	519	727	727	
v/s Ratio Prot		0.23			c0.31			0.07				c0.14	
v/s Ratio Perm	0.17		0.01	0.21		0.06	0.01		0.03	0.11			
v/c Ratio	0.38	0.52	0.01	0.48	0.70	0.13	0.02	0.15	0.08	0.24	0.30	0.30	
Uniform Delay, d1	13.6	14.7	11.4	14.4	16.4	12.0	10.9	11.5	11.2	12.1	12.5	12.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.6	0.0	1.1	3.2	0.1	0.1	0.4	0.2	1.1	1.1	1.1	
Delay (s)	14.6	15.3	11.4	15.5	19.6	12.1	10.9	11.9	11.4	13.1	13.5	13.5	
Level of Service	B	B	B	B	B	B	B	B	B	B	B	B	
Approach Delay (s)		15.0			17.2			11.6			13.4		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			15.3									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)	8.0
Intersection Capacity Utilization			70.1%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2032 FB Sc1> PM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	70	361	391	44	90	57
Future Volume (Veh/h)	70	361	391	44	90	57
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	392	425	48	98	62
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	473				969	425
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	473				969	425
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				63	90
cM capacity (veh/h)	1094				264	634
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	76	392	425	48	98	62
Volume Left	76	0	0	0	98	0
Volume Right	0	0	0	48	0	62
cSH	1094	1700	1700	1700	264	634
Volume to Capacity	0.07	0.23	0.25	0.03	0.37	0.10
Queue Length 95th (m)	1.7	0.0	0.0	0.0	12.5	2.5
Control Delay (s)	8.5	0.0	0.0	0.0	26.5	11.3
Lane LOS	A				D	B
Approach Delay (s)	1.4		0.0		20.6	
Approach LOS					C	
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			42.0%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2032 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	9	136	8	14	0	109	0	6	1	3	6
Future Volume (Veh/h)	2	9	136	8	14	0	109	0	6	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	10	148	9	15	0	118	0	7	1	3	7
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	15			158			130	121	84	128	195	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			158			130	121	84	128	195	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			86	100	99	100	100	99
cM capacity (veh/h)	1616			1434			828	767	981	839	699	1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	160	24	125	11								
Volume Left	2	9	118	1								
Volume Right	148	0	7	7								
cSH	1616	1434	835	915								
Volume to Capacity	0.00	0.01	0.15	0.01								
Queue Length 95th (m)	0.0	0.1	4.0	0.3								
Control Delay (s)	0.1	2.9	10.1	9.0								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.9	10.1	9.0								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			30.1%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2032 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	201	12	19	299
Future Volume (Veh/h)	8	11	201	12	19	299
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)	9	12	218	13	21	325
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	592	224			231	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	592	224			231	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	465	820			1349	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	231	346			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	618	1700	1349			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			43.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2032 FB Sc1> PM Peak Hour
06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	202	12	19	288
Future Volume (Veh/h)	8	11	202	12	19	288
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)	9	12	220	13	21	313
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	582	226			233	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	226			233	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	471	818			1346	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	233	334			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	622	1700	1346			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			43.3%	ICU Level of Service		A
Analysis Period (min)			15			

C-6 *2032 FUTURE*
BACKGROUND SC2

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road



















<2032 FB Sc2> AM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	156	56	3	84	58	53
Future Volume (Veh/h)	156	56	3	84	58	53
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)	170	61	3	91	63	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)						
pX, platoon unblocked						
vC, conflicting volume			231		298	200
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			231		298	200
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		91	93
cM capacity (veh/h)			1349		672	835
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	231	94	121			
Volume Left	0	3	63			
Volume Right	61	0	58			
cSH	1700	1349	741			
Volume to Capacity	0.14	0.00	0.16			
Queue Length 95th (m)	0.0	0.1	4.4			
Control Delay (s)	0.0	0.3	10.8			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.3	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			26.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	61	0	0	186	0	628	71	0	431	123
Future Volume (Veh/h)	0	0	61	0	0	186	0	628	71	0	431	123
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	66	0	0	202	0	683	77	0	468	134
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	1353	1228	468	1151	1151	683	468			760		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1353	1228	468	1151	1151	683	468			760		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	89	100	100	55	100			100		
cM capacity (veh/h)	70	180	579	156	200	446	1104			861		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	66	202	683	77	468	134						
Volume Left	0	0	0	0	0	0						
Volume Right	66	202	0	77	0	134						
cSH	579	446	1700	1700	1700	1700						
Volume to Capacity	0.11	0.45	0.40	0.05	0.28	0.08						
Queue Length 95th (m)	2.9	17.6	0.0	0.0	0.0	0.0						
Control Delay (s)	12.0	19.6	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	12.0	19.6	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			55.1%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2032 FB Sc2> AM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶	↷	
Traffic Volume (veh/h)	82	140	60	19	67	5
Future Volume (Veh/h)	82	140	60	19	67	5
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)	89	152	65	21	73	5
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			241		316	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			241		316	165
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			95		89	99
cM capacity (veh/h)			1320		636	885
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	241	86	78			
Volume Left	0	65	73			
Volume Right	152	0	5			
cSH	1700	1320	648			
Volume to Capacity	0.14	0.05	0.12			
Queue Length 95th (m)	0.0	1.2	3.1			
Control Delay (s)	0.0	6.0	11.3			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.0	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			33.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2032 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	0	1	0	0	93	1	210	2	36	98	3
Future Volume (vph)	3	0	1	0	0	93	1	210	2	36	98	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	1	0	0	101	1	228	2	39	107	3
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	4	101	231	149								
Volume Left (vph)	3	0	1	39								
Volume Right (vph)	1	101	2	3								
Hadj (s)	0.42	-0.57	0.00	0.13								
Departure Headway (s)	5.3	4.2	4.3	4.5								
Degree Utilization, x	0.01	0.12	0.28	0.19								
Capacity (veh/h)	616	783	811	765								
Control Delay (s)	8.3	7.8	8.9	8.5								
Approach Delay (s)	8.3	7.8	8.9	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			36.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2032 FB Sc2> AM Peak Hour

05/28/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	9	7	208	29	146	23	515	305	104	361	20
Future Volume (vph)	11	9	7	208	29	146	23	515	305	104	361	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1522		1478	1478		1492	1713	1298	1521	1685	
Fl _t Permitted	0.52	1.00		0.75	1.00		0.52	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	777	1522		1160	1478		816	1713	1298	470	1685	
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	10	8	226	32	159	25	560	332	113	392	22
RTOR Reduction (vph)	0	6	0	0	118	0	0	0	149	0	2	0
Lane Group Flow (vph)	12	12	0	226	73	0	25	560	183	113	412	0
Heavy Vehicles (%)	9%	11%	0%	5%	0%	3%	4%	1%	7%	2%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.1	23.1		23.1	23.1		51.9	51.9	51.9	63.0	63.0	
Effective Green, g (s)	26.1	26.1		26.1	26.1		55.6	55.6	55.6	63.0	66.7	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.55	0.55	0.55	0.63	0.66	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	201	394		300	382		450	944	715	378	1114	
v/s Ratio Prot		0.01			0.05			c0.33		0.02	c0.24	
v/s Ratio Perm	0.02			c0.19			0.03		0.14	0.16		
v/c Ratio	0.06	0.03		0.75	0.19		0.06	0.59	0.26	0.30	0.37	
Uniform Delay, d ₁	28.1	27.9		34.4	29.1		10.5	15.1	11.8	9.9	7.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		10.2	0.2		0.2	2.7	0.9	0.4	0.9	
Delay (s)	28.2	27.9		44.6	29.4		10.7	17.8	12.7	10.3	8.6	
Level of Service	C	C		D	C		B	B	B	B	A	
Approach Delay (s)		28.1			37.6			15.7			9.0	
Approach LOS		C			D			B			A	
Intersection Summary												
HCM 2000 Control Delay	18.9			HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio	0.62											
Actuated Cycle Length (s)	100.8			Sum of lost time (s)				11.0				
Intersection Capacity Utilization	67.8%			ICU Level of Service				C				
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FB Sc2> AM Peak Hour

05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	326	29	64	294	114	79	174	124	96	50	15
Future Volume (vph)	29	326	29	64	294	114	79	174	124	96	50	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1596	1664	1471	1612	1617	1471	1644	1713	1471	1644	1645	
Flt Permitted	0.46	1.00	1.00	0.42	1.00	1.00	0.71	1.00	1.00	0.64	1.00	
Satd. Flow (perm)	771	1664	1471	711	1617	1471	1231	1713	1471	1105	1645	
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)	32	354	32	70	320	124	86	189	135	104	54	16
RTOR Reduction (vph)	0	0	20	0	0	77	0	0	68	0	8	0
Lane Group Flow (vph)	32	354	12	70	320	47	86	189	67	104	62	0
Heavy Vehicles (%)	3%	4%	0%	2%	7%	0%	0%	1%	0%	0%	0%	7%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	21.4	21.4	21.4	21.4	21.4	21.4	30.0	30.0	30.0	30.0	30.0	
Effective Green, g (s)	24.4	24.4	24.4	24.4	24.4	24.4	32.0	32.0	32.0	32.0	32.0	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.50	0.50	0.50	0.50	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	292	630	557	269	612	557	611	851	730	549	817	
v/s Ratio Prot		c0.21			0.20			c0.11			0.04	
v/s Ratio Perm	0.04		0.01	0.10		0.03	0.07		0.05	0.09		
v/c Ratio	0.11	0.56	0.02	0.26	0.52	0.08	0.14	0.22	0.09	0.19	0.08	
Uniform Delay, d1	13.0	15.8	12.5	13.8	15.5	12.8	8.8	9.2	8.5	9.0	8.5	
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	0.2	1.2	0.0	0.5	0.8	0.1	0.5	0.6	0.2	0.8	0.2	
Delay (s)	13.1	16.9	12.5	14.3	16.3	12.9	9.2	9.8	8.8	9.8	8.7	
Level of Service	B	B	B	B	B	B	A	A	A	A	A	
Approach Delay (s)		16.3			15.2			9.3			9.3	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			13.2									B
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			64.4						8.0			
Intersection Capacity Utilization			66.9%									C
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2032 FB Sc2> AM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	104	384	312	60	32	38
Future Volume (Veh/h)	104	384	312	60	32	38
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)	113	417	339	65	35	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)						
pX, platoon unblocked						
vC, conflicting volume	404				982	339
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404				982	339
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	90				86	94
cM capacity (veh/h)	1149				242	708
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	113	417	339	65	35	41
Volume Left	113	0	0	0	35	0
Volume Right	0	0	0	65	0	41
cSH	1149	1700	1700	1700	242	708
Volume to Capacity	0.10	0.25	0.20	0.04	0.14	0.06
Queue Length 95th (m)	2.5	0.0	0.0	0.0	3.8	1.4
Control Delay (s)	8.5	0.0	0.0	0.0	22.4	10.4
Lane LOS	A				C	B
Approach Delay (s)	1.8		0.0		15.9	
Approach LOS					C	
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			37.4%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2032 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	6	69	3	4	0	159	0	5	0	1	7
Future Volume (Veh/h)	1	6	69	3	4	0	159	0	5	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	7	75	3	4	0	173	0	5	0	1	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	4			82			65	56	44	62	94	4
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			82			65	56	44	62	94	4
tC, single (s)	4.1			4.4			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			81	100	100	100	100	99
cM capacity (veh/h)	1631			1341			914	836	1031	932	798	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	83	7	178	9								
Volume Left	1	3	173	0								
Volume Right	75	0	5	8								
cSH	1631	1341	917	1044								
Volume to Capacity	0.00	0.00	0.19	0.01								
Queue Length 95th (m)	0.0	0.1	5.4	0.2								
Control Delay (s)	0.1	3.3	9.9	8.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	3.3	9.9	8.5								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			28.3%	ICU Level of Service	A							
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2032 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	356	4	5	137
Future Volume (Veh/h)	11	17	356	4	5	137
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)	12	18	387	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	548	389			391	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	548	389			391	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			100	
cM capacity (veh/h)	499	664			1179	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	391	154			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	586	1700	1179			
Volume to Capacity	0.05	0.23	0.00			
Queue Length 95th (m)	1.2	0.0	0.1			
Control Delay (s)	11.5	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.5	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			30.6%	ICU Level of Service		A
Analysis Period (min)			15			

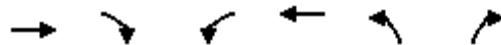
HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2032 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	339	4	5	144
Future Volume (Veh/h)	11	17	339	4	5	144
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)	12	18	368	4	5	157
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	537	370			372	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	537	370			372	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			100	
cM capacity (veh/h)	506	680			1198	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	372	162			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	598	1700	1198			
Volume to Capacity	0.05	0.22	0.00			
Queue Length 95th (m)	1.2	0.0	0.1			
Control Delay (s)	11.3	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.3	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			29.6%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2032 FB Sc2> PM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶		
Traffic Volume (veh/h)	115	99	1	57	120	48
Future Volume (Veh/h)	115	99	1	57	120	48
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)	125	108	1	62	130	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)						
pX, platoon unblocked						
vC, conflicting volume			233		243	179
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			233		243	179
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		82	94
cM capacity (veh/h)			1346		736	869
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	233	63	182			
Volume Left	0	1	130			
Volume Right	108	0	52			
cSH	1700	1346	770			
Volume to Capacity	0.14	0.00	0.24			
Queue Length 95th (m)	0.0	0.0	7.0			
Control Delay (s)	0.0	0.1	11.1			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.1	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			30.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	90	0	0	162	0	539	49	0	679	121
Future Volume (Veh/h)	0	0	90	0	0	162	0	539	49	0	679	121
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	98	0	0	176	0	586	53	0	738	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)												
pX, platoon unblocked												
vC, conflicting volume	1500	1377	738	1324	1324	586	738			639		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1500	1377	738	1324	1324	586	738			639		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	76	100	100	66	100			100		
cM capacity (veh/h)	67	146	415	103	157	512	877			955		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	98	176	586	53	738	132						
Volume Left	0	0	0	0	0	0						
Volume Right	98	176	0	53	0	132						
cSH	415	512	1700	1700	1700	1700						
Volume to Capacity	0.24	0.34	0.34	0.03	0.43	0.08						
Queue Length 95th (m)	6.9	11.5	0.0	0.0	0.0	0.0						
Control Delay (s)	16.4	15.7	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	16.4	15.7	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			51.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

















<2032 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	74	94	77	14	49	4
Future Volume (Veh/h)	74	94	77	14	49	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)	80	102	84	15	53	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			182		314	131
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			182		314	131
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		92	100
cM capacity (veh/h)			1405		638	924
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	182	99	57			
Volume Left	0	84	53			
Volume Right	102	0	4			
cSH	1700	1405	652			
Volume to Capacity	0.11	0.06	0.09			
Queue Length 95th (m)	0.0	1.4	2.2			
Control Delay (s)	0.0	6.6	11.0			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.6	11.0			
Approach LOS			B			
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			29.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road























<2032 FB Sc2> PM Peak Hour
 05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Future Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	0	0	68	0	142	1	96	279	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	1	68	143	376								
Volume Left (vph)	1	0	0	96								
Volume Right (vph)	0	68	1	1								
Hadj (s)	0.20	-0.52	0.00	0.05								
Departure Headway (s)	5.4	4.5	4.4	4.3								
Degree Utilization, x	0.00	0.09	0.18	0.45								
Capacity (veh/h)	598	709	779	822								
Control Delay (s)	8.4	8.0	8.4	10.7								
Approach Delay (s)	8.4	8.0	8.4	10.7								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			9.8									
Level of Service			A									
Intersection Capacity Utilization			42.2%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2032 FB Sc2> PM Peak Hour

























05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	26	16	294	7	112	2	457	253	189	627	14
Future Volume (vph)	32	26	16	294	7	112	2	457	253	189	627	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.94		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1632		1521	1433		1552	1713	1361	1521	1706	
Fl _t Permitted	0.66	1.00		0.73	1.00		0.32	1.00	1.00	0.24	1.00	
Satd. Flow (perm)	1072	1632		1165	1433		521	1713	1361	390	1706	
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)	35	28	17	320	8	122	2	497	275	205	682	15
RTOR Reduction (vph)	0	11	0	0	80	0	0	0	157	0	1	0
Lane Group Flow (vph)	35	34	0	320	50	0	2	497	118	205	696	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	1%	2%	2%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	29.9	29.9		29.9	29.9		37.0	37.0	37.0	50.6	50.6	
Effective Green, g (s)	32.9	32.9		32.9	32.9		40.7	40.7	40.7	50.6	54.3	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.43	0.43	0.43	0.53	0.57	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	370	564		402	495		222	732	581	333	973	
v/s Ratio Prot		0.02			0.04			0.29		0.07	c0.41	
v/s Ratio Perm	0.03			c0.27			0.00		0.09	0.26		
v/c Ratio	0.09	0.06		0.80	0.10		0.01	0.68	0.20	0.62	0.72	
Uniform Delay, d ₁	21.1	20.8		28.1	21.1		15.7	22.0	17.1	14.9	14.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		10.4	0.1		0.1	5.0	0.8	3.4	4.5	
Delay (s)	21.2	20.9		38.6	21.2		15.7	27.0	17.9	18.2	19.3	
Level of Service	C	C		D	C		B	C	B	B	B	
Approach Delay (s)		21.0			33.6			23.7			19.1	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.7	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			95.2	Sum of lost time (s)				11.0				
Intersection Capacity Utilization			87.8%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	326	101	149	356	147	59	80	79	100	172	49
Future Volume (vph)	46	326	101	149	356	147	59	80	79	100	172	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	
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	1.00	1.00	1.00	1.00	1.00	0.99	
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	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1612	1664	1471	1644	1648	1456	1640	1731	1471	1644	1657	
Flt Permitted	0.39	1.00	1.00	0.43	1.00	1.00	0.59	1.00	1.00	0.70	1.00	
Satd. Flow (perm)	662	1664	1471	739	1648	1456	1012	1731	1471	1212	1657	
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)	50	354	110	162	387	160	64	87	86	109	187	53
RTOR Reduction (vph)	0	0	67	0	0	97	0	0	47	0	10	0
Lane Group Flow (vph)	50	354	43	162	387	63	64	87	39	109	230	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	2%	4%	0%	0%	5%	1%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	23.1	23.1	23.1	23.1	23.1	23.1	30.1	30.1	30.1	30.1	30.1	
Effective Green, g (s)	26.1	26.1	26.1	26.1	26.1	26.1	32.1	32.1	30.1	32.1	32.1	
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.48	0.48	0.45	0.48	0.48	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	261	656	579	291	649	574	490	839	668	587	803	
v/s Ratio Prot		0.21			c0.23			0.05			c0.14	
v/s Ratio Perm	0.08		0.03	0.22		0.04	0.06		0.03	0.09		
v/c Ratio	0.19	0.54	0.07	0.56	0.60	0.11	0.13	0.10	0.06	0.19	0.29	
Uniform Delay, d1	13.1	15.4	12.5	15.6	15.9	12.7	9.4	9.2	10.1	9.7	10.2	
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	0.4	0.9	0.1	2.3	1.5	0.1	0.6	0.2	0.2	0.7	0.9	
Delay (s)	13.5	16.3	12.6	17.9	17.4	12.8	9.9	9.5	10.3	10.3	11.1	
Level of Service	B	B	B	B	B	B	A	A	B	B	B	
Approach Delay (s)		15.2			16.4			9.9			10.9	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			14.2									B
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			66.2							8.0		
Intersection Capacity Utilization			76.2%									D
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2032 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	75	421	383	30	76	56
Future Volume (Veh/h)	75	421	383	30	76	56
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)	82	458	416	33	83	61
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	449				1038	416
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	449				1038	416
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				65	90
cM capacity (veh/h)	1106				238	641
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	82	458	416	33	83	61
Volume Left	82	0	0	0	83	0
Volume Right	0	0	0	33	0	61
cSH	1106	1700	1700	1700	238	641
Volume to Capacity	0.07	0.27	0.24	0.02	0.35	0.10
Queue Length 95th (m)	1.8	0.0	0.0	0.0	11.3	2.4
Control Delay (s)	8.5	0.0	0.0	0.0	28.0	11.2
Lane LOS	A				D	B
Approach Delay (s)	1.3		0.0		20.9	
Approach LOS					C	
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			41.0%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2032 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	6	130	4	9	0	101	2	8	0	1	1
Future Volume (Veh/h)	3	6	130	4	9	0	101	2	8	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	141	4	10	0	110	2	9	0	1	1
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	10			148			103	102	78	112	172	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			148			103	102	78	112	172	10
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			87	100	99	100	100	100
cM capacity (veh/h)	1429			1446			870	788	989	858	721	1077
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	151	14	121	2								
Volume Left	3	4	110	0								
Volume Right	141	0	9	1								
cSH	1429	1446	876	864								
Volume to Capacity	0.00	0.00	0.14	0.00								
Queue Length 95th (m)	0.0	0.1	3.6	0.1								
Control Delay (s)	0.2	2.2	9.8	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.2	2.2	9.8	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			29.4%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2032 FB Sc2> PM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	204	12	19	398
Future Volume (Veh/h)	8	11	204	12	19	398
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)	9	12	222	13	21	433
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	704	228			235	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	704	228			235	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	400	816			1344	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	235	454			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	565	1700	1344			
Volume to Capacity	0.04	0.14	0.02			
Queue Length 95th (m)	0.9	0.0	0.4			
Control Delay (s)	11.6	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.6	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			49.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2032 FB Sc2> PM Peak Hour
05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	206	12	19	384
Future Volume (Veh/h)	8	11	206	12	19	384
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)	9	12	224	13	21	417
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	690	230			237	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	690	230			237	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	408	814			1342	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	237	438			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	570	1700	1342			
Volume to Capacity	0.04	0.14	0.02			
Queue Length 95th (m)	0.9	0.0	0.4			
Control Delay (s)	11.6	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.6	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			48.7%	ICU Level of Service	A	
Analysis Period (min)			15			

C-7 2037 FUTURE

BACKGROUND SCT

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2037 FB Sc1> AM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	150	84	21	122	49	17
Future Volume (Veh/h)	150	84	21	122	49	17
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)	163	91	23	133	53	18
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			254		388	208
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			254		388	208
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		91	98
cM capacity (veh/h)			1323		598	837
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	254	156	71			
Volume Left	0	23	53			
Volume Right	91	0	18			
cSH	1700	1323	644			
Volume to Capacity	0.15	0.02	0.11			
Queue Length 95th (m)	0.0	0.4	2.8			
Control Delay (s)	0.0	1.3	11.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.3	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			36.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2037 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	97	0	0	102	0	797	96	0	469	56
Future Volume (Veh/h)	0	0	97	0	0	102	0	797	96	0	469	56
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	105	0	0	111	0	866	104	0	510	61
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	1487	1480	510	1376	1376	866	510			970		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1487	1480	510	1376	1376	866	510			970		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	81	100	100	69	100			100		
cM capacity (veh/h)	71	127	554	100	146	353	1065			719		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	105	111	866	104	510	61						
Volume Left	0	0	0	0	0	0						
Volume Right	105	111	0	104	0	61						
cSH	554	353	1700	1700	1700	1700						
Volume to Capacity	0.19	0.31	0.51	0.06	0.30	0.04						
Queue Length 95th (m)	5.3	10.0	0.0	0.0	0.0	0.0						
Control Delay (s)	13.0	19.8	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	13.0	19.8	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			59.1%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road













<2037 FB Sc1> AM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	83	88	15	51	94	12
Future Volume (Veh/h)	83	88	15	51	94	12
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)	90	96	16	55	102	13
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			186		225	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			186		225	138
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		86	99
cM capacity (veh/h)			1401		750	916
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	186	71	115			
Volume Left	0	16	102			
Volume Right	96	0	13			
cSH	1700	1401	766			
Volume to Capacity	0.11	0.01	0.15			
Queue Length 95th (m)	0.0	0.3	4.0			
Control Delay (s)	0.0	1.8	10.5			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.8	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			30.2%	ICU Level of Service		A
Analysis Period (min)			15			























HCM Unsignalized Intersection Capacity Analysis
 4: Kingsway & Forks Road

<2037 FB Sc1> AM Peak Hour
 06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Future Volume (vph)	57	9	19	0	26	77	59	148	0	18	56	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	10	21	0	28	84	64	161	0	20	61	73
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	93	112	225	154								
Volume Left (vph)	62	0	64	20								
Volume Right (vph)	21	84	0	73								
Hadj (s)	0.06	-0.39	0.07	-0.21								
Departure Headway (s)	5.0	4.5	4.7	4.5								
Degree Utilization, x	0.13	0.14	0.29	0.19								
Capacity (veh/h)	654	721	737	753								
Control Delay (s)	8.7	8.3	9.6	8.5								
Approach Delay (s)	8.7	8.3	9.6	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.9									
Level of Service			A									
Intersection Capacity Utilization			41.4%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FB Sc1> AM Peak Hour
06/17/2020

























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	19	9	7	143	19	161	16	567	344	70	401	17	
Future Volume (vph)	19	9	7	143	19	161	16	567	344	70	401	17	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Fr _t	1.00	0.93		1.00	0.87		1.00	1.00	0.85	1.00	0.99		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1615		1450	1486		1552	1731	1375	1536	1720		
Fl _t Permitted	0.50	1.00		0.75	1.00		0.50	1.00	1.00	0.28	1.00		
Satd. Flow (perm)	815	1615		1138	1486		818	1731	1375	449	1720		
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)	21	10	8	155	21	175	17	616	374	76	436	18	
RTOR Reduction (vph)	0	6	0	0	132	0	0	0	155	0	1	0	
Lane Group Flow (vph)	21	12	0	155	64	0	17	616	219	76	453	0	
Heavy Vehicles (%)	0%	0%	0%	7%	0%	1%	0%	0%	1%	1%	0%	0%	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2		2	6			
Actuated Green, G (s)	21.4	21.4		21.4	21.4		54.6	54.6	54.6	63.6	63.6		
Effective Green, g (s)	24.4	24.4		24.4	24.4		58.3	58.3	58.3	63.6	67.3		
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.58	0.58	0.58	0.64	0.68		
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	199	395		278	363		478	1012	804	351	1161		
v/s Ratio Prot		0.01			0.04			c0.36		0.01	c0.26		
v/s Ratio Perm	0.03			c0.14			0.02		0.16	0.12			
v/c Ratio	0.11	0.03		0.56	0.18		0.04	0.61	0.27	0.22	0.39		
Uniform Delay, d ₁	29.2	28.6		32.9	29.7		8.8	13.3	10.2	9.3	7.1		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	0.2	0.0		2.4	0.2		0.1	2.7	0.8	0.3	1.0		
Delay (s)	29.4	28.7		35.3	29.9		8.9	16.1	11.1	9.6	8.1		
Level of Service	C	C		D	C		A	B	B	A	A		
Approach Delay (s)		29.1			32.3			14.1			8.3		
Approach LOS		C			C			B			A		
Intersection Summary													
HCM 2000 Control Delay			16.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.58										
Actuated Cycle Length (s)			99.7									Sum of lost time (s)	11.0
Intersection Capacity Utilization			67.8%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FB Sc1> AM Peak Hour

06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	78	391	7	69	286	137	22	139	147	130	53	18	
Future Volume (vph)	78	391	7	69	286	137	22	139	147	130	53	18	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1617	1290	1581	1588	1428	1337	1680	1442	1628	1573		
Flt Permitted	0.48	1.00	1.00	0.36	1.00	1.00	0.71	1.00	1.00	0.66	1.00		
Satd. Flow (perm)	829	1617	1290	591	1588	1428	994	1680	1442	1133	1573		
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)	85	425	8	75	311	149	24	151	160	141	58	20	
RTOR Reduction (vph)	0	0	5	0	0	89	0	0	84	0	10	0	
Lane Group Flow (vph)	85	425	3	75	311	60	24	151	76	141	68	0	
Heavy Vehicles (%)	0%	7%	14%	4%	9%	3%	23%	3%	2%	1%	4%	11%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2	24.2	30.2	30.2	30.2	30.2	30.2		
Effective Green, g (s)	27.2	27.2	27.2	27.2	27.2	27.2	32.2	32.2	32.2	32.2	32.2		
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.48	0.48	0.48	0.48	0.48		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	334	652	520	238	640	576	474	802	688	541	751		
v/s Ratio Prot		c0.26			0.20			0.09			0.04		
v/s Ratio Perm	0.10		0.00	0.13		0.04	0.02		0.05	c0.12			
v/c Ratio	0.25	0.65	0.01	0.32	0.49	0.10	0.05	0.19	0.11	0.26	0.09		
Uniform Delay, d1	13.4	16.3	12.0	13.7	14.9	12.5	9.4	10.1	9.7	10.5	9.6		
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	0.4	2.3	0.0	0.8	0.6	0.1	0.2	0.5	0.3	1.2	0.2		
Delay (s)	13.8	18.6	12.0	14.5	15.5	12.6	9.6	10.6	10.0	11.7	9.8		
Level of Service	B	B	B	B	B	B	A	B	B	B	A		
Approach Delay (s)		17.7			14.5			10.3			11.0		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			14.2									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.44										
Actuated Cycle Length (s)			67.4									Sum of lost time (s)	8.0
Intersection Capacity Utilization			69.0%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2037 FB Sc1> AM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	118	367	349	66	34	37
Future Volume (Veh/h)	118	367	349	66	34	37
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)	128	399	379	72	37	40
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	451				1034	379
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	451				1034	379
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				84	94
cM capacity (veh/h)	1115				230	661
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	128	399	379	72	37	40
Volume Left	128	0	0	0	37	0
Volume Right	0	0	0	72	0	40
cSH	1115	1700	1700	1700	230	661
Volume to Capacity	0.11	0.23	0.22	0.04	0.16	0.06
Queue Length 95th (m)	2.9	0.0	0.0	0.0	4.3	1.5
Control Delay (s)	8.6	0.0	0.0	0.0	23.7	10.8
Lane LOS	A				C	B
Approach Delay (s)	2.1		0.0		17.0	
Approach LOS					C	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			40.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2037 FB Sc1> AM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	7	79	3	6	1	166	4	7	1	3	8
Future Volume (Veh/h)	4	7	79	3	6	1	166	4	7	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	8	86	3	7	1	180	4	8	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	8			94			83	73	51	82	116	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			94			83	73	51	82	116	8
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			80	100	99	100	100	99
cM capacity (veh/h)	1625			1513			892	818	1023	896	665	979
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	98	11	192	13								
Volume Left	4	3	180	1								
Volume Right	86	1	8	9								
cSH	1625	1513	895	877								
Volume to Capacity	0.00	0.00	0.21	0.01								
Queue Length 95th (m)	0.1	0.0	6.2	0.3								
Control Delay (s)	0.3	2.0	10.1	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.3	2.0	10.1	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			30.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway










<2037 FB Sc1> AM Peak Hour
 06/17/2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	291	4	5	124
Future Volume (Veh/h)	11	17	291	4	5	124
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)	12	18	316	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	463	318			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	463	318			320	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	559	727			1251	
Direction, Lane #						
	WB 1	NB 1	SB 1			
Volume Total	30	320	140			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	649	1700	1251			
Volume to Capacity	0.05	0.19	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.8	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization		26.9%		ICU Level of Service		A
Analysis Period (min)		15				










HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FB Sc1> AM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	278	4	5	130
Future Volume (Veh/h)	11	17	278	4	5	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)	12	18	302	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	455	304			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	455	304			306	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	98			100	
cM capacity (veh/h)	565	740			1266	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	306	146			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	658	1700	1266			
Volume to Capacity	0.05	0.18	0.00			
Queue Length 95th (m)	1.1	0.0	0.1			
Control Delay (s)	10.7	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.7	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			26.1%		ICU Level of Service	A
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2037 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	161	104	18	119	118	22
Future Volume (Veh/h)	161	104	18	119	118	22
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)	175	113	20	129	128	24
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			288		400	232
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			288		400	232
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		78	97
cM capacity (veh/h)			1286		594	813
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	288	149	152			
Volume Left	0	20	128			
Volume Right	113	0	24			
cSH	1700	1286	620			
Volume to Capacity	0.17	0.02	0.24			
Queue Length 95th (m)	0.0	0.4	7.3			
Control Delay (s)	0.0	1.2	12.7			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.2	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			38.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2037 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	110	0	0	103	0	676	74	0	828	131
Future Volume (Veh/h)	0	0	110	0	0	103	0	676	74	0	828	131
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	120	0	0	112	0	735	80	0	900	142
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	1747	1715	900	1635	1635	735	900			815		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1747	1715	900	1635	1635	735	900			815		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	65	100	100	73	100			100		
cM capacity (veh/h)	50	91	340	53	102	416	763			821		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	120	112	735	80	900	142						
Volume Left	0	0	0	0	0	0						
Volume Right	120	112	0	80	0	142						
cSH	340	416	1700	1700	1700	1700						
Volume to Capacity	0.35	0.27	0.43	0.05	0.53	0.08						
Queue Length 95th (m)	11.8	8.2	0.0	0.0	0.0	0.0						
Control Delay (s)	21.3	16.8	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	21.3	16.8	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			61.4%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road













<2037 FB Sc1> PM Peak Hour
 06/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶		↷
Traffic Volume (veh/h)	108	77	29	73	64	18
Future Volume (Veh/h)	108	77	29	73	64	18
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)	117	84	32	79	70	20
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			201		302	159
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			201		302	159
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			98		89	98
cM capacity (veh/h)			1383		666	892
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	201	111	90			
Volume Left	0	32	70			
Volume Right	84	0	20			
cSH	1700	1383	705			
Volume to Capacity	0.12	0.02	0.13			
Queue Length 95th (m)	0.0	0.5	3.3			
Control Delay (s)	0.0	2.3	10.8			
Lane LOS			A	B		
Approach Delay (s)	0.0	2.3	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			32.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2037 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Future Volume (vph)	74	27	60	0	19	50	35	90	0	79	154	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	29	65	0	21	54	38	98	0	86	167	68
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	174	75	136	321								
Volume Left (vph)	80	0	38	86								
Volume Right (vph)	65	54	0	68								
Hadj (s)	-0.12	-0.43	0.07	-0.06								
Departure Headway (s)	5.0	4.9	5.0	4.7								
Degree Utilization, x	0.24	0.10	0.19	0.42								
Capacity (veh/h)	658	655	666	733								
Control Delay (s)	9.6	8.4	9.2	11.0								
Approach Delay (s)	9.6	8.4	9.2	11.0								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			10.0									
Level of Service			B									
Intersection Capacity Utilization			46.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FB Sc1> PM Peak Hour

























06/17/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	28	17	353	16	134	0	572	232	172	645	16		
Future Volume (vph)	39	28	17	353	16	134	0	572	232	172	645	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Frt	1.00	0.94		1.00	0.87			1.00	0.85	1.00	1.00			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1620		1533	1434			1731	1348	1536	1724			
Flt Permitted	0.65	1.00		0.73	1.00			1.00	1.00	0.20	1.00			
Satd. Flow (perm)	1068	1620		1171	1434			1731	1348	318	1724			
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)	42	30	18	384	17	146	0	622	252	187	701	17		
RTOR Reduction (vph)	0	12	0	0	96	0	0	0	125	0	1	0		
Lane Group Flow (vph)	42	36	0	384	67	0	0	622	127	187	717	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	1%	0%	5%	0%	0%	3%	1%	0%	0%		
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2		2	6				
Actuated Green, G (s)	34.7	34.7		34.7	34.7			44.3	44.3	52.3	52.3			
Effective Green, g (s)	34.7	34.7		34.7	34.7			44.3	44.3	52.3	52.3			
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.44	0.44	0.51	0.51			
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	364	552		399	489			754	587	223	886			
v/s Ratio Prot		0.02			0.05			0.36		0.04	c0.42			
v/s Ratio Perm	0.04			c0.33					0.09	c0.39				
v/c Ratio	0.12	0.07		0.96	0.14			0.82	0.22	0.84	0.81			
Uniform Delay, d1	23.0	22.6		32.9	23.1			25.3	17.9	22.9	20.6			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1		35.1	0.1			10.0	0.8	23.1	7.9			
Delay (s)	23.1	22.6		68.0	23.3			35.3	18.7	46.0	28.4			
Level of Service	C	C		E	C			D	B	D	C			
Approach Delay (s)		22.9			54.7			30.5			32.1			
Approach LOS		C			D			C			C			
Intersection Summary														
HCM 2000 Control Delay			36.3									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.92											
Actuated Cycle Length (s)			101.7								17.7			
Intersection Capacity Utilization			108.4%										ICU Level of Service	G
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FB Sc1> PM Peak Hour

06/17/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	91	372	18	145	500	174	7	102	103	123	155	67	
Future Volume (vph)	91	372	18	145	500	174	7	102	103	123	155	67	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	
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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1644	1633	1471	1644	1617	1456	1642	1697	1471	1612	1607	1607	
Flt Permitted	0.27	1.00	1.00	0.40	1.00	1.00	0.56	1.00	1.00	0.69	1.00	1.00	
Satd. Flow (perm)	474	1633	1471	697	1617	1456	976	1697	1471	1163	1607	1607	
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)	99	404	20	158	543	189	8	111	112	134	168	73	
RTOR Reduction (vph)	0	0	11	0	0	85	0	0	63	0	17	0	
Lane Group Flow (vph)	99	404	9	158	543	104	8	111	49	134	224	0	
Confl. Peds. (#/hr)							1					1	
Heavy Vehicles (%)	0%	6%	0%	0%	7%	1%	0%	2%	0%	2%	3%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	Perm	NA	
Protected Phases		4			8			2				6	
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.3	30.3	30.3	30.3	30.3	30.3	
Effective Green, g (s)	33.0	33.0	33.0	33.0	33.0	33.0	32.3	32.3	32.3	32.3	32.3	32.3	
Actuated g/C Ratio	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	213	735	662	313	727	655	430	747	648	512	708	708	
v/s Ratio Prot		0.25			c0.34			0.07				c0.14	
v/s Ratio Perm	0.21		0.01	0.23		0.07	0.01		0.03	0.12			
v/c Ratio	0.46	0.55	0.01	0.50	0.75	0.16	0.02	0.15	0.08	0.26	0.32	0.32	
Uniform Delay, d1	14.0	14.7	11.1	14.3	16.7	11.9	11.6	12.3	11.9	13.0	13.3	13.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	0.8	0.0	1.3	4.2	0.1	0.1	0.4	0.2	1.2	1.2	1.2	
Delay (s)	15.6	15.6	11.2	15.6	20.9	12.0	11.6	12.7	12.1	14.2	14.5	14.5	
Level of Service	B	B	B	B	C	B	B	B	B	B	B	B	
Approach Delay (s)		15.4			18.1			12.4			14.4		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			16.0									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.53										
Actuated Cycle Length (s)			73.3									Sum of lost time (s)	8.0
Intersection Capacity Utilization			72.7%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2037 FB Sc1> PM Peak Hour
06/17/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	75	397	428	49	99	60
Future Volume (Veh/h)	75	397	428	49	99	60
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)	82	432	465	53	108	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)						
pX, platoon unblocked						
vC, conflicting volume	518				1061	465
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518				1061	465
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				53	89
cM capacity (veh/h)	1053				231	602
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	82	432	465	53	108	65
Volume Left	82	0	0	0	108	0
Volume Right	0	0	0	53	0	65
cSH	1053	1700	1700	1700	231	602
Volume to Capacity	0.08	0.25	0.27	0.03	0.47	0.11
Queue Length 95th (m)	1.9	0.0	0.0	0.0	17.5	2.7
Control Delay (s)	8.7	0.0	0.0	0.0	33.7	11.7
Lane LOS	A				D	B
Approach Delay (s)	1.4		0.0		25.4	
Approach LOS					D	
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			44.9%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2037 FB Sc1> PM Peak Hour
06/17/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	10	147	8	15	0	118	0	7	1	3	6
Future Volume (Veh/h)	2	10	147	8	15	0	118	0	7	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	11	160	9	16	0	128	0	8	1	3	7
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	16			171			138	129	91	137	209	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			171			138	129	91	137	209	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			84	100	99	100	100	99
cM capacity (veh/h)	1615			1418			818	760	972	827	686	1069
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	173	25	136	11								
Volume Left	2	9	128	1								
Volume Right	160	0	8	7								
cSH	1615	1418	826	907								
Volume to Capacity	0.00	0.01	0.16	0.01								
Queue Length 95th (m)	0.0	0.1	4.5	0.3								
Control Delay (s)	0.1	2.8	10.2	9.0								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.8	10.2	9.0								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			31.5%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2037 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	201	12	19	299
Future Volume (Veh/h)	8	11	201	12	19	299
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)	9	12	218	13	21	325
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	592	224			231	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	592	224			231	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	465	820			1349	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	231	346			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	618	1700	1349			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			43.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street











<2037 FB Sc1> PM Peak Hour
 06/17/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	202	12	19	288
Future Volume (Veh/h)	8	11	202	12	19	288
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)	9	12	220	13	21	313
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	582	226			233	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	226			233	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	471	818			1346	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	233	334			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	622	1700	1346			
Volume to Capacity	0.03	0.14	0.02			
Queue Length 95th (m)	0.8	0.0	0.4			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			43.3%	ICU Level of Service		A
Analysis Period (min)			15			

C-8 *2037 FUTURE*
BACKGROUND SC2



















HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2037 FB Sc2> AM Peak Hour
05/28/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	172	62	3	92	64	55
Future Volume (Veh/h)	172	62	3	92	64	55
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)	187	67	3	100	70	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)						
pX, platoon unblocked						
vC, conflicting volume			254	326		220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			254	326		220
tC, single (s)			4.1	6.5		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.6		3.3
p0 queue free %			100	89		93
cM capacity (veh/h)			1323	648		814
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	254	103	130			
Volume Left	0	3	70			
Volume Right	67	0	60			
cSH	1700	1323	715			
Volume to Capacity	0.15	0.00	0.18			
Queue Length 95th (m)	0.0	0.1	5.0			
Control Delay (s)	0.0	0.2	11.1			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.2	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			28.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2037 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	67	0	0	204	0	693	78	0	475	132
Future Volume (Veh/h)	0	0	67	0	0	204	0	693	78	0	475	132
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	73	0	0	222	0	753	85	0	516	143
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	1491	1354	516	1269	1269	753	516			838		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1491	1354	516	1269	1269	753	516			838		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	87	100	100	45	100			100		
cM capacity (veh/h)	47	151	545	127	170	406	1060			805		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	73	222	753	85	516	143						
Volume Left	0	0	0	0	0	0						
Volume Right	73	222	0	85	0	143						
cSH	545	406	1700	1700	1700	1700						
Volume to Capacity	0.13	0.55	0.44	0.05	0.30	0.08						
Queue Length 95th (m)	3.5	24.1	0.0	0.0	0.0	0.0						
Control Delay (s)	12.6	24.0	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	12.6	24.0	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			3.5									
Intersection Capacity Utilization			60.0%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2037 FB Sc2> AM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖		↘
Traffic Volume (veh/h)	88	154	66	21	74	6
Future Volume (Veh/h)	88	154	66	21	74	6
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)	96	167	72	23	80	7
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			263		346	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			263		346	180
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		87	99
cM capacity (veh/h)			1295		608	869
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	263	95	87			
Volume Left	0	72	80			
Volume Right	167	0	7			
cSH	1700	1295	623			
Volume to Capacity	0.15	0.06	0.14			
Queue Length 95th (m)	0.0	1.3	3.7			
Control Delay (s)	0.0	6.1	11.7			
Lane LOS			A			B
Approach Delay (s)	0.0	6.1	11.7			
Approach LOS			B			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			35.3%	ICU Level of Service	A	
Analysis Period (min)			15			























HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	0	1	0	0	93	1	210	2	36	98	3
Future Volume (vph)	3	0	1	0	0	93	1	210	2	36	98	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	1	0	0	101	1	228	2	39	107	3
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	4	101	231	149								
Volume Left (vph)	3	0	1	39								
Volume Right (vph)	1	101	2	3								
Hadj (s)	0.42	-0.57	0.00	0.13								
Departure Headway (s)	5.3	4.2	4.3	4.5								
Degree Utilization, x	0.01	0.12	0.28	0.19								
Capacity (veh/h)	616	783	811	765								
Control Delay (s)	8.3	7.8	8.9	8.5								
Approach Delay (s)	8.3	7.8	8.9	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			36.6%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FB Sc2> AM Peak Hour
05/28/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	9	7	225	29	161	23	568	335	115	399	20
Future Volume (vph)	11	9	7	225	29	161	23	568	335	115	399	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.93		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1522		1478	1474		1492	1713	1310	1521	1686	
Fl _t Permitted	0.51	1.00		0.75	1.00		0.50	1.00	1.00	0.26	1.00	
Satd. Flow (perm)	766	1522		1160	1474		783	1713	1310	411	1686	
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	10	8	245	32	175	25	617	364	125	434	22
RTOR Reduction (vph)	0	6	0	0	126	0	0	0	162	0	2	0
Lane Group Flow (vph)	12	12	0	245	81	0	25	617	202	125	454	0
Heavy Vehicles (%)	9%	11%	0%	5%	0%	3%	4%	1%	6%	2%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	24.9	24.9		24.9	24.9		51.1	51.1	51.1	59.1	59.1	
Effective Green, g (s)	27.9	27.9		27.9	27.9		54.8	54.8	54.8	59.1	62.8	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.56	0.56	0.56	0.60	0.64	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	216	430		327	416		434	951	727	302	1072	
v/s Ratio Prot		0.01			0.06			c0.36		0.02	c0.27	
v/s Ratio Perm	0.02			c0.21			0.03		0.15	0.23		
v/c Ratio	0.06	0.03		0.75	0.20		0.06	0.65	0.28	0.41	0.42	
Uniform Delay, d ₁	25.8	25.6		32.2	26.9		10.1	15.3	11.5	11.6	8.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		9.1	0.2		0.3	3.4	1.0	0.9	1.2	
Delay (s)	25.9	25.6		41.3	27.1		10.3	18.7	12.5	12.5	10.2	
Level of Service	C	C		D	C		B	B	B	B	B	
Approach Delay (s)		25.7			34.8			16.2			10.7	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.9	HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			98.7	Sum of lost time (s)				11.0				
Intersection Capacity Utilization			71.0%	ICU Level of Service				C				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FB Sc2> AM Peak Hour

05/28/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	32	360	30	68	325	126	82	187	131	106	54	17	
Future Volume (vph)	32	360	30	68	325	126	82	187	131	106	54	17	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1596	1664	1471	1628	1617	1471	1644	1713	1471	1644	1647		
Flt Permitted	0.43	1.00	1.00	0.38	1.00	1.00	0.71	1.00	1.00	0.63	1.00		
Satd. Flow (perm)	714	1664	1471	655	1617	1471	1223	1713	1471	1082	1647		
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)	35	391	33	74	353	137	89	203	142	115	59	18	
RTOR Reduction (vph)	0	0	20	0	0	84	0	0	73	0	9	0	
Lane Group Flow (vph)	35	391	13	74	353	53	89	203	69	115	68	0	
Heavy Vehicles (%)	3%	4%	0%	1%	7%	0%	0%	1%	0%	0%	0%	6%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	22.5	22.5	22.5	22.5	22.5	22.5	30.1	30.1	30.1	30.1	30.1		
Effective Green, g (s)	25.5	25.5	25.5	25.5	25.5	25.5	32.1	32.1	32.1	32.1	32.1		
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.49	0.49	0.49	0.49	0.49		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	277	646	571	254	628	571	598	838	719	529	805		
v/s Ratio Prot		c0.23			0.22			c0.12			0.04		
v/s Ratio Perm	0.05		0.01	0.11		0.04	0.07		0.05	0.11			
v/c Ratio	0.13	0.61	0.02	0.29	0.56	0.09	0.15	0.24	0.10	0.22	0.08		
Uniform Delay, d1	12.9	16.0	12.4	13.8	15.7	12.7	9.2	9.7	9.0	9.6	8.9		
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	0.2	1.6	0.0	0.6	1.2	0.1	0.5	0.7	0.3	0.9	0.2		
Delay (s)	13.1	17.6	12.4	14.5	16.8	12.8	9.8	10.4	9.2	10.5	9.1		
Level of Service	B	B	B	B	B	B	A	B	A	B	A		
Approach Delay (s)		16.9			15.5			9.9			10.0		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay			13.8									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.40										
Actuated Cycle Length (s)			65.6									Sum of lost time (s)	8.0
Intersection Capacity Utilization			69.6%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2037 FB Sc2> AM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	111	420	344	66	35	41
Future Volume (Veh/h)	111	420	344	66	35	41
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)	121	457	374	72	38	45
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	446				1073	374
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				1073	374
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	89				82	93
cM capacity (veh/h)	1109				211	677
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	121	457	374	72	38	45
Volume Left	121	0	0	0	38	0
Volume Right	0	0	0	72	0	45
cSH	1109	1700	1700	1700	211	677
Volume to Capacity	0.11	0.27	0.22	0.04	0.18	0.07
Queue Length 95th (m)	2.8	0.0	0.0	0.0	4.9	1.6
Control Delay (s)	8.6	0.0	0.0	0.0	25.8	10.7
Lane LOS	A				D	B
Approach Delay (s)	1.8		0.0		17.6	
Approach LOS					C	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			39.7%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2037 FB Sc2> AM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	75	3	4	0	173	0	6	0	1	7
Future Volume (Veh/h)	1	7	75	3	4	0	173	0	6	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	8	82	3	4	0	188	0	7	0	1	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	4			90			70	61	49	68	102	4
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			90			70	61	49	68	102	4
tC, single (s)	4.1			4.4			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			79	100	99	100	100	99
cM capacity (veh/h)	1631			1331			910	831	1025	921	790	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	91	7	195	9								
Volume Left	1	3	188	0								
Volume Right	82	0	7	8								
cSH	1631	1331	914	1042								
Volume to Capacity	0.00	0.00	0.21	0.01								
Queue Length 95th (m)	0.0	0.1	6.1	0.2								
Control Delay (s)	0.1	3.3	10.0	8.5								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	3.3	10.0	8.5								
Approach LOS			B	A								
Intersection Summary												
Average Delay			6.8									
Intersection Capacity Utilization			29.6%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2037 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	376	4	5	145
Future Volume (Veh/h)	11	17	376	4	5	145
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)	12	18	409	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	579	411			413	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579	411			413	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	97			100	
cM capacity (veh/h)	478	645			1157	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	413	163			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	566	1700	1157			
Volume to Capacity	0.05	0.24	0.00			
Queue Length 95th (m)	1.3	0.0	0.1			
Control Delay (s)	11.7	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.7	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			31.7%	ICU Level of Service		A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FB Sc2> AM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	358	4	5	154
Future Volume (Veh/h)	11	17	358	4	5	154
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)	12	18	389	4	5	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)						
pX, platoon unblocked						
vC, conflicting volume	568	391			393	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	568	391			393	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			100	
cM capacity (veh/h)	486	662			1177	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	393	172			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	578	1700	1177			
Volume to Capacity	0.05	0.23	0.00			
Queue Length 95th (m)	1.2	0.0	0.1			
Control Delay (s)	11.6	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.6	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			30.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road



















<2037 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	127	109	1	63	133	50
Future Volume (Veh/h)	127	109	1	63	133	50
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)	138	118	1	68	145	54
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			256		267	197
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			256		267	197
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		80	94
cM capacity (veh/h)			1321		715	849
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	256	69	199			
Volume Left	0	1	145			
Volume Right	118	0	54			
cSH	1700	1321	747			
Volume to Capacity	0.15	0.00	0.27			
Queue Length 95th (m)	0.0	0.0	8.1			
Control Delay (s)	0.0	0.1	11.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.1	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization			32.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2037 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	99	0	0	175	0	595	55	0	749	132
Future Volume (Veh/h)	0	0	99	0	0	175	0	595	55	0	749	132
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	108	0	0	190	0	647	60	0	814	143
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	1651	1521	814	1461	1461	647	814			707		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1651	1521	814	1461	1461	647	814			707		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	71	100	100	60	100			100		
cM capacity (veh/h)	48	120	375	77	130	473	822			901		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	108	190	647	60	814	143						
Volume Left	0	0	0	0	0	0						
Volume Right	108	190	0	60	0	143						
cSH	375	473	1700	1700	1700	1700						
Volume to Capacity	0.29	0.40	0.38	0.04	0.48	0.08						
Queue Length 95th (m)	8.9	14.5	0.0	0.0	0.0	0.0						
Control Delay (s)	18.4	17.6	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	18.4	17.6	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			56.1%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2037 FB Sc2> PM Peak Hour
 05/28/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩		↩
Traffic Volume (veh/h)	80	104	81	15	55	4
Future Volume (Veh/h)	80	104	81	15	55	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)	87	113	88	16	60	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			200		336	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			200		336	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		90	100
cM capacity (veh/h)			1384		618	909
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	200	104	64			
Volume Left	0	88	60			
Volume Right	113	0	4			
cSH	1700	1384	630			
Volume to Capacity	0.12	0.06	0.10			
Queue Length 95th (m)	0.0	1.5	2.6			
Control Delay (s)	0.0	6.7	11.4			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.7	11.4			
Approach LOS			B			
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			30.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2037 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Future Volume (vph)	1	0	0	0	0	63	0	131	1	88	257	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	0	0	68	0	142	1	96	279	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	1	68	143	376								
Volume Left (vph)	1	0	0	96								
Volume Right (vph)	0	68	1	1								
Hadj (s)	0.20	-0.52	0.00	0.05								
Departure Headway (s)	5.4	4.5	4.4	4.3								
Degree Utilization, x	0.00	0.09	0.18	0.45								
Capacity (veh/h)	598	709	779	822								
Control Delay (s)	8.4	8.0	8.4	10.7								
Approach Delay (s)	8.4	8.0	8.4	10.7								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			9.8									
Level of Service			A									
Intersection Capacity Utilization			42.2%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FB Sc2> PM Peak Hour

























05/28/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	32	26	16	322	7	123	2	504	276	207	692	14	
Future Volume (vph)	32	26	16	322	7	123	2	504	276	207	692	14	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Fr _t	1.00	0.94		1.00	0.86		1.00	1.00	0.85	1.00	1.00		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1632		1521	1445		1552	1713	1361	1521	1706		
Fl _t Permitted	0.64	1.00		0.73	1.00		0.25	1.00	1.00	0.18	1.00		
Satd. Flow (perm)	1047	1632		1165	1445		407	1713	1361	281	1706		
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)	35	28	17	350	8	134	2	548	300	225	752	15	
RTOR Reduction (vph)	0	11	0	0	86	0	0	0	162	0	0	0	
Lane Group Flow (vph)	35	34	0	350	56	0	2	548	138	225	767	0	
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	0%	1%	2%	2%	1%	7%	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2		2	6			
Actuated Green, G (s)	31.8	31.8		31.8	31.8		36.0	36.0	36.0	50.5	50.5		
Effective Green, g (s)	34.8	34.8		34.8	34.8		39.7	39.7	39.7	50.5	54.2		
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.41	0.41	0.41	0.52	0.56		
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	375	585		417	518		166	701	557	293	953		
v/s Ratio Prot		0.02			0.04			0.32		0.09	c0.45		
v/s Ratio Perm	0.03			c0.30			0.00		0.10	0.31			
v/c Ratio	0.09	0.06		0.84	0.11		0.01	0.78	0.25	0.77	0.80		
Uniform Delay, d ₁	20.6	20.4		28.5	20.7		17.0	24.9	18.8	17.4	17.2		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	0.1	0.0		13.8	0.1		0.1	8.5	1.1	11.4	7.2		
Delay (s)	20.7	20.4		42.3	20.8		17.1	33.4	19.9	28.8	24.3		
Level of Service	C	C		D	C		B	C	B	C	C		
Approach Delay (s)		20.6			36.1			28.6			25.3		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			28.5									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			97.0									Sum of lost time (s)	11.0
Intersection Capacity Utilization			96.0%									ICU Level of Service	F
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	360	106	158	393	162	62	86	83	111	185	55
Future Volume (vph)	50	360	106	158	393	162	62	86	83	111	185	55
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	
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	1.00	1.00	1.00	1.00	1.00	0.99	
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	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1612	1680	1471	1644	1664	1456	1641	1731	1471	1644	1654	
Flt Permitted	0.36	1.00	1.00	0.39	1.00	1.00	0.56	1.00	1.00	0.70	1.00	
Satd. Flow (perm)	606	1680	1471	683	1664	1456	966	1731	1471	1206	1654	
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)	54	391	115	172	427	176	67	93	90	121	201	60
RTOR Reduction (vph)	0	0	68	0	0	104	0	0	50	0	11	0
Lane Group Flow (vph)	54	391	47	172	427	72	67	93	40	121	250	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	2%	3%	0%	0%	4%	1%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	24.9	24.9	24.9	24.9	24.9	24.9	30.2	30.2	30.2	30.2	30.2	
Effective Green, g (s)	27.9	27.9	27.9	27.9	27.9	27.9	32.2	32.2	30.2	32.2	32.2	
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.41	0.41	0.47	0.47	0.44	0.47	0.47	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	248	688	602	279	681	596	456	818	652	570	782	
v/s Ratio Prot		0.23			c0.26			0.05			c0.15	
v/s Ratio Perm	0.09		0.03	0.25		0.05	0.07		0.03	0.10		
v/c Ratio	0.22	0.57	0.08	0.62	0.63	0.12	0.15	0.11	0.06	0.21	0.32	
Uniform Delay, d1	13.0	15.5	12.3	15.9	16.0	12.5	10.2	10.0	10.8	10.5	11.1	
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	0.4	1.1	0.1	4.0	1.8	0.1	0.7	0.3	0.2	0.8	1.1	
Delay (s)	13.5	16.5	12.3	19.9	17.8	12.6	10.8	10.3	11.0	11.4	12.2	
Level of Service	B	B	B	B	B	B	B	B	B	B	B	
Approach Delay (s)		15.4			17.1			10.7			12.0	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			14.8									B
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			68.1							8.0		
Intersection Capacity Utilization			78.3%									D
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2037 FB Sc2> PM Peak Hour
05/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Traffic Volume (veh/h)	81	463	420	34	84	59
Future Volume (Veh/h)	81	463	420	34	84	59
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)	88	503	457	37	91	64
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	494				1136	457
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	494				1136	457
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				56	89
cM capacity (veh/h)	1070				206	608
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	88	503	457	37	91	64
Volume Left	88	0	0	0	91	0
Volume Right	0	0	0	37	0	64
cSH	1070	1700	1700	1700	206	608
Volume to Capacity	0.08	0.30	0.27	0.02	0.44	0.11
Queue Length 95th (m)	2.0	0.0	0.0	0.0	15.8	2.7
Control Delay (s)	8.7	0.0	0.0	0.0	35.6	11.6
Lane LOS	A				E	B
Approach Delay (s)	1.3		0.0		25.7	
Approach LOS					D	
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			43.9%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2037 FB Sc2> PM Peak Hour
05/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	7	140	4	10	0	110	2	8	0	1	1
Future Volume (Veh/h)	3	7	140	4	10	0	110	2	8	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	8	152	4	11	0	120	2	9	0	1	1
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	11			160			110	109	84	119	185	11
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	11			160			110	109	84	119	185	11
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			86	100	99	100	100	100
cM capacity (veh/h)	1428			1432			860	781	981	849	709	1076
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	163	15	131	2								
Volume Left	3	4	120	0								
Volume Right	152	0	9	1								
cSH	1428	1432	866	855								
Volume to Capacity	0.00	0.00	0.15	0.00								
Queue Length 95th (m)	0.0	0.1	4.0	0.1								
Control Delay (s)	0.2	2.0	9.9	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.2	2.0	9.9	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			30.7%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2037 FB Sc2> PM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	215	12	19	422
Future Volume (Veh/h)	8	11	215	12	19	422
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)	9	12	234	13	21	459
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	742	240			247	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	742	240			247	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	380	803			1331	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	247	480			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	544	1700	1331			
Volume to Capacity	0.04	0.15	0.02			
Queue Length 95th (m)	0.9	0.0	0.4			
Control Delay (s)	11.9	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.9	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			50.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street











<2037 FB Sc2> PM Peak Hour
 05/28/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	217	12	19	406
Future Volume (Veh/h)	8	11	217	12	19	406
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)	9	12	236	13	21	441
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	726	242			249	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	726	242			249	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			98	
cM capacity (veh/h)	388	801			1328	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	249	462			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	551	1700	1328			
Volume to Capacity	0.04	0.15	0.02			
Queue Length 95th (m)	0.9	0.0	0.4			
Control Delay (s)	11.8	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	11.8	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			50.0%	ICU Level of Service		A
Analysis Period (min)			15			

C-9 *2027 FUTURE TOTAL*
SC1



















HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2027 FT Sc1> AM Peak Hour
06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	139	69	188	149	40	14
Future Volume (Veh/h)	139	69	188	149	40	14
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)	151	75	204	162	43	15
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			226		758	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			226		758	188
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			85		86	98
cM capacity (veh/h)			1354		310	859
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	226	366	58			
Volume Left	0	204	43			
Volume Right	75	0	15			
cSH	1700	1354	371			
Volume to Capacity	0.13	0.15	0.16			
Queue Length 95th (m)	0.0	4.0	4.2			
Control Delay (s)	0.0	5.1	16.5			
Lane LOS			A	C		
Approach Delay (s)	0.0	5.1	16.5			
Approach LOS			C			
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization			45.7%	ICU Level of Service		A
Analysis Period (min)			15			











HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FT Sc1> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	250	0	0	85	0	654	134	0	385	47
Future Volume (Veh/h)	0	0	250	0	0	85	0	654	134	0	385	47
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	272	0	0	92	0	711	146	0	418	51
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	1221	1275	418	1129	1129	711	418			857		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1221	1275	418	1129	1129	711	418			857		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	56	100	100	79	100			100		
cM capacity (veh/h)	124	168	616	102	206	431	1152			792		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	272	92	711	146	418	51						
Volume Left	0	0	0	0	0	0						
Volume Right	272	92	0	146	0	51						
cSH	616	431	1700	1700	1700	1700						
Volume to Capacity	0.44	0.21	0.42	0.09	0.25	0.03						
Queue Length 95th (m)	17.1	6.1	0.0	0.0	0.0	0.0						
Control Delay (s)	15.4	15.6	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	15.4	15.6	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			49.8%		ICU Level of Service				A			
Analysis Period (min)			15									













HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

<2027 FT Sc1> AM Peak Hour
06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	84	72	14	261	77	65
Future Volume (Veh/h)	84	72	14	261	77	65
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	78	15	284	84	71
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			169	444		130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			169	444		130
tC, single (s)			4.1	6.5		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.6		3.3
p0 queue free %			99	85		92
cM capacity (veh/h)			1421	558		925
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	169	299	155			
Volume Left	0	15	84			
Volume Right	78	0	71			
cSH	1700	1421	682			
Volume to Capacity	0.10	0.01	0.23			
Queue Length 95th (m)	0.0	0.2	6.6			
Control Delay (s)	0.0	0.5	11.8			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.5	11.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			42.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FT Sc1> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	57	80	19	0	244	464	59	148	0	144	56	67
Future Volume (vph)	57	80	19	0	244	464	59	148	0	144	56	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	87	21	0	265	504	64	161	0	157	61	73
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	170	769	225	291								
Volume Left (vph)	62	0	64	157								
Volume Right (vph)	21	504	0	73								
Hadj (s)	0.03	-0.30	0.09	0.11								
Departure Headway (s)	7.1	5.9	7.2	7.0								
Degree Utilization, x	0.34	1.26	0.45	0.57								
Capacity (veh/h)	466	601	469	494								
Control Delay (s)	13.7	149.7	16.0	18.9								
Approach Delay (s)	13.7	149.7	16.0	18.9								
Approach LOS	B	F	C	C								
Intersection Summary												
Delay			87.0									
Level of Service			F									
Intersection Capacity Utilization			94.1%	ICU Level of Service	F							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FT Sc1> AM Peak Hour

























06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	13	7	117	31	283	16	466	283	106	329	17
Future Volume (vph)	19	13	7	117	31	283	16	466	283	106	329	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.95		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1636		1411	1483		1552	1713	1375	1521	1702	
Flt Permitted	0.24	1.00		0.74	1.00		0.54	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	395	1636		1103	1483		879	1713	1375	544	1702	
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)	21	14	8	127	34	308	17	507	308	115	358	18
RTOR Reduction (vph)	0	6	0	0	233	0	0	0	134	0	2	0
Lane Group Flow (vph)	21	16	0	127	109	0	17	507	174	115	374	0
Heavy Vehicles (%)	0%	0%	0%	10%	0%	1%	0%	1%	1%	2%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	21.0	21.0		21.0	21.0		52.1	52.1	52.1	63.1	63.1	
Effective Green, g (s)	24.0	24.0		24.0	24.0		55.8	55.8	55.8	63.1	66.8	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.56	0.56	0.56	0.64	0.68	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	95	397		267	360		496	967	776	426	1150	
v/s Ratio Prot		0.01			0.07			c0.30		0.02	c0.22	
v/s Ratio Perm	0.05			c0.12			0.02		0.13	0.15		
v/c Ratio	0.22	0.04		0.48	0.30		0.03	0.52	0.22	0.27	0.33	
Uniform Delay, d1	29.9	28.6		32.0	30.6		9.5	13.3	10.7	8.5	6.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.0		1.3	0.5		0.1	2.0	0.7	0.3	0.8	
Delay (s)	31.1	28.6		33.4	31.0		9.7	15.3	11.4	8.8	7.4	
Level of Service	C	C		C	C		A	B	B	A	A	
Approach Delay (s)		29.8			31.7			13.8			7.7	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			17.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			98.8			Sum of lost time (s)			11.0			
Intersection Capacity Utilization			67.3%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FT Sc1> AM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	64	320	60	118	234	113	185	212	298	107	77	15	
Future Volume (vph)	64	320	60	118	234	113	185	212	298	107	77	15	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1545	1290	1566	1531	1414	1348	1680	1442	1628	1577		
Flt Permitted	0.54	1.00	1.00	0.43	1.00	1.00	0.69	1.00	1.00	0.60	1.00		
Satd. Flow (perm)	935	1545	1290	709	1531	1414	982	1680	1442	1025	1577		
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)	70	348	65	128	254	123	201	230	324	116	84	16	
RTOR Reduction (vph)	0	0	40	0	0	75	0	0	165	0	7	0	
Lane Group Flow (vph)	70	348	25	128	254	48	201	230	159	116	93	0	
Heavy Vehicles (%)	0%	12%	14%	5%	13%	4%	22%	3%	2%	1%	5%	18%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	22.4	22.4	22.4	22.4	22.4	22.4	30.1	30.1	30.1	30.1	30.1		
Effective Green, g (s)	25.4	25.4	25.4	25.4	25.4	25.4	32.1	32.1	32.1	32.1	32.1		
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.49	0.49	0.49	0.49	0.49		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	362	599	500	274	593	548	481	823	706	502	772		
v/s Ratio Prot		c0.23			0.17			0.14			0.06		
v/s Ratio Perm	0.07		0.02	0.18		0.03	c0.20		0.11	0.11			
v/c Ratio	0.19	0.58	0.05	0.47	0.43	0.09	0.42	0.28	0.22	0.23	0.12		
Uniform Delay, d1	13.3	15.8	12.5	15.0	14.7	12.7	10.7	9.9	9.6	9.6	9.1		
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	0.3	1.4	0.0	1.3	0.5	0.1	2.7	0.8	0.7	1.1	0.3		
Delay (s)	13.5	17.3	12.6	16.3	15.2	12.8	13.4	10.7	10.3	10.7	9.4		
Level of Service	B	B	B	B	B	B	B	B	B	B	A		
Approach Delay (s)		16.1			14.9			11.2			10.1		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			13.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49										
Actuated Cycle Length (s)			65.5									Sum of lost time (s)	8.0
Intersection Capacity Utilization			68.7%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FT Sc1> AM Peak Hour
06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	132	428	327	54	28	42
Future Volume (Veh/h)	132	428	327	54	28	42
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)	143	465	355	59	30	46
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	414				1106	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	414				1106	355
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	88				85	93
cM capacity (veh/h)	1145				206	671
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	143	465	355	59	30	46
Volume Left	143	0	0	0	30	0
Volume Right	0	0	0	59	0	46
cSH	1145	1700	1700	1700	206	671
Volume to Capacity	0.12	0.27	0.21	0.03	0.15	0.07
Queue Length 95th (m)	3.2	0.0	0.0	0.0	3.8	1.7
Control Delay (s)	8.6	0.0	0.0	0.0	25.5	10.8
Lane LOS	A				D	B
Approach Delay (s)	2.0		0.0		16.6	
Approach LOS					C	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			40.0%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FT Sc1> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	76	2	5	1	171	4	6	1	3	8
Future Volume (Veh/h)	4	6	76	2	5	1	171	4	6	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	83	2	5	1	186	4	7	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			90			76	66	48	75	108	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			90			76	66	48	75	108	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			79	100	99	100	100	99
cM capacity (veh/h)	1628			1518			899	825	1026	908	673	981
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	94	8	197	13								
Volume Left	4	2	186	1								
Volume Right	83	1	7	9								
cSH	1628	1518	901	883								
Volume to Capacity	0.00	0.00	0.22	0.01								
Queue Length 95th (m)	0.1	0.0	6.3	0.3								
Control Delay (s)	0.3	1.9	10.1	9.1								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.3	1.9	10.1	9.1								
Approach LOS			B	A								
Intersection Summary												
Average Delay			6.9									
Intersection Capacity Utilization			30.2%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	678	4	5	250
Future Volume (Veh/h)	11	17	678	4	5	250
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)	12	18	737	4	5	272
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	1021	739			741	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1021	739			741	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	96			99	
cM capacity (veh/h)	263	421			875	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	741	277			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	339	1700	875			
Volume to Capacity	0.09	0.44	0.01			
Queue Length 95th (m)	2.2	0.0	0.1			
Control Delay (s)	16.6	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	16.6	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			49.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2027 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	665	4	5	256
Future Volume (Veh/h)	11	17	665	4	5	256
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)	12	18	723	4	5	278
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	1013	725			727	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1013	725			727	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	96			99	
cM capacity (veh/h)	266	428			886	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	727	283			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	344	1700	886			
Volume to Capacity	0.09	0.43	0.01			
Queue Length 95th (m)	2.2	0.0	0.1			
Control Delay (s)	16.5	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	16.5	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			48.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2027 FT Sc1> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↑	↷		↶	↷
Traffic Volume (veh/h)	148	50	155	0	0	454
Future Volume (Veh/h)	148	50	155	0	0	454
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)	161	54	168	0	0	493
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			348			
pX, platoon unblocked						
vC, conflicting volume	168				544	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				544	168
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				100	44
cM capacity (veh/h)	1422				447	881
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	161	54	168	493		
Volume Left	161	0	0	0		
Volume Right	0	0	0	493		
cSH	1422	1700	1700	881		
Volume to Capacity	0.11	0.03	0.10	0.56		
Queue Length 95th (m)	2.9	0.0	0.0	27.0		
Control Delay (s)	7.9	0.0	0.0	14.1		
Lane LOS	A			B		
Approach Delay (s)	5.9		0.0	14.1		
Approach LOS				B		
Intersection Summary						
Average Delay			9.4			
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access











<2027 FT Sc1> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	49	0	0	0	0	151
Future Volume (Veh/h)	49	0	0	0	0	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)	53	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				106	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				106	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	85
cM capacity (veh/h)	1636				868	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	53	0	164			
Volume Left	53	0	0			
Volume Right	0	0	164			
cSH	1636	1700	1091			
Volume to Capacity	0.03	0.00	0.15			
Queue Length 95th (m)	0.8	0.0	4.0			
Control Delay (s)	7.3	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization		20.2%		ICU Level of Service		A
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2027 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	185	85	124	130	96	20
Future Volume (Veh/h)	185	85	124	130	96	20
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)	201	92	135	141	104	22
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			293		658	247
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			293		658	247
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		73	97
cM capacity (veh/h)			1280		381	797
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	293	276	126			
Volume Left	0	135	104			
Volume Right	92	0	22			
cSH	1700	1280	419			
Volume to Capacity	0.17	0.11	0.30			
Queue Length 95th (m)	0.0	2.7	9.5			
Control Delay (s)	0.0	4.5	17.2			
Lane LOS		A	C			
Approach Delay (s)	0.0	4.5	17.2			
Approach LOS			C			
Intersection Summary						
Average Delay			4.9			
Intersection Capacity Utilization			48.2%	ICU Level of Service		A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FT Sc1> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	200	0	0	85	0	555	248	0	679	110
Future Volume (Veh/h)	0	0	200	0	0	85	0	555	248	0	679	110
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	217	0	0	92	0	603	270	0	738	120
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	1433	1611	738	1341	1341	603	738			873		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1433	1611	738	1341	1341	603	738			873		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	48	100	100	81	100			100		
cM capacity (veh/h)	92	105	421	63	154	492	877			781		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	217	92	603	270	738	120						
Volume Left	0	0	0	0	0	0						
Volume Right	217	92	0	270	0	120						
cSH	421	492	1700	1700	1700	1700						
Volume to Capacity	0.52	0.19	0.35	0.16	0.43	0.07						
Queue Length 95th (m)	21.8	5.2	0.0	0.0	0.0	0.0						
Control Delay (s)	22.3	14.0	0.0	0.0	0.0	0.0						
Lane LOS	C	B										
Approach Delay (s)	22.3	14.0	0.0		0.0							
Approach LOS	C	B										
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			58.9%		ICU Level of Service				B			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2027 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	143	63	25	201	53	202
Future Volume (Veh/h)	143	63	25	201	53	202
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)	155	68	27	218	58	220
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			223			461 189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223			461 189
tC, single (s)			4.1			6.5 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.6 3.3
p0 queue free %			98			89 74
cM capacity (veh/h)			1358			535 858
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	223	245	278			
Volume Left	0	27	58			
Volume Right	68	0	220			
cSH	1700	1358	762			
Volume to Capacity	0.13	0.02	0.36			
Queue Length 95th (m)	0.0	0.5	12.7			
Control Delay (s)	0.0	1.0	12.4			
Lane LOS			A	B		
Approach Delay (s)	0.0	1.0	12.4			
Approach LOS			B			
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			52.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FT Sc1> PM Peak Hour
06/30/2020

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Sign Control		Stop			Stop			Stop			Stop				
Traffic Volume (vph)	74	266	60	0	160	300	35	90	0	505	154	63			
Future Volume (vph)	74	266	60	0	160	300	35	90	0	505	154	63			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	80	289	65	0	174	326	38	98	0	549	167	68			
Direction, Lane #	EB 1	WB 1	NB 1	SB 1											
Volume Total (vph)	434	500	136	784											
Volume Left (vph)	80	0	38	549											
Volume Right (vph)	65	326	0	68											
Hadj (s)	-0.05	-0.39	0.09	0.09											
Departure Headway (s)	7.9	7.4	9.5	7.9											
Degree Utilization, x	0.95	1.03	0.36	1.72											
Capacity (veh/h)	452	485	369	460											
Control Delay (s)	58.2	77.1	17.8	355.0											
Approach Delay (s)	58.2	77.1	17.8	355.0											
Approach LOS	F	F	C	F											
Intersection Summary															
Delay			185.9												
Level of Service			F												
Intersection Capacity Utilization			112.8%				ICU Level of Service				H				
Analysis Period (min)			15												

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2027 FT Sc1> PM Peak Hour

06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	41	17	289	24	208	0	470	191	308	531	16		
Future Volume (vph)	39	41	17	289	24	208	0	470	191	308	531	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Frt	1.00	0.96		1.00	0.87			1.00	0.85	1.00	1.00			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1646		1504	1409			1731	1298	1536	1707			
Flt Permitted	0.49	1.00		0.72	1.00			1.00	1.00	0.29	1.00			
Satd. Flow (perm)	793	1646		1133	1409			1731	1298	470	1707			
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)	42	45	18	314	26	226	0	511	208	335	577	17		
RTOR Reduction (vph)	0	12	0	0	149	0	0	0	105	0	1	0		
Lane Group Flow (vph)	42	51	0	314	103	0	0	511	103	335	593	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	3%	0%	7%	0%	0%	7%	1%	1%	0%		
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2		2	6				
Actuated Green, G (s)	30.1	30.1		30.1	30.1			44.5	44.5	52.5	52.5			
Effective Green, g (s)	33.1	33.1		33.1	33.1			48.2	48.2	52.5	56.2			
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.50	0.50	0.54	0.58			
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	269	559		385	479			857	642	308	985			
v/s Ratio Prot		0.03			0.07			0.30		c0.06	0.35			
v/s Ratio Perm	0.05			c0.28					0.08	c0.53				
v/c Ratio	0.16	0.09		0.82	0.21			0.60	0.16	1.09	0.60			
Uniform Delay, d1	22.4	21.9		29.3	22.8			17.6	13.5	25.0	13.3			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.3	0.1		12.5	0.2			3.1	0.5	76.7	2.7			
Delay (s)	22.6	21.9		41.8	23.1			20.6	14.0	101.8	16.0			
Level of Service	C	C		D	C			C	B	F	B			
Approach Delay (s)		22.2			33.5			18.7			46.9			
Approach LOS		C			C			B			D			
Intersection Summary														
HCM 2000 Control Delay			33.8									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.97											
Actuated Cycle Length (s)			97.3								11.0			
Intersection Capacity Utilization			93.2%										ICU Level of Service	F
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FT Sc1> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	306	198	311	410	142	113	148	201	101	235	55
Future Volume (vph)	75	306	198	311	410	142	113	148	201	101	235	55
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	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	1.00	0.85	1.00	0.97	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1644	1559	1471	1644	1559	1442	1642	1697	1471	1596	1634	1634
Flt Permitted	0.38	1.00	1.00	0.48	1.00	1.00	0.47	1.00	1.00	0.65	1.00	1.00
Satd. Flow (perm)	649	1559	1471	831	1559	1442	820	1697	1471	1089	1634	1634
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)	82	333	215	338	446	154	123	161	218	110	255	60
RTOR Reduction (vph)	0	0	113	0	0	81	0	0	126	0	10	0
Lane Group Flow (vph)	82	333	102	338	446	73	123	161	92	110	305	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	11%	0%	0%	11%	2%	0%	2%	0%	3%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	33.3	33.3	33.3	33.3	33.3	33.3	30.4	30.4	30.4	30.4	30.4	30.4
Effective Green, g (s)	36.3	36.3	36.3	36.3	36.3	36.3	32.4	32.4	32.4	32.4	32.4	32.4
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47	0.47	0.42	0.42	0.42	0.42	0.42	0.42
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	307	737	696	393	737	682	346	716	621	460	690	690
v/s Ratio Prot		0.21			0.29			0.09				c0.19
v/s Ratio Perm	0.13		0.07	c0.41		0.05	0.15		0.06	0.10		
v/c Ratio	0.27	0.45	0.15	0.86	0.61	0.11	0.36	0.22	0.15	0.24	0.44	0.44
Uniform Delay, d1	12.2	13.5	11.4	17.9	14.9	11.2	15.1	14.1	13.6	14.2	15.7	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.1	17.2	1.4	0.1	2.8	0.7	0.5	1.2	2.1	2.1
Delay (s)	12.6	14.0	11.5	35.1	16.3	11.3	17.9	14.9	14.2	15.5	17.8	17.8
Level of Service	B	B	B	D	B	B	B	B	B	B	B	B
Approach Delay (s)		13.0			22.3			15.3			17.2	
Approach LOS		B			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.6									B
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			76.7						8.0			
Intersection Capacity Utilization			79.3%									D
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FT Sc1> PM Peak Hour
06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	85	407	490	40	82	88
Future Volume (Veh/h)	85	407	490	40	82	88
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)	92	442	533	43	89	96
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	576				1159	533
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	576				1159	533
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				55	83
cM capacity (veh/h)	992				198	551
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	92	442	533	43	89	96
Volume Left	92	0	0	0	89	0
Volume Right	0	0	0	43	0	96
cSH	992	1700	1700	1700	198	551
Volume to Capacity	0.09	0.26	0.31	0.03	0.45	0.17
Queue Length 95th (m)	2.3	0.0	0.0	0.0	16.1	4.8
Control Delay (s)	9.0	0.0	0.0	0.0	37.2	12.9
Lane LOS	A				E	B
Approach Delay (s)	1.6		0.0		24.6	
Approach LOS					C	
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			48.0%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FT Sc1> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	8	159	7	13	0	121	0	6	1	3	6
Future Volume (Veh/h)	2	8	159	7	13	0	121	0	6	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	9	173	8	14	0	132	0	7	1	3	7
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	14			182			138	130	96	136	216	14
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			182			138	130	96	136	216	14
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			84	100	99	100	100	99
cM capacity (veh/h)	1617			1405			815	760	967	829	681	1072
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	184	22	139	11								
Volume Left	2	8	132	1								
Volume Right	173	0	7	7								
cSH	1617	1405	822	906								
Volume to Capacity	0.00	0.01	0.17	0.01								
Queue Length 95th (m)	0.0	0.1	4.6	0.3								
Control Delay (s)	0.1	2.8	10.3	9.0								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.8	10.3	9.0								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			32.3%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	451	12	19	725
Future Volume (Veh/h)	8	11	451	12	19	725
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)	9	12	490	13	21	788
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	1326	496			503	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	496			503	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	98			98	
cM capacity (veh/h)	170	577			1072	
Direction, Lane #						
	WB 1	NB 1	SB 1			
Volume Total	21	503	809			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	285	1700	1072			
Volume to Capacity	0.07	0.30	0.02			
Queue Length 95th (m)	1.8	0.0	0.5			
Control Delay (s)	18.7	0.0	0.5			
Lane LOS	C		A			
Approach Delay (s)	18.7	0.0	0.5			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2027 FT Sc1> PM Peak Hour
06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	452	12	19	714
Future Volume (Veh/h)	8	11	452	12	19	714
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)	9	12	491	13	21	776
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	1316	498			504	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1316	498			504	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	98			98	
cM capacity (veh/h)	172	577			1071	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	504	797			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	288	1700	1071			
Volume to Capacity	0.07	0.30	0.02			
Queue Length 95th (m)	1.8	0.0	0.5			
Control Delay (s)	18.5	0.0	0.5			
Lane LOS	C		A			
Approach Delay (s)	18.5	0.0	0.5			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			67.4%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2027 FT Sc1> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↔		↘	
Traffic Volume (veh/h)	499	170	101	0	0	293
Future Volume (Veh/h)	499	170	101	0	0	293
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)	542	185	110	0	0	318
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			359			
pX, platoon unblocked						
vC, conflicting volume	110				1379	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110				1379	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	64				100	66
cM capacity (veh/h)	1493				102	949
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	542	185	110	318		
Volume Left	542	0	0	0		
Volume Right	0	0	0	318		
cSH	1493	1700	1700	949		
Volume to Capacity	0.36	0.11	0.06	0.34		
Queue Length 95th (m)	12.8	0.0	0.0	11.3		
Control Delay (s)	8.8	0.0	0.0	10.7		
Lane LOS	A			B		
Approach Delay (s)	6.5		0.0	10.7		
Approach LOS				B		
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			63.0%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access

<2027 FT Sc1> PM Peak Hour
 06/30/2020















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	166	0	0	0	0	98
Future Volume (Veh/h)	166	0	0	0	0	98
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)	180	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				360	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				360	0
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				100	90
cM capacity (veh/h)	1636				572	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	180	0	107			
Volume Left	180	0	0			
Volume Right	0	0	107			
cSH	1636	1700	1091			
Volume to Capacity	0.11	0.00	0.10			
Queue Length 95th (m)	2.8	0.0	2.5			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			23.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road


















<2027 FT w Recom Sc1> AM Peak Hour

06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕		↙	↘		
Traffic Volume (vph)	57	80	19	0	244	464	59	148	0	144	56	67	
Future Volume (vph)	57	80	19	0	244	464	59	148	0	144	56	67	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)		4.0			4.0			4.0		6.0	4.0		
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00		
Frbp, ped/bikes		1.00			0.99			1.00		1.00	1.00		
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00		
Frt		0.98			0.91			1.00		1.00	0.92		
Flt Protected		0.98			1.00			0.99		0.95	1.00		
Satd. Flow (prot)		1632			1477			1670		1442	1543		
Flt Permitted		0.60			1.00			0.88		0.57	1.00		
Satd. Flow (perm)		996			1477			1485		870	1543		
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)	62	87	21	0	265	504	64	161	0	157	61	73	
RTOR Reduction (vph)	0	7	0	0	92	0	0	0	0	0	52	0	
Lane Group Flow (vph)	0	163	0	0	677	0	0	225	0	157	82	0	
Confl. Peds. (#/hr)	2		2	2		2							
Heavy Vehicles (%)	1%	0%	14%	0%	0%	8%	0%	3%	0%	14%	3%	3%	
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		31.7			31.7			15.3		15.3	15.3		
Effective Green, g (s)		33.7			33.7			17.3		15.3	17.3		
Actuated g/C Ratio		0.57			0.57			0.29		0.26	0.29		
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0		
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0		
Lane Grp Cap (vph)		568			843			435		225	452		
v/s Ratio Prot					c0.46						0.05		
v/s Ratio Perm		0.16						0.15		c0.18			
v/c Ratio		0.29			0.80			0.52		0.70	0.18		
Uniform Delay, d1		6.5			10.0			17.4		19.8	15.6		
Progression Factor		1.00			1.00			1.00		1.00	1.00		
Incremental Delay, d2		1.3			8.0			1.0		9.1	0.2		
Delay (s)		7.8			18.0			18.4		28.8	15.8		
Level of Service		A			B			B		C	B		
Approach Delay (s)		7.8			18.0			18.4			22.8		
Approach LOS		A			B			B			C		
Intersection Summary													
HCM 2000 Control Delay			17.8									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			59.0									Sum of lost time (s)	8.0
Intersection Capacity Utilization			92.4%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2027 FT w Recom Sc1> PM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	74	266	60	0	160	300	35	90	0	505	154	63	
Future Volume (vph)	74	266	60	0	160	300	35	90	0	505	154	63	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0		
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00		
Frbp, ped/bikes		1.00			1.00			1.00		1.00	1.00		
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00		
Frt		0.98			0.91			1.00		1.00	0.96		
Flt Protected		0.99			1.00			0.99		0.95	1.00		
Satd. Flow (prot)		1671			1578			1669		1644	1639		
Flt Permitted		0.63			1.00			0.87		0.59	1.00		
Satd. Flow (perm)		1057			1578			1470		1026	1639		
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)	80	289	65	0	174	326	38	98	0	549	167	68	
RTOR Reduction (vph)	0	8	0	0	81	0	0	0	0	0	17	0	
Lane Group Flow (vph)	0	426	0	0	419	0	0	136	0	549	218	0	
Confl. Peds. (#/hr)			2	2									
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	8%	0%	0%	0%	1%	1%	
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		33.2			33.2			22.1		38.1	38.1		
Effective Green, g (s)		35.2			35.2			24.1		38.1	40.1		
Actuated g/C Ratio		0.42			0.42			0.29		0.46	0.48		
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0		
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0		
Lane Grp Cap (vph)		446			666			425		565	789		
v/s Ratio Prot					0.27					c0.15	0.13		
v/s Ratio Perm		c0.40						0.09		c0.29			
v/c Ratio		0.96			0.63			0.32		0.97	0.28		
Uniform Delay, d1		23.3			18.9			23.2		21.9	12.9		
Progression Factor		1.00			1.00			1.00		1.00	1.00		
Incremental Delay, d2		31.3			1.9			2.0		30.6	0.9		
Delay (s)		54.6			20.8			25.2		52.5	13.8		
Level of Service		D			C			C		D	B		
Approach Delay (s)		54.6			20.8			25.2			40.9		
Approach LOS		D			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			37.5									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.97										
Actuated Cycle Length (s)			83.3									Sum of lost time (s)	11.0
Intersection Capacity Utilization			101.3%									ICU Level of Service	G
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road










<2027 FT w Recom Sc1> PM Peak Hour
06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	41	17	289	24	208	0	470	191	308	531	16		
Future Volume (vph)	39	41	17	289	24	208	0	470	191	308	531	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Frt	1.00	0.96		1.00	0.87			1.00	0.85	1.00	1.00			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1646		1504	1409			1731	1298	1536	1707			
Flt Permitted	0.48	1.00		0.72	1.00			1.00	1.00	0.17	1.00			
Satd. Flow (perm)	780	1646		1133	1409			1731	1298	278	1707			
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)	42	45	18	314	26	226	0	511	208	335	577	17		
RTOR Reduction (vph)	0	12	0	0	151	0	0	0	121	0	1	0		
Lane Group Flow (vph)	42	51	0	314	101	0	0	511	87	335	593	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	3%	0%	7%	0%	0%	7%	1%	1%	0%		
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2		2	6				
Actuated Green, G (s)	29.6	29.6		29.6	29.6			33.6	33.6	54.5	54.5			
Effective Green, g (s)	32.6	32.6		32.6	32.6			37.3	37.3	54.5	58.2			
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.38	0.38	0.55	0.59			
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	257	543		373	464			653	490	381	1005			
v/s Ratio Prot		0.03			0.07			0.30		c0.16	0.35			
v/s Ratio Perm	0.05			c0.28					0.07	c0.33				
v/c Ratio	0.16	0.09		0.84	0.22			0.78	0.18	0.88	0.59			
Uniform Delay, d1	23.4	22.9		30.7	23.9			27.2	20.5	21.1	12.8			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.3	0.1		15.7	0.2			9.1	0.8	19.9	2.5			
Delay (s)	23.7	23.0		46.4	24.1			36.2	21.3	41.0	15.3			
Level of Service	C	C		D	C			D	C	D	B			
Approach Delay (s)		23.3			36.5			31.9			24.6			
Approach LOS		C			D			C			C			
Intersection Summary														
HCM 2000 Control Delay			29.7									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.85											
Actuated Cycle Length (s)			98.8								11.0			
Intersection Capacity Utilization			93.2%										ICU Level of Service	F
Analysis Period (min)			15											
c	Critical Lane Group													

***C-10 2027 FUTURE
TOTAL SC2***



















HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2027 FT Sc2> AM Peak Hour
06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	157	51	2	76	101	51
Future Volume (Veh/h)	157	51	2	76	101	51
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)	171	55	2	83	110	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			226		286	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			226		286	198
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			100		84	93
cM capacity (veh/h)			1354		677	815
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	226	85	165			
Volume Left	0	2	110			
Volume Right	55	0	55			
cSH	1700	1354	718			
Volume to Capacity	0.13	0.00	0.23			
Queue Length 95th (m)	0.0	0.0	6.7			
Control Delay (s)	0.0	0.2	11.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.2	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			28.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FT Sc2> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	55	0	0	186	0	623	64	0	561	163
Future Volume (Veh/h)	0	0	55	0	0	186	0	623	64	0	561	163
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	60	0	0	202	0	677	70	0	610	177
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	1489	1357	610	1287	1287	677	610			747		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1489	1357	610	1287	1287	677	610			747		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	87	100	100	55	100			100		
cM capacity (veh/h)	56	150	475	124	166	446	979			870		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	60	202	677	70	610	177						
Volume Left	0	0	0	0	0	0						
Volume Right	60	202	0	70	0	177						
cSH	475	446	1700	1700	1700	1700						
Volume to Capacity	0.13	0.45	0.40	0.04	0.36	0.10						
Queue Length 95th (m)	3.3	17.6	0.0	0.0	0.0	0.0						
Control Delay (s)	13.7	19.6	0.0	0.0	0.0	0.0						
Lane LOS	B	C										
Approach Delay (s)	13.7	19.6	0.0		0.0							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			54.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

















<2027 FT Sc2> AM Peak Hour
 06/30/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	78	142	56	17	61	5
Future Volume (Veh/h)	78	142	56	17	61	5
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)	85	154	61	18	66	5
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			239		302	162
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			239		302	162
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			95		90	99
cM capacity (veh/h)			1310		646	888
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	239	79	71			
Volume Left	0	61	66			
Volume Right	154	0	5			
cSH	1700	1310	658			
Volume to Capacity	0.14	0.05	0.11			
Queue Length 95th (m)	0.0	1.1	2.7			
Control Delay (s)	0.0	6.2	11.1			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.2	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			32.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2027 FT Sc2> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	0	1	0	0	698	1	210	2	233	98	2
Future Volume (vph)	2	0	1	0	0	698	1	210	2	233	98	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	1	0	0	759	1	228	2	253	107	2
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	3	759	231	362								
Volume Left (vph)	2	0	1	253								
Volume Right (vph)	1	759	2	2								
Hadj (s)	0.50	-0.53	0.01	0.38								
Departure Headway (s)	7.8	5.3	6.6	6.7								
Degree Utilization, x	0.01	1.12	0.42	0.67								
Capacity (veh/h)	408	674	534	533								
Control Delay (s)	10.9	92.6	14.4	22.2								
Approach Delay (s)	10.9	92.6	14.4	22.2								
Approach LOS	B	F	B	C								
Intersection Summary												
Delay			60.3									
Level of Service			F									
Intersection Capacity Utilization			89.0%	ICU Level of Service	E							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FT Sc2> AM Peak Hour

06/30/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	13	7	410	41	284	23	466	348	144	327	20
Future Volume (vph)	11	13	7	410	41	284	23	466	348	144	327	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1529		1437	1441		1492	1697	1274	1506	1668	
Flt Permitted	0.27	1.00		0.74	1.00		0.54	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	403	1529		1124	1441		845	1697	1274	507	1668	
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	14	8	446	45	309	25	507	378	157	355	22
RTOR Reduction (vph)	0	6	0	0	225	0	0	0	177	0	2	0
Lane Group Flow (vph)	12	16	0	446	129	0	25	507	201	157	375	0
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		51.0	51.0	51.0	63.0	63.0	
Effective Green, g (s)	28.0	28.0		28.0	28.0		54.7	54.7	54.7	63.0	66.7	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.53	0.53	0.53	0.61	0.65	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	109	416		306	392		450	903	678	398	1083	
v/s Ratio Prot		0.01			0.09			c0.30		c0.03	0.22	
v/s Ratio Perm	0.03			c0.40			0.03		0.16	0.21		
v/c Ratio	0.11	0.04		1.46	0.33		0.06	0.56	0.30	0.39	0.35	
Uniform Delay, d1	28.0	27.5		37.4	29.9		11.6	16.0	13.3	10.5	8.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.0		223.2	0.5		0.2	2.5	1.1	0.6	0.9	
Delay (s)	28.5	27.5		260.5	30.3		11.8	18.5	14.4	11.2	9.0	
Level of Service	C	C		F	C		B	B	B	B	A	
Approach Delay (s)		27.8			158.7			16.6			9.6	
Approach LOS		C			F			B			A	
Intersection Summary												
HCM 2000 Control Delay			65.0				HCM 2000 Level of Service				E	
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			102.7			Sum of lost time (s)				11.0		
Intersection Capacity Utilization			78.0%			ICU Level of Service				D		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FT Sc2> AM Peak Hour

06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	295	150	103	266	103	453	221	262	87	68	14
Future Volume (vph)	26	295	150	103	266	103	453	221	262	87	68	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1581	1648	1471	1596	1588	1471	1644	1713	1471	1644	1664	
Flt Permitted	0.49	1.00	1.00	0.46	1.00	1.00	0.70	1.00	1.00	0.59	1.00	
Satd. Flow (perm)	823	1648	1471	766	1588	1471	1210	1713	1471	1024	1664	
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)	28	321	163	112	289	112	492	240	285	95	74	15
RTOR Reduction (vph)	0	0	102	0	0	70	0	0	143	0	7	0
Lane Group Flow (vph)	28	321	61	112	289	42	492	240	142	95	82	0
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	21.1	21.1	21.1	21.1	21.1	21.1	30.0	30.0	30.0	30.0	30.0	
Effective Green, g (s)	24.1	24.1	24.1	24.1	24.1	24.1	32.0	32.0	32.0	32.0	32.0	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.50	0.50	0.50	0.50	0.50	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	309	619	553	287	597	553	604	855	734	511	830	
v/s Ratio Prot		c0.19			0.18			0.14			0.05	
v/s Ratio Perm	0.03		0.04	0.15		0.03	c0.41		0.10	0.09		
v/c Ratio	0.09	0.52	0.11	0.39	0.48	0.08	0.81	0.28	0.19	0.19	0.10	
Uniform Delay, d1	12.9	15.5	13.0	14.6	15.3	12.8	13.5	9.3	8.9	8.9	8.5	
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	0.1	0.7	0.1	0.9	0.6	0.1	11.5	0.8	0.6	0.8	0.2	
Delay (s)	13.0	16.2	13.1	15.5	15.9	12.9	25.1	10.2	9.5	9.7	8.7	
Level of Service	B	B	B	B	B	B	C	B	A	A	A	
Approach Delay (s)		15.1			15.1			17.2			9.2	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			64.1				Sum of lost time (s)		8.0			
Intersection Capacity Utilization			82.4%				ICU Level of Service		E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2027 FT Sc2> AM Peak Hour
06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	127	471	323	54	29	45
Future Volume (Veh/h)	127	471	323	54	29	45
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)	138	512	351	59	32	49
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	410				1139	351
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410				1139	351
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	88				83	93
cM capacity (veh/h)	1133				187	697
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	138	512	351	59	32	49
Volume Left	138	0	0	0	32	0
Volume Right	0	0	0	59	0	49
cSH	1133	1700	1700	1700	187	697
Volume to Capacity	0.12	0.30	0.21	0.03	0.17	0.07
Queue Length 95th (m)	3.2	0.0	0.0	0.0	4.6	1.7
Control Delay (s)	8.6	0.0	0.0	0.0	28.2	10.6
Lane LOS	A				D	B
Approach Delay (s)	1.8		0.0		17.5	
Approach LOS					C	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			39.4%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FT Sc2> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	6	73	2	3	0	177	0	5	0	1	7
Future Volume (Veh/h)	1	6	73	2	3	0	177	0	5	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	7	79	2	3	0	192	0	5	0	1	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	3			86			64	56	46	60	95	3
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			86			64	56	46	60	95	3
tC, single (s)	4.1			4.6			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			79	100	100	100	100	99
cM capacity (veh/h)	1632			1256			911	838	1029	934	797	1087
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	87	5	197	9								
Volume Left	1	2	192	0								
Volume Right	79	0	5	8								
cSH	1632	1256	914	1045								
Volume to Capacity	0.00	0.00	0.22	0.01								
Queue Length 95th (m)	0.0	0.0	6.2	0.2								
Control Delay (s)	0.1	3.2	10.0	8.5								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	3.2	10.0	8.5								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.0									
Intersection Capacity Utilization			29.6%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FT Sc2> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	919	4	5	316
Future Volume (Veh/h)	11	17	919	4	5	316
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)	12	18	999	4	5	343
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	1354	1001			1003	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1354	1001			1003	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	94			99	
cM capacity (veh/h)	165	297			698	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	1003	348			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	225	1700	698			
Volume to Capacity	0.13	0.59	0.01			
Queue Length 95th (m)	3.4	0.0	0.2			
Control Delay (s)	23.4	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	23.4	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			62.8%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2027 FT Sc2> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	906	4	5	322
Future Volume (Veh/h)	11	17	906	4	5	322
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)	12	18	985	4	5	350
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	1347	987			989	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1347	987			989	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	94			99	
cM capacity (veh/h)	167	303			707	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	989	355			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	229	1700	707			
Volume to Capacity	0.13	0.58	0.01			
Queue Length 95th (m)	3.4	0.0	0.2			
Control Delay (s)	23.1	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	23.1	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			62.0%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2027 FT Sc2> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	148	50	155	0	0	454
Future Volume (Veh/h)	148	50	155	0	0	454
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)	161	54	168	0	0	493
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	168				544	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				544	168
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				100	44
cM capacity (veh/h)	1422				447	881
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	161	54	168	493		
Volume Left	161	0	0	0		
Volume Right	0	0	0	493		
cSH	1422	1700	1700	881		
Volume to Capacity	0.11	0.03	0.10	0.56		
Queue Length 95th (m)	2.9	0.0	0.0	27.0		
Control Delay (s)	7.9	0.0	0.0	14.1		
Lane LOS	A			B		
Approach Delay (s)	5.9		0.0	14.1		
Approach LOS				B		
Intersection Summary						
Average Delay			9.4			
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access










<2027 FT Sc2> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	49	0	0	0	0	151
Future Volume (Veh/h)	49	0	0	0	0	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)	53	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				106	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				106	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	85
cM capacity (veh/h)	1636				868	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	53	0	164			
Volume Left	53	0	0			
Volume Right	0	0	164			
cSH	1636	1700	1091			
Volume to Capacity	0.03	0.00	0.15			
Queue Length 95th (m)	0.8	0.0	4.0			
Control Delay (s)	7.3	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization		20.2%		ICU Level of Service		A
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2027 FT Sc2> PM Peak Hour
06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	158	90	1	52	140	45
Future Volume (Veh/h)	158	90	1	52	140	45
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)	172	98	1	57	152	49
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			270		280	221
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			270		280	221
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		78	94
cM capacity (veh/h)			1305		699	824
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	270	58	201			
Volume Left	0	1	152			
Volume Right	98	0	49			
cSH	1700	1305	726			
Volume to Capacity	0.16	0.00	0.28			
Queue Length 95th (m)	0.0	0.0	8.6			
Control Delay (s)	0.0	0.1	11.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.1	11.9			
Approach LOS			B			
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			33.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2027 FT Sc2> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	82	0	0	203	0	675	45	0	724	143
Future Volume (Veh/h)	0	0	82	0	0	203	0	675	45	0	724	143
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	89	0	0	221	0	734	49	0	787	155
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	1742	1570	787	1521	1521	734	787			783		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1742	1570	787	1521	1521	734	787			783		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	77	100	100	47	100			100		
cM capacity (veh/h)	33	112	385	75	120	420	841			844		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	89	221	734	49	787	155						
Volume Left	0	0	0	0	0	0						
Volume Right	89	221	0	49	0	155						
cSH	385	420	1700	1700	1700	1700						
Volume to Capacity	0.23	0.53	0.43	0.03	0.46	0.09						
Queue Length 95th (m)	6.7	22.6	0.0	0.0	0.0	0.0						
Control Delay (s)	17.1	22.7	0.0	0.0	0.0	0.0						
Lane LOS	C	C										
Approach Delay (s)	17.1	22.7	0.0		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			58.9%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

















<2027 FT Sc2> PM Peak Hour
06/30/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	69	138	73	13	45	3
Future Volume (Veh/h)	69	138	73	13	45	3
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)	75	150	79	14	49	3
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			225		322	150
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			225		322	150
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		92	100
cM capacity (veh/h)			1356		631	902
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	225	93	52			
Volume Left	0	79	49			
Volume Right	150	0	3			
cSH	1700	1356	642			
Volume to Capacity	0.13	0.06	0.08			
Queue Length 95th (m)	0.0	1.4	2.0			
Control Delay (s)	0.0	6.7	11.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	6.7	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			31.6%	ICU Level of Service	A	
Analysis Period (min)			15			























HCM Unsignalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2027 FT Sc2> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	1	0	0	0	0	454	0	131	1	753	257	1
Future Volume (vph)	1	0	0	0	0	454	0	131	1	753	257	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	0	0	493	0	142	1	818	279	1
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	1	493	143	1098								
Volume Left (vph)	1	0	0	818								
Volume Right (vph)	0	493	1	1								
Hadj (s)	0.20	-0.46	0.00	0.15								
Departure Headway (s)	7.5	5.6	6.5	5.8								
Degree Utilization, x	0.00	0.77	0.26	1.78								
Capacity (veh/h)	437	493	530	627								
Control Delay (s)	10.5	24.9	11.7	372.6								
Approach Delay (s)	10.5	24.9	11.7	372.6								
Approach LOS	B	C	B	F								
Intersection Summary												
Delay			243.9									
Level of Service			F									
Intersection Capacity Utilization			108.2%	ICU Level of Service	G							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2027 FT Sc2> PM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	32	40	16	409	15	199	2	414	472	338	567	14	
Future Volume (vph)	32	40	16	409	15	199	2	414	472	338	567	14	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	1.00		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1657		1506	1423		1552	1713	1335	1506	1705		
Fl _t Permitted	0.54	1.00		0.72	1.00		0.35	1.00	1.00	0.24	1.00		
Satd. Flow (perm)	875	1657		1138	1423		565	1713	1335	376	1705		
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)	35	43	17	445	16	216	2	450	513	367	616	15	
RTOR Reduction (vph)	0	10	0	0	130	0	0	0	318	0	1	0	
Lane Group Flow (vph)	35	50	0	445	102	0	2	450	195	367	630	0	
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8			2		2	6			
Actuated Green, G (s)	37.7	37.7		37.7	37.7		35.3	35.3	35.3	50.3	50.3		
Effective Green, g (s)	40.7	40.7		40.7	40.7		39.0	39.0	39.0	50.3	54.0		
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.38	0.38	0.38	0.49	0.53		
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	346	656		450	563		214	650	506	316	896		
v/s Ratio Prot		0.03			0.07			0.26		c0.14	0.37		
v/s Ratio Perm	0.04			c0.39			0.00		0.15	c0.43			
v/c Ratio	0.10	0.08		0.99	0.18		0.01	0.69	0.39	1.16	0.70		
Uniform Delay, d ₁	19.5	19.3		30.8	20.2		19.8	26.8	23.1	22.7	18.3		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	0.1	0.0		39.1	0.2		0.1	6.0	2.2	101.9	4.6		
Delay (s)	19.6	19.3		69.9	20.3		19.9	32.8	25.3	124.5	22.9		
Level of Service	B	B		E	C		B	C	C	F	C		
Approach Delay (s)		19.4			52.9			28.8			60.3		
Approach LOS		B			D			C			E		
Intersection Summary													
HCM 2000 Control Delay			45.9									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.07										
Actuated Cycle Length (s)			102.7									Sum of lost time (s)	11.0
Intersection Capacity Utilization			91.3%									ICU Level of Service	F
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2027 FT Sc2> PM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	41	295	509	297	323	133	299	117	168	91	227	45	
Future Volume (vph)	41	295	509	297	323	133	299	117	168	91	227	45	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	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	1.00	0.85	1.00	0.98	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1596	1648	1471	1644	1633	1456	1641	1731	1471	1644	1673	1673	
Flt Permitted	0.46	1.00	1.00	0.49	1.00	1.00	0.50	1.00	1.00	0.68	1.00	1.00	
Satd. Flow (perm)	772	1648	1471	846	1633	1456	863	1731	1471	1169	1673	1673	
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)	45	321	553	323	351	145	325	127	183	99	247	49	
RTOR Reduction (vph)	0	0	252	0	0	78	0	0	104	0	8	0	
Lane Group Flow (vph)	45	321	301	323	351	67	325	127	79	99	288	0	
Confl. Peds. (#/hr)							2					2	
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	Perm	NA	
Protected Phases		4			8			2				6	
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	31.9	31.9	31.9	31.9	31.9	31.9	30.3	30.3	30.3	30.3	30.3	30.3	
Effective Green, g (s)	34.9	34.9	34.9	34.9	34.9	34.9	32.3	32.3	32.3	32.3	32.3	32.3	
Actuated g/C Ratio	0.46	0.46	0.46	0.46	0.46	0.46	0.43	0.43	0.43	0.43	0.43	0.43	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	358	764	682	392	757	675	370	743	631	502	718	718	
v/s Ratio Prot		0.19			0.21			0.07				0.17	
v/s Ratio Perm	0.06		0.20	c0.38		0.05	c0.38		0.05	0.08			
v/c Ratio	0.13	0.42	0.44	0.82	0.46	0.10	0.88	0.17	0.12	0.20	0.40	0.40	
Uniform Delay, d1	11.5	13.4	13.6	17.5	13.8	11.3	19.7	13.2	12.9	13.4	14.8	14.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.5	13.1	0.5	0.1	24.3	0.5	0.4	0.9	1.7	1.7	
Delay (s)	11.6	13.8	14.0	30.6	14.2	11.4	44.0	13.7	13.3	14.2	16.5	16.5	
Level of Service	B	B	B	C	B	B	D	B	B	B	B	B	
Approach Delay (s)		13.8			20.2			29.1				15.9	
Approach LOS		B			C			C				B	
Intersection Summary													
HCM 2000 Control Delay			19.5									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			75.2									Sum of lost time (s)	8.0
Intersection Capacity Utilization			83.9%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 7: Highway 58A & Reaker Road

















<2027 FT Sc2> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	461	483	28	69	87
Future Volume (Veh/h)	90	461	483	28	69	87
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)	98	501	525	30	75	95
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	555				1222	525
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	555				1222	525
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				58	83
cM capacity (veh/h)	1001				179	556
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	98	501	525	30	75	95
Volume Left	98	0	0	0	75	0
Volume Right	0	0	0	30	0	95
cSH	1001	1700	1700	1700	179	556
Volume to Capacity	0.10	0.29	0.31	0.02	0.42	0.17
Queue Length 95th (m)	2.5	0.0	0.0	0.0	14.4	4.6
Control Delay (s)	9.0	0.0	0.0	0.0	38.9	12.8
Lane LOS	A				E	B
Approach Delay (s)	1.5		0.0		24.3	
Approach LOS					C	
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			47.2%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2027 FT Sc2> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	6	153	3	8	0	114	2	7	0	1	1
Future Volume (Veh/h)	3	6	153	3	8	0	114	2	7	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	166	3	9	0	124	2	8	0	1	1
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	9			173			112	111	90	120	194	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			173			112	111	90	120	194	9
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			85	100	99	100	100	100
cM capacity (veh/h)	1430			1416			854	780	973	849	702	1079
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	12	134	2								
Volume Left	3	3	124	0								
Volume Right	166	0	8	1								
cSH	1430	1416	859	850								
Volume to Capacity	0.00	0.00	0.16	0.00								
Queue Length 95th (m)	0.0	0.0	4.2	0.1								
Control Delay (s)	0.1	1.9	10.0	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	1.9	10.0	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			31.7%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Huron Street & Kingsway

<2027 FT Sc2> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	573	12	19	1014
Future Volume (Veh/h)	8	11	573	12	19	1014
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)	9	12	623	13	21	1102
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	1774	630			636	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1774	630			636	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	98			98	
cM capacity (veh/h)	90	486			957	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	636	1123			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	169	1700	957			
Volume to Capacity	0.12	0.37	0.02			
Queue Length 95th (m)	3.2	0.0	0.5			
Control Delay (s)	29.4	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	29.4	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			84.5%	ICU Level of Service		E
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2027 FT Sc2> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	574	12	19	1003
Future Volume (Veh/h)	8	11	574	12	19	1003
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)	9	12	624	13	21	1090
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	1762	630			637	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1762	630			637	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	98			98	
cM capacity (veh/h)	92	485			956	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	637	1111			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	171	1700	956			
Volume to Capacity	0.12	0.37	0.02			
Queue Length 95th (m)	3.1	0.0	0.5			
Control Delay (s)	29.0	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	29.0	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			83.8%	ICU Level of Service	E	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2027 FT Sc2> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	499	170	101	0	0	293
Future Volume (Veh/h)	499	170	101	0	0	293
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)	542	185	110	0	0	318
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110				1379	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110				1379	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	64				100	66
cM capacity (veh/h)	1493				102	949
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	542	185	110	318		
Volume Left	542	0	0	0		
Volume Right	0	0	0	318		
cSH	1493	1700	1700	949		
Volume to Capacity	0.36	0.11	0.06	0.34		
Queue Length 95th (m)	12.8	0.0	0.0	11.3		
Control Delay (s)	8.8	0.0	0.0	10.7		
Lane LOS	A			B		
Approach Delay (s)	6.5		0.0	10.7		
Approach LOS				B		
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			63.0%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access


















<2027 FT Sc2> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	166	0	0	0	0	98
Future Volume (Veh/h)	166	0	0	0	0	98
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)	180	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				360	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				360	0
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				100	90
cM capacity (veh/h)	1636				572	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	180	0	107			
Volume Left	180	0	0			
Volume Right	0	0	107			
cSH	1636	1700	1091			
Volume to Capacity	0.11	0.00	0.10			
Queue Length 95th (m)	2.8	0.0	2.5			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			23.2%		ICU Level of Service	A
Analysis Period (min)			15			























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2027 FT w Recom Sc2> AM Peak Hour
06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	2	0	1	0	0	698	1	210	2	233	98	2		
Future Volume (vph)	2	0	1	0	0	698	1	210	2	233	98	2		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0			
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes		0.99			1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00			
Frt		0.95			0.86			1.00		1.00	1.00			
Flt Protected		0.97			1.00			1.00		0.95	1.00			
Satd. Flow (prot)		1190			1439			1711		1390	1645			
Flt Permitted		0.61			1.00			1.00		0.52	1.00			
Satd. Flow (perm)		751			1439			1710		758	1645			
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)	2	0	1	0	0	759	1	228	2	253	107	2		
RTOR Reduction (vph)	0	2	0	0	416	0	0	1	0	0	1	0		
Lane Group Flow (vph)	0	1	0	0	343	0	0	230	0	253	108	0		
Confl. Peds. (#/hr)			2	2					5	5				
Heavy Vehicles (%)	50%	0%	0%	0%	0%	4%	0%	1%	0%	18%	5%	0%		
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)		18.0			18.0			23.2		33.3	33.3			
Effective Green, g (s)		20.0			20.0			25.2		33.3	35.3			
Actuated g/C Ratio		0.32			0.32			0.40		0.53	0.56			
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)		237			454			680		469	917			
v/s Ratio Prot					c0.24					c0.06	0.07			
v/s Ratio Perm		0.00						0.13		c0.22				
v/c Ratio		0.00			0.76			0.34		0.54	0.12			
Uniform Delay, d1		14.8			19.5			13.3		9.3	6.6			
Progression Factor		1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2		0.0			7.0			1.4		1.2	0.3			
Delay (s)		14.8			26.5			14.6		10.5	6.9			
Level of Service		B			C			B		B	A			
Approach Delay (s)		14.8			26.5			14.6			9.4			
Approach LOS		B			C			B			A			
Intersection Summary														
HCM 2000 Control Delay			19.9									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.63											
Actuated Cycle Length (s)			63.3								11.0			
Intersection Capacity Utilization			89.3%										ICU Level of Service	E
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FT w Recom Sc2> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	13	7	410	41	284	23	466	348	144	327	20
Future Volume (vph)	11	13	7	410	41	284	23	466	348	144	327	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.95		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1529		1437	1441		1492	1697	1274	1506	1668	
Fl _t Permitted	0.44	1.00		0.74	1.00		0.54	1.00	1.00	0.12	1.00	
Satd. Flow (perm)	653	1529		1124	1441		845	1697	1274	198	1668	
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	14	8	446	45	309	25	507	378	157	355	22
RTOR Reduction (vph)	0	4	0	0	170	0	0	0	224	0	2	0
Lane Group Flow (vph)	12	18	0	446	184	0	25	507	154	157	375	0
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	40.8	40.8		40.8	40.8		29.1	29.1	29.1	41.6	41.6	
Effective Green, g (s)	43.8	43.8		43.8	43.8		32.8	32.8	32.8	41.6	45.3	
Actuated g/C Ratio	0.45	0.45		0.45	0.45		0.34	0.34	0.34	0.43	0.47	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	294	689		507	650		285	573	430	212	778	
v/s Ratio Prot		0.01			0.13			c0.30		c0.07	0.22	
v/s Ratio Perm	0.02			c0.40			0.03		0.12	0.24		
v/c Ratio	0.04	0.03		0.88	0.28		0.09	0.88	0.36	0.74	0.48	
Uniform Delay, d ₁	14.9	14.8		24.3	16.8		21.9	30.4	24.2	21.5	17.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.1	0.0		15.9	0.2		0.6	17.9	2.3	13.0	2.1	
Delay (s)	15.0	14.8		40.1	17.0		22.5	48.3	26.5	34.5	20.0	
Level of Service	B	B		D	B		C	D	C	C	B	
Approach Delay (s)		14.9			29.9			38.6			24.2	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			31.8									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			97.1								11.0	Sum of lost time (s)
Intersection Capacity Utilization			78.0%									ICU Level of Service D
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2027 FT w Recom Sc2> PM Peak Hour

06/30/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↗	↖	
Traffic Volume (vph)	1	0	0	0	0	454	0	131	1	753	257	1
Future Volume (vph)	1	0	0	0	0	454	0	131	1	753	257	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		1.00			0.98			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		1.00			0.86			1.00		1.00	1.00	
Flt Protected		0.95			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1643			1356			1729		1644	1730	
Flt Permitted		0.33			1.00			1.00		0.58	1.00	
Satd. Flow (perm)		576			1356			1729		997	1730	
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)	1	0	0	0	0	493	0	142	1	818	279	1
RTOR Reduction (vph)	0	0	0	0	417	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	76	0	0	143	0	818	280	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.0			10.0			23.3		56.0	56.0	
Effective Green, g (s)		12.0			12.0			25.3		56.0	58.0	
Actuated g/C Ratio		0.15			0.15			0.32		0.72	0.74	
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		88			208			560		962	1286	
v/s Ratio Prot					c0.06			0.08		c0.32	0.16	
v/s Ratio Perm		0.00								c0.29		
v/c Ratio		0.01			0.36			0.26		0.85	0.22	
Uniform Delay, d1		28.0			29.6			19.4		6.5	3.1	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.1			1.1		7.3	0.4	
Delay (s)		28.0			30.7			20.5		13.7	3.4	
Level of Service		C			C			C		B	A	
Approach Delay (s)		28.0			30.7			20.5			11.1	
Approach LOS		C			C			C			B	























Intersection Summary		
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.77	B
Actuated Cycle Length (s)	78.0	Sum of lost time (s)
Intersection Capacity Utilization	94.3%	11.0
Analysis Period (min)	15	ICU Level of Service
		F

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2027 FT w Recom Sc2> PM Peak Hour

06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	32	40	16	409	15	199	2	414	472	338	567	14		
Future Volume (vph)	32	40	16	409	15	199	2	414	472	338	567	14		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00			
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	1.00			
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1657		1506	1423		1552	1713	1335	1506	1705			
Fl _t Permitted	0.54	1.00		0.72	1.00		0.43	1.00	1.00	0.15	1.00			
Satd. Flow (perm)	886	1657		1138	1423		695	1713	1335	232	1705			
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)	35	43	17	445	16	216	2	450	513	367	616	15		
RTOR Reduction (vph)	0	10	0	0	127	0	0	0	355	0	1	0		
Lane Group Flow (vph)	35	50	0	445	105	0	2	450	158	367	630	0		
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%		
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2		2	6				
Actuated Green, G (s)	38.9	38.9		38.9	38.9		24.3	24.3	24.3	48.3	48.3			
Effective Green, g (s)	41.9	41.9		41.9	41.9		28.0	28.0	28.0	48.3	52.0			
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.27	0.27	0.27	0.47	0.51			
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	364	681		467	585		190	470	366	372	870			
v/s Ratio Prot		0.03			0.07			c0.26		c0.20	0.37			
v/s Ratio Perm	0.04			c0.39			0.00		0.12	0.26				
v/c Ratio	0.10	0.07		0.95	0.18		0.01	0.96	0.43	0.99	0.72			
Uniform Delay, d ₁	18.4	18.2		29.0	19.1		26.9	36.4	30.4	29.1	19.4			
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d ₂	0.1	0.0		29.8	0.1		0.1	32.2	3.7	42.7	5.2			
Delay (s)	18.5	18.3		58.9	19.2		27.0	68.5	34.1	71.8	24.6			
Level of Service	B	B		E	B		C	E	C	E	C			
Approach Delay (s)		18.4			45.3			50.1			41.9			
Approach LOS		B			D			D			D			
Intersection Summary														
HCM 2000 Control Delay			44.8									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.96											
Actuated Cycle Length (s)			101.9								11.0			
Intersection Capacity Utilization			91.3%										ICU Level of Service	F
Analysis Period (min)			15											

c Critical Lane Group

***C-11 2032 FUTURE
TOTAL SC1***



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2032 FT Sc1> AM Peak Hour
 06/30/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
Traffic Volume (veh/h)	180	76	372	214	44	16
Future Volume (Veh/h)	180	76	372	214	44	16
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)	196	83	404	233	48	17
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			279		1278	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			279		1278	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		62	98
cM capacity (veh/h)			1295		127	806
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	279	637	65			
Volume Left	0	404	48			
Volume Right	83	0	17			
cSH	1700	1295	163			
Volume to Capacity	0.16	0.31	0.40			
Queue Length 95th (m)	0.0	10.2	13.2			
Control Delay (s)	0.0	6.9	40.9			
Lane LOS			A	E		
Approach Delay (s)	0.0	6.9	40.9			
Approach LOS			E			
Intersection Summary						
Average Delay			7.2			
Intersection Capacity Utilization			63.6%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FT Sc1> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	440	0	0	93	0	722	233	0	425	51
Future Volume (Veh/h)	0	0	440	0	0	93	0	722	233	0	425	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	478	0	0	101	0	785	253	0	462	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1348	1500	462	1247	1247	785	462			1038		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1348	1500	462	1247	1247	785	462			1038		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	21	100	100	74	100			100		
cM capacity (veh/h)	96	123	604	32	175	396	1110			678		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	478	101	785	253	462	55						
Volume Left	0	0	0	0	0	0						
Volume Right	478	101	0	253	0	55						
cSH	604	396	1700	1700	1700	1700						
Volume to Capacity	0.79	0.26	0.46	0.15	0.27	0.03						
Queue Length 95th (m)	58.2	7.6	0.0	0.0	0.0	0.0						
Control Delay (s)	29.8	17.2	0.0	0.0	0.0	0.0						
Lane LOS	D	C										
Approach Delay (s)	29.8	17.2	0.0		0.0							
Approach LOS	D	C										
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			60.5%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

<2032 FT Sc1> AM Peak Hour
06/30/2020




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	119	80	14	503	85	157
Future Volume (Veh/h)	119	80	14	503	85	157
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)	129	87	15	547	92	171
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			216		750	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			216		750	172
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		76	80
cM capacity (veh/h)			1366		378	876
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	216	562	263			
Volume Left	0	15	92			
Volume Right	87	0	171			
cSH	1700	1366	600			
Volume to Capacity	0.13	0.01	0.44			
Queue Length 95th (m)	0.0	0.3	16.9			
Control Delay (s)	0.0	0.3	15.6			
Lane LOS			A	C		
Approach Delay (s)	0.0	0.3	15.6			
Approach LOS			C			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			63.2%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2032 FT Sc1> AM Peak Hour

06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	167	89	19	0	269	509	59	157	0	159	64	280		
Future Volume (vph)	167	89	19	0	269	509	59	157	0	159	64	280		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)		4.0			4.0			4.0		6.0	4.0			
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes		1.00			0.99			1.00		1.00	1.00			
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00			
Frt		0.99			0.91			1.00		1.00	0.88			
Flt Protected		0.97			1.00			0.99		0.95	1.00			
Satd. Flow (prot)		1661			1554			1707		1644	1520			
Flt Permitted		0.23			1.00			0.63		0.56	1.00			
Satd. Flow (perm)		398			1554			1084		976	1520			
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)	182	97	21	0	292	553	64	171	0	173	70	304		
RTOR Reduction (vph)	0	4	0	0	93	0	0	0	0	0	212	0		
Lane Group Flow (vph)	0	296	0	0	752	0	0	235	0	173	162	0		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA			
Protected Phases		4			8			2			6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)		31.2			31.2			15.9		15.9	15.9			
Effective Green, g (s)		33.2			33.2			17.9		15.9	17.9			
Actuated g/C Ratio		0.56			0.56			0.30		0.27	0.30			
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)		223			872			328		262	460			
v/s Ratio Prot					0.48						0.11			
v/s Ratio Perm		c0.74						c0.22		0.18				
v/c Ratio		1.33			0.86			0.72		0.66	0.35			
Uniform Delay, d1		12.9			11.0			18.3		19.2	16.1			
Progression Factor		1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2		175.8			11.0			7.3		6.1	0.5			
Delay (s)		188.7			22.0			25.6		25.3	16.5			
Level of Service		F			C			C		C	B			
Approach Delay (s)		188.7			22.0			25.6			19.3			
Approach LOS		F			C			C			B			
Intersection Summary														
HCM 2000 Control Delay			47.6									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			1.11											
Actuated Cycle Length (s)			59.1								8.0			
Intersection Capacity Utilization			116.0%										ICU Level of Service	H
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT Sc1> AM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	21	7	129	45	467	16	514	312	201	363	17
Future Volume (vph)	19	21	7	129	45	467	16	514	312	201	363	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1664		1552	1494		1552	1731	1388	1552	1719	
Fl _t Permitted	0.16	1.00		0.74	1.00		0.52	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	261	1664		1204	1494		850	1731	1388	474	1719	
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)	21	23	8	140	49	508	17	559	339	218	395	18
RTOR Reduction (vph)	0	6	0	0	306	0	0	0	154	0	2	0
Lane Group Flow (vph)	21	25	0	140	251	0	17	559	185	218	411	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.0	22.0		22.0	22.0		50.7	50.7	50.7	63.1	63.1	
Effective Green, g (s)	25.0	25.0		25.0	25.0		54.4	54.4	54.4	63.1	66.8	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.55	0.55	0.55	0.63	0.67	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	65	416		301	374		463	943	756	401	1150	
v/s Ratio Prot		0.02			c0.17			c0.32		c0.05	0.24	
v/s Ratio Perm	0.08			0.12			0.02		0.13	0.29		
v/c Ratio	0.32	0.06		0.47	0.67		0.04	0.59	0.24	0.54	0.36	
Uniform Delay, d ₁	30.5	28.5		31.7	33.7		10.5	15.3	11.9	10.5	7.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	2.9	0.1		1.1	4.7		0.1	2.7	0.8	1.5	0.9	
Delay (s)	33.4	28.5		32.9	38.4		10.7	18.0	12.7	12.0	8.0	
Level of Service	C	C		C	D		B	B	B	B	A	
Approach Delay (s)		30.5			37.3			15.9			9.4	
Approach LOS		C			D			B			A	
Intersection Summary												
HCM 2000 Control Delay			20.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			99.8			Sum of lost time (s)			11.0			
Intersection Capacity Utilization			85.4%			ICU Level of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT Sc1> AM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	71	354	157	207	259	124	369	293	468	118	119	16	
Future Volume (vph)	71	354	157	207	259	124	369	293	468	118	119	16	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1731	1471	1644	1731	1471	1644	1731	1471	1644	1700		
Flt Permitted	0.52	1.00	1.00	0.41	1.00	1.00	0.66	1.00	1.00	0.49	1.00		
Satd. Flow (perm)	897	1731	1471	709	1731	1471	1149	1731	1471	856	1700		
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)	77	385	171	225	282	135	401	318	509	128	129	17	
RTOR Reduction (vph)	0	0	98	0	0	77	0	0	226	0	5	0	
Lane Group Flow (vph)	77	385	73	225	282	58	401	318	283	128	141	0	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	27.1	27.1	27.1	27.1	27.1	27.1	30.4	30.4	30.4	30.4	30.4		
Effective Green, g (s)	30.1	30.1	30.1	30.1	30.1	30.1	32.4	32.4	32.4	32.4	32.4		
Actuated g/C Ratio	0.43	0.43	0.43	0.43	0.43	0.43	0.46	0.46	0.46	0.46	0.46		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	382	739	628	302	739	628	528	795	676	393	781		
v/s Ratio Prot		0.22			0.16			0.18			0.08		
v/s Ratio Perm	0.09		0.05	c0.32		0.04	c0.35		0.19	0.15			
v/c Ratio	0.20	0.52	0.12	0.75	0.38	0.09	0.76	0.40	0.42	0.33	0.18		
Uniform Delay, d1	12.7	14.9	12.2	17.0	13.8	12.0	15.8	12.6	12.7	12.1	11.2		
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	0.3	0.7	0.1	9.6	0.3	0.1	9.9	1.5	1.9	2.2	0.5		
Delay (s)	12.9	15.6	12.3	26.6	14.2	12.1	25.7	14.1	14.7	14.3	11.7		
Level of Service	B	B	B	C	B	B	C	B	B	B	B		
Approach Delay (s)		14.3			18.1			18.1			12.9		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			16.7									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.75										
Actuated Cycle Length (s)			70.5									Sum of lost time (s)	8.0
Intersection Capacity Utilization			80.8%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2032 FT Sc1> AM Peak Hour
06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	174	592	427	60	30	62
Future Volume (Veh/h)	174	592	427	60	30	62
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)	189	643	464	65	33	67
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	529				1485	464
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	529				1485	464
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	82				71	89
cM capacity (veh/h)	1048				114	602
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	189	643	464	65	33	67
Volume Left	189	0	0	0	33	0
Volume Right	0	0	0	65	0	67
cSH	1048	1700	1700	1700	114	602
Volume to Capacity	0.18	0.38	0.27	0.04	0.29	0.11
Queue Length 95th (m)	5.0	0.0	0.0	0.0	8.4	2.8
Control Delay (s)	9.2	0.0	0.0	0.0	49.1	11.7
Lane LOS	A				E	B
Approach Delay (s)	2.1		0.0		24.1	
Approach LOS					C	
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			48.2%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2032 FT Sc1> AM Peak Hour
 06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	100	3	5	1	217	4	6	1	3	8
Future Volume (Veh/h)	4	6	100	3	5	1	217	4	6	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	109	3	5	1	236	4	7	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			116			92	82	62	90	136	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			116			92	82	62	90	136	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			73	100	99	100	100	99
cM capacity (veh/h)	1628			1485			884	809	1009	887	756	1083
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	120	9	247	13								
Volume Left	4	3	236	1								
Volume Right	109	1	7	9								
cSH	1628	1485	886	970								
Volume to Capacity	0.00	0.00	0.28	0.01								
Queue Length 95th (m)	0.1	0.0	8.7	0.3								
Control Delay (s)	0.3	2.5	10.6	8.8								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.3	2.5	10.6	8.8								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.2									
Intersection Capacity Utilization			34.4%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2032 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	842	4	5	486
Future Volume (Veh/h)	11	17	842	4	5	486
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)	12	18	915	4	5	528
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			199			389
pX, platoon unblocked						
vC, conflicting volume	1455	917			919	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1455	917			919	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			99	
cM capacity (veh/h)	144	332			751	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	919	533			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	218	1700	751			
Volume to Capacity	0.14	0.54	0.01			
Queue Length 95th (m)	3.6	0.0	0.2			
Control Delay (s)	24.1	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	24.1	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2032 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	829	4	5	492
Future Volume (Veh/h)	11	17	829	4	5	492
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)	12	18	901	4	5	535
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	101					
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	1448	903			905	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1445	873			875	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	95			99	
cM capacity (veh/h)	139	336			742	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	905	540			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	214	1700	742			
Volume to Capacity	0.14	0.53	0.01			
Queue Length 95th (m)	3.6	0.0	0.2			
Control Delay (s)	24.5	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	24.5	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			57.6%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2032 FT Sc1> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	166	56	173	0	0	506
Future Volume (Veh/h)	166	56	173	0	0	506
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)	180	61	188	0	0	550
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	188				609	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				609	188
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				100	36
cM capacity (veh/h)	1398				402	859
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	180	61	188	550		
Volume Left	180	0	0	0		
Volume Right	0	0	0	550		
cSH	1398	1700	1700	859		
Volume to Capacity	0.13	0.04	0.11	0.64		
Queue Length 95th (m)	3.4	0.0	0.0	36.1		
Control Delay (s)	8.0	0.0	0.0	16.3		
Lane LOS	A			C		
Approach Delay (s)	5.9		0.0	16.3		
Approach LOS				C		
Intersection Summary						
Average Delay			10.6			
Intersection Capacity Utilization			63.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2032 FT Sc1> AM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	55	0	0	0	0	169
Future Volume (Veh/h)	55	0	0	0	0	169
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)	60	0	0	0	0	184
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	0				120	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				120	0
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				100	83
cM capacity (veh/h)	1636				848	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	60	0	184			
Volume Left	60	0	0			
Volume Right	0	0	184			
cSH	1636	1700	1091			
Volume to Capacity	0.04	0.00	0.17			
Queue Length 95th (m)	0.9	0.0	4.6			
Control Delay (s)	7.3	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			21.4%	ICU Level of Service		A
Analysis Period (min)			15			













HCM Unsignalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	41	277	853	16	114	369
Future Volume (Veh/h)	41	277	853	16	114	369
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)	45	301	927	17	124	401
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	1584	936			944	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1584	936			944	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	55	7			83	
cM capacity (veh/h)	100	324			735	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	45	301	944	124	401	
Volume Left	45	0	0	124	0	
Volume Right	0	301	17	0	0	
cSH	100	324	1700	735	1700	
Volume to Capacity	0.45	0.93	0.56	0.17	0.24	
Queue Length 95th (m)	14.5	70.4	0.0	4.6	0.0	
Control Delay (s)	67.4	69.9	0.0	10.9	0.0	
Lane LOS	F	F		B		
Approach Delay (s)	69.5		0.0	2.6		
Approach LOS	F					
Intersection Summary						
Average Delay			14.0			
Intersection Capacity Utilization			75.1%	ICU Level of Service	D	
Analysis Period (min)			15			











HCM Unsignalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2032 FT Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	180	113	756	103	99	311
Future Volume (Veh/h)	180	113	756	103	99	311
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)	196	123	822	112	108	338
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	1376	822			934	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1376	822			934	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	67			85	
cM capacity (veh/h)	138	377			741	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	196	123	822	112	108	338
Volume Left	196	0	0	0	108	0
Volume Right	0	123	0	112	0	0
cSH	138	377	1700	1700	741	1700
Volume to Capacity	1.42	0.33	0.48	0.07	0.15	0.20
Queue Length 95th (m)	98.3	10.6	0.0	0.0	3.9	0.0
Control Delay (s)	285.5	19.1	0.0	0.0	10.7	0.0
Lane LOS	F	C			B	
Approach Delay (s)	182.8		0.0		2.6	
Approach LOS	F					
Intersection Summary						
Average Delay			35.0			
Intersection Capacity Utilization			70.0%		ICU Level of Service	C
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2032 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	250	94	232	171	107	21
Future Volume (Veh/h)	250	94	232	171	107	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)	272	102	252	186	116	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			374		1013	323
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			374		1013	323
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		45	97
cM capacity (veh/h)			1196		211	723
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	374	438	139			
Volume Left	0	252	116			
Volume Right	102	0	23			
cSH	1700	1196	239			
Volume to Capacity	0.22	0.21	0.58			
Queue Length 95th (m)	0.0	6.0	25.1			
Control Delay (s)	0.0	6.0	39.2			
Lane LOS			A	E		
Approach Delay (s)	0.0	6.0	39.2			
Approach LOS			E			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			62.0%	ICU Level of Service		B
Analysis Period (min)			15			











HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FT Sc1> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	315	0	0	94	0	613	424	0	750	120
Future Volume (Veh/h)	0	0	315	0	0	94	0	613	424	0	750	120
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	342	0	0	102	0	666	461	0	815	130
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	1583	1942	815	1481	1481	666	815			1127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1583	1942	815	1481	1481	666	815			1127		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	10	100	100	78	100			100		
cM capacity (veh/h)	69	66	381	11	127	463	821			627		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	342	102	666	461	815	130						
Volume Left	0	0	0	0	0	0						
Volume Right	342	102	0	461	0	130						
cSH	381	463	1700	1700	1700	1700						
Volume to Capacity	0.90	0.22	0.39	0.27	0.48	0.08						
Queue Length 95th (m)	69.7	6.3	0.0	0.0	0.0	0.0						
Control Delay (s)	57.6	15.0	0.0	0.0	0.0	0.0						
Lane LOS	F	B										
Approach Delay (s)	57.6	15.0	0.0		0.0							
Approach LOS	F	B										
Intersection Summary												
Average Delay			8.4									
Intersection Capacity Utilization			70.7%		ICU Level of Service					C		
Analysis Period (min)			15									


















HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2032 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	203	70	27	344	58	373
Future Volume (Veh/h)	203	70	27	344	58	373
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)	221	76	29	374	63	405
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			297		691	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			297		691	259
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		84	48
cM capacity (veh/h)			1276		404	785
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	297	403	468			
Volume Left	0	29	63			
Volume Right	76	0	405			
cSH	1700	1276	696			
Volume to Capacity	0.17	0.02	0.67			
Queue Length 95th (m)	0.0	0.5	39.5			
Control Delay (s)	0.0	0.8	20.1			
Lane LOS			A	C		
Approach Delay (s)	0.0	0.8	20.1			
Approach LOS			C			
Intersection Summary						
Average Delay			8.3			
Intersection Capacity Utilization			76.0%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2032 FT Sc1> PM Peak Hour
06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	266	295	60	0	176	329	35	92	0	555	156	184		
Future Volume (vph)	266	295	60	0	176	329	35	92	0	555	156	184		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0			
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes		1.00			1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00			
Frt		0.99			0.91			1.00		1.00	0.92			
Flt Protected		0.98			1.00			0.99		0.95	1.00			
Satd. Flow (prot)		1668			1578			1707		1644	1590			
Flt Permitted		0.34			1.00			0.83		0.59	1.00			
Satd. Flow (perm)		572			1578			1444		1012	1590			
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)	289	321	65	0	191	358	38	100	0	603	170	200		
RTOR Reduction (vph)	0	5	0	0	80	0	0	0	0	0	50	0		
Lane Group Flow (vph)	0	670	0	0	469	0	0	138	0	603	320	0		
Confl. Peds. (#/hr)			2	2										
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)		35.0			35.0			22.0		38.0	38.0			
Effective Green, g (s)		37.0			37.0			24.0		38.0	40.0			
Actuated g/C Ratio		0.44			0.44			0.28		0.45	0.47			
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)		248			686			407		549	748			
v/s Ratio Prot					0.30					c0.17	0.20			
v/s Ratio Perm		c1.17						0.10		c0.32				
v/c Ratio		2.70			0.68			0.34		1.10	0.43			
Uniform Delay, d1		24.0			19.3			24.2		23.3	14.9			
Progression Factor		1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2		778.0			2.8			2.3		68.1	1.8			
Delay (s)		802.0			22.1			26.5		91.4	16.7			
Level of Service		F			C			C		F	B			
Approach Delay (s)		802.0			22.1			26.5			63.0			
Approach LOS		F			C			C			E			
Intersection Summary														
HCM 2000 Control Delay			264.8									HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio			1.91											
Actuated Cycle Length (s)			85.0							11.0				
Intersection Capacity Utilization			118.8%										ICU Level of Service	H
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT Sc1> PM Peak Hour

06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	54	17	320	31	316	0	519	211	476	586	16
Future Volume (vph)	39	54	17	320	31	316	0	519	211	476	586	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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	1.00	
Frt	1.00	0.96		1.00	0.86			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1661		1549	1494			1731	1388	1552	1724	
Flt Permitted	0.33	1.00		0.71	1.00			1.00	1.00	0.11	1.00	
Satd. Flow (perm)	534	1661		1152	1494			1731	1388	185	1724	
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)	42	59	18	348	34	343	0	564	229	517	637	17
RTOR Reduction (vph)	0	11	0	0	225	0	0	0	125	0	1	0
Lane Group Flow (vph)	42	66	0	348	152	0	0	564	104	517	653	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	31.5	31.5		31.5	31.5			32.4	32.4	54.4	54.4	
Effective Green, g (s)	34.5	34.5		34.5	34.5			36.1	36.1	54.4	58.1	
Actuated g/C Ratio	0.34	0.34		0.34	0.34			0.36	0.36	0.54	0.58	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	183	569		395	512			621	498	358	995	
v/s Ratio Prot		0.04			0.10			0.33		c0.27	0.38	
v/s Ratio Perm	0.08			c0.30					0.07	c0.51		
v/c Ratio	0.23	0.12		0.88	0.30			0.91	0.21	1.44	0.66	
Uniform Delay, d1	23.6	22.6		31.1	24.2			30.7	22.4	30.1	14.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.1		19.9	0.3			19.5	1.0	215.1	3.4	
Delay (s)	24.2	22.7		51.0	24.5			50.2	23.3	245.1	17.8	
Level of Service	C	C		D	C			D	C	F	B	
Approach Delay (s)		23.2			37.2			42.4			118.2	
Approach LOS		C			D			D			F	
Intersection Summary												
HCM 2000 Control Delay			71.9									E
HCM 2000 Volume to Capacity ratio			1.21									
Actuated Cycle Length (s)			100.6							11.0		
Intersection Capacity Utilization			103.5%									G
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT Sc1> PM Peak Hour
06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	337	364	465	453	157	216	195	297	112	309	61
Future Volume (vph)	82	337	364	465	453	157	216	195	297	112	309	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	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	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1644	1731	1471	1644	1731	1471	1643	1731	1471	1644	1682	1682
Flt Permitted	0.36	1.00	1.00	0.46	1.00	1.00	0.35	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	622	1731	1471	804	1731	1471	606	1731	1471	987	1682	1682
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)	89	366	396	505	492	171	235	212	323	122	336	66
RTOR Reduction (vph)	0	0	169	0	0	75	0	0	198	0	9	0
Lane Group Flow (vph)	89	366	227	505	492	96	235	212	125	122	393	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	40.0	40.0	40.0	40.0	40.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0
Effective Green, g (s)	43.0	43.0	43.0	43.0	43.0	43.0	32.0	32.0	32.0	32.0	32.0	32.0
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	322	896	762	416	896	762	233	667	567	380	648	648
v/s Ratio Prot		0.21			0.28			0.12				0.23
v/s Ratio Perm	0.14		0.15	c0.63		0.07	c0.39		0.08	0.12		
v/c Ratio	0.28	0.41	0.30	1.21	0.55	0.13	1.01	0.32	0.22	0.32	0.61	
Uniform Delay, d1	11.2	12.2	11.4	20.0	13.5	10.3	25.5	17.9	17.1	17.9	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	0.5	0.3	0.2	116.6	0.7	0.1	61.2	1.3	0.9	2.2	4.2	
Delay (s)	11.7	12.5	11.6	136.6	14.2	10.4	86.7	19.1	18.0	20.1	24.6	
Level of Service	B	B	B	F	B	B	F	B	B	C	C	
Approach Delay (s)		12.0			66.5			39.3			23.6	
Approach LOS		B			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			39.4									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			83.0									Sum of lost time (s) 8.0
Intersection Capacity Utilization			95.3%									ICU Level of Service F
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

















<2032 FT Sc1> PM Peak Hour
06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	109	516	647	44	90	121
Future Volume (Veh/h)	109	516	647	44	90	121
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)	118	561	703	48	98	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)						
pX, platoon unblocked						
vC, conflicting volume	751				1500	703
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	751				1500	703
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	86				16	70
cM capacity (veh/h)	868				117	441
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	118	561	703	48	98	132
Volume Left	118	0	0	0	98	0
Volume Right	0	0	0	48	0	132
cSH	868	1700	1700	1700	117	441
Volume to Capacity	0.14	0.33	0.41	0.03	0.84	0.30
Queue Length 95th (m)	3.6	0.0	0.0	0.0	37.8	9.4
Control Delay (s)	9.8	0.0	0.0	0.0	112.2	16.6
Lane LOS	A				F	C
Approach Delay (s)	1.7		0.0		57.3	
Approach LOS					F	
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			58.9%		ICU Level of Service	B
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2032 FT Sc1> PM Peak Hour
 06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	9	200	8	14	0	148	0	6	1	3	6
Future Volume (Veh/h)	2	9	200	8	14	0	148	0	6	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	10	217	9	15	0	161	0	7	1	3	7
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	15			227			164	156	118	162	264	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			227			164	156	118	162	264	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			80	100	99	100	100	99
cM capacity (veh/h)	1616			1353			792	734	939	796	640	1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	229	24	168	11								
Volume Left	2	9	161	1								
Volume Right	217	0	7	7								
cSH	1616	1353	798	881								
Volume to Capacity	0.00	0.01	0.21	0.01								
Queue Length 95th (m)	0.0	0.2	6.0	0.3								
Control Delay (s)	0.1	2.9	10.7	9.1								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.9	10.7	9.1								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			36.7%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2032 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	674	12	19	898
Future Volume (Veh/h)	8	11	674	12	19	898
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)	9	12	733	13	21	976
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	199					
pX, platoon unblocked						
vC, conflicting volume	1758	740			746	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1758	740			746	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	97			98	
cM capacity (veh/h)	92	420			871	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	746	997			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	166	1700	871			
Volume to Capacity	0.13	0.44	0.02			
Queue Length 95th (m)	3.2	0.0	0.6			
Control Delay (s)	29.8	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	29.8	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			77.9%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Kingsway & Erie Street

<2032 FT Sc1> PM Peak Hour
06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	675	12	19	887
Future Volume (Veh/h)	8	11	675	12	19	887
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)	9	12	734	13	21	964
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			104			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	1746	740			747	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1750	729			736	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	97			98	
cM capacity (veh/h)	92	420			866	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	747	985			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	166	1700	866			
Volume to Capacity	0.13	0.44	0.02			
Queue Length 95th (m)	3.2	0.0	0.6			
Control Delay (s)	29.9	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	29.9	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			77.2%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2032 FT Sc1> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	190	112	0	0	327
Future Volume (Veh/h)	558	190	112	0	0	327
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)	607	207	122	0	0	355
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	122				1543	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				1543	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	59				100	62
cM capacity (veh/h)	1478				75	935
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	607	207	122	355		
Volume Left	607	0	0	0		
Volume Right	0	0	0	355		
cSH	1478	1700	1700	935		
Volume to Capacity	0.41	0.12	0.07	0.38		
Queue Length 95th (m)	15.6	0.0	0.0	13.6		
Control Delay (s)	9.1	0.0	0.0	11.2		
Lane LOS	A			B		
Approach Delay (s)	6.8		0.0	11.2		
Approach LOS				B		
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			68.9%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2032 FT Sc1> PM Peak Hour
 06/30/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	186	0	0	0	0	109
Future Volume (Veh/h)	186	0	0	0	0	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)	202	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				404	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				404	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				100	89
cM capacity (veh/h)	1636				532	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	202	0	118			
Volume Left	202	0	0			
Volume Right	0	0	118			
cSH	1636	1700	1091			
Volume to Capacity	0.12	0.00	0.11			
Queue Length 95th (m)	3.2	0.0	2.8			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			25.2%		ICU Level of Service	A
Analysis Period (min)			15			













HCM Unsignalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	169	539	41	280	858
Future Volume (Veh/h)	25	169	539	41	280	858
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)	27	184	586	45	304	933
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	373					
pX, platoon unblocked						
vC, conflicting volume	2150	608			631	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2150	608			631	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	26	63			68	
cM capacity (veh/h)	37	499			961	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	27	184	631	304	933	
Volume Left	27	0	0	304	0	
Volume Right	0	184	45	0	0	
cSH	37	499	1700	961	1700	
Volume to Capacity	0.74	0.37	0.37	0.32	0.55	
Queue Length 95th (m)	20.0	12.8	0.0	10.4	0.0	
Control Delay (s)	233.1	16.4	0.0	10.5	0.0	
Lane LOS	F	C		B		
Approach Delay (s)	44.1		0.0	2.6		
Approach LOS	E					
Intersection Summary						
Average Delay			6.0			
Intersection Capacity Utilization			63.7%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street



















<2032 FT Sc1> PM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	98	48	532	153	64	819
Future Volume (Veh/h)	98	48	532	153	64	819
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)	107	52	578	166	70	890
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	1608	578			744	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1608	578			744	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	90			92	
cM capacity (veh/h)	107	519			873	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	107	52	578	166	70	890
Volume Left	107	0	0	0	70	0
Volume Right	0	52	0	166	0	0
cSH	107	519	1700	1700	873	1700
Volume to Capacity	1.00	0.10	0.34	0.10	0.08	0.52
Queue Length 95th (m)	48.0	2.5	0.0	0.0	2.0	0.0
Control Delay (s)	160.7	12.7	0.0	0.0	9.5	0.0
Lane LOS	F	B			A	
Approach Delay (s)	112.3		0.0		0.7	
Approach LOS	F					
Intersection Summary						
Average Delay			9.9			
Intersection Capacity Utilization			59.4%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access

<2032 FT w Recom Sc1> AM Peak Hour

06/30/2020



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	440	0	0	93	0	722	233	0	425	51
Future Volume (vph)	0	0	440	0	0	93	0	722	233	0	425	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00
Frt			0.86			0.86		1.00	0.85		1.00	0.85
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)			1497			1497		1731	1471		1731	1471
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)			1497			1497		1731	1471		1731	1471
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)	0	0	478	0	0	101	0	785	253	0	462	55
RTOR Reduction (vph)	0	0	309	0	0	77	0	0	95	0	0	21
Lane Group Flow (vph)	0	0	169	0	0	24	0	785	158	0	462	34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Perm			Perm		NA	Perm		NA	Perm
Protected Phases								2			6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)			11.5			11.5		34.0	34.0		34.0	34.0
Effective Green, g (s)			13.5			13.5		36.0	36.0		36.0	36.0
Actuated g/C Ratio			0.23			0.23		0.63	0.63		0.63	0.63
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)			351			351		1083	920		1083	920
v/s Ratio Prot								c0.45			0.27	
v/s Ratio Perm			c0.11			0.02			0.11			0.02
v/c Ratio			0.48			0.07		0.72	0.17		0.43	0.04
Uniform Delay, d1			19.0			17.1		7.4	4.5		5.5	4.1
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2			1.0			0.1		4.2	0.4		1.2	0.1
Delay (s)			20.0			17.2		11.6	4.9		6.7	4.2
Level of Service			C			B		B	A		A	A
Approach Delay (s)		20.0			17.2			10.0			6.4	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			11.7			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			57.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			60.5%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 4: Kingsway & Forks Road

<2032 FT w Recom Sc1> AM Peak Hour

06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	167	89	19	0	269	509	59	157	0	159	64	280		
Future Volume (vph)	167	89	19	0	269	509	59	157	0	159	64	280		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		6.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	1.00	1.00			0.98			1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00			
Frt	1.00	0.97			0.91			1.00		1.00	0.88			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1644	1677			1553			1707		1644	1520			
Flt Permitted	0.09	1.00			1.00			0.51		0.51	1.00			
Satd. Flow (perm)	147	1677			1553			889		878	1520			
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)	182	97	21	0	292	553	64	171	0	173	70	304		
RTOR Reduction (vph)	0	8	0	0	75	0	0	0	0	0	175	0		
Lane Group Flow (vph)	182	110	0	0	770	0	0	235	0	173	199	0		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA			
Protected Phases	7	4			8			2				6		
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	54.0	54.0			44.0			23.0		23.0	23.0			
Effective Green, g (s)	54.0	56.0			46.0			25.0		23.0	25.0			
Actuated g/C Ratio	0.61	0.63			0.52			0.28		0.26	0.28			
Clearance Time (s)	3.0	6.0			6.0			6.0		6.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	206	1055			802			249		226	426			
v/s Ratio Prot	c0.07	0.07			c0.50						0.13			
v/s Ratio Perm	0.46							c0.26		0.20				
v/c Ratio	0.88	0.10			0.96			0.94		0.77	0.47			
Uniform Delay, d1	22.0	6.5			20.6			31.3		30.5	26.5			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	32.9	0.2			23.5			41.5		14.3	0.8			
Delay (s)	54.9	6.7			44.1			72.8		44.8	27.3			
Level of Service	D	A			D			E		D	C			
Approach Delay (s)		36.0			44.1			72.8			32.8			
Approach LOS		D			D			E			C			
Intersection Summary														
HCM 2000 Control Delay			43.1									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.95											
Actuated Cycle Length (s)			89.0							11.0				
Intersection Capacity Utilization			116.0%										ICU Level of Service	H
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2032 FT w Recom Sc1> AM Peak Hour

06/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	21	7	129	45	467	16	514	312	201	363	17
Future Volume (vph)	19	21	7	129	45	467	16	514	312	201	363	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1664		1552	1494		1552	1731	1388	3010	1719	
Flt Permitted	0.16	1.00		0.74	1.00		0.52	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	266	1664		1204	1494		850	1731	1388	3010	1719	
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)	21	23	8	140	49	508	17	559	339	218	395	18
RTOR Reduction (vph)	0	5	0	0	243	0	0	0	199	0	2	0
Lane Group Flow (vph)	21	26	0	140	314	0	17	559	140	218	411	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	21.6	21.6		21.6	21.6		26.3	26.3	26.3	7.0	36.3	
Effective Green, g (s)	24.6	24.6		24.6	24.6		30.0	30.0	30.0	7.0	40.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.41	0.41	0.41	0.10	0.55	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	90	563		407	506		351	715	573	290	947	
v/s Ratio Prot		0.02			c0.21			c0.32		c0.07	0.24	
v/s Ratio Perm	0.08			0.12			0.02		0.10			
v/c Ratio	0.23	0.05		0.34	0.62		0.05	0.78	0.24	0.75	0.43	
Uniform Delay, d1	17.2	16.1		18.0	20.1		12.8	18.5	13.9	32.0	9.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	0.0		0.5	2.4		0.3	8.3	1.0	10.5	1.4	
Delay (s)	18.6	16.2		18.5	22.5		13.0	26.8	14.9	42.4	11.1	
Level of Service	B	B		B	C		B	C	B	D	B	
Approach Delay (s)		17.1			21.7			22.1			21.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay	21.8			HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio	0.71											
Actuated Cycle Length (s)	72.6			Sum of lost time (s)				11.0				
Intersection Capacity Utilization	82.4%			ICU Level of Service				E				
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2032 FT w Recom Sc1> AM Peak Hour
06/30/2020














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	174	592	427	60	30	62
Future Volume (vph)	174	592	427	60	30	62
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1731	1731	1388	1644	1471
Flt Permitted	0.42	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	731	1731	1731	1388	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	643	464	65	33	67
RTOR Reduction (vph)	0	0	0	31	0	47
Lane Group Flow (vph)	189	643	464	34	33	20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	23.2	23.2	23.2	23.2	12.3	12.3
Effective Green, g (s)	25.2	25.2	25.2	25.2	14.3	14.3
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.30	0.30
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	387	918	918	736	494	442
v/s Ratio Prot		c0.37	0.27		c0.02	
v/s Ratio Perm	0.26			0.02		0.01
v/c Ratio	0.49	0.70	0.51	0.05	0.07	0.05
Uniform Delay, d1	7.1	8.3	7.2	5.4	11.8	11.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	2.4	0.4	0.0	0.3	0.2
Delay (s)	8.0	10.8	7.6	5.4	12.1	12.0
Level of Service	A	B	A	A	B	B
Approach Delay (s)		10.1	7.3		12.0	
Approach LOS		B	A		B	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group













HCM Signalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT w Recom Sc1> AM Peak Hour
 06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	41	277	853	16	114	369
Future Volume (vph)	41	277	853	16	114	369
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1726		1644	1731
Flt Permitted	0.95	1.00	1.00		0.17	1.00
Satd. Flow (perm)	1644	1471	1726		291	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	301	927	17	124	401
RTOR Reduction (vph)	0	111	1	0	0	0
Lane Group Flow (vph)	45	190	943	0	124	401
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	14.4	14.4	46.7		46.7	46.7
Effective Green, g (s)	16.4	16.4	48.7		48.7	48.7
Actuated g/C Ratio	0.22	0.22	0.67		0.67	0.67
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	368	330	1149		193	1153
v/s Ratio Prot	0.03		c0.55			0.23
v/s Ratio Perm		c0.13			0.43	
v/c Ratio	0.12	0.58	0.82		0.64	0.35
Uniform Delay, d1	22.6	25.3	9.0		7.1	5.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	2.4	6.6		15.3	0.8
Delay (s)	22.8	27.7	15.6		22.4	6.1
Level of Service	C	C	B		C	A
Approach Delay (s)	27.0		15.6			10.0
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			16.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			73.1		Sum of lost time (s)	8.0
Intersection Capacity Utilization			76.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2032 FT w Recom Sc1> AM Peak Hour
 06/30/2020



















						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	180	113	756	103	99	311
Future Volume (vph)	180	113	756	103	99	311
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.24	1.00
Satd. Flow (perm)	1644	1471	1731	1471	416	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	123	822	112	108	338
RTOR Reduction (vph)	0	96	0	15	0	0
Lane Group Flow (vph)	196	27	822	97	108	338
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	14.1	14.1	48.1	48.1	48.1	48.1
Effective Green, g (s)	16.1	16.1	50.1	50.1	50.1	50.1
Actuated g/C Ratio	0.22	0.22	0.68	0.68	0.68	0.68
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	356	319	1168	993	280	1168
v/s Ratio Prot	c0.12		c0.47			0.20
v/s Ratio Perm		0.02		0.07	0.26	
v/c Ratio	0.55	0.08	0.70	0.10	0.39	0.29
Uniform Delay, d1	25.8	23.2	7.5	4.2	5.3	4.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	0.1	3.6	0.2	4.0	0.6
Delay (s)	27.7	23.3	11.0	4.4	9.3	5.5
Level of Service	C	C	B	A	A	A
Approach Delay (s)	26.0		10.2			6.4
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			12.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			74.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			72.4%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

2: Highway 58 & Forks Road Access

<2032 FT w Recom Sc1> PM Peak Hour

06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	315	0	0	94	0	613	424	0	750	120
Future Volume (vph)	0	0	315	0	0	94	0	613	424	0	750	120
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00
Frt			0.86			0.86		1.00	0.85		1.00	0.85
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)			1497			1497		1731	1471		1731	1471
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)			1497			1497		1731	1471		1731	1471
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)	0	0	342	0	0	102	0	666	461	0	815	130
RTOR Reduction (vph)	0	0	148	0	0	78	0	0	170	0	0	48
Lane Group Flow (vph)	0	0	194	0	0	24	0	666	291	0	815	82
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Perm			Perm		NA	Perm		NA	Perm
Protected Phases								2			6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)			11.6			11.6		35.0	35.0		35.0	35.0
Effective Green, g (s)			13.6			13.6		37.0	37.0		37.0	37.0
Actuated g/C Ratio			0.23			0.23		0.63	0.63		0.63	0.63
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)			347			347		1092	928		1092	928
v/s Ratio Prot								0.38			c0.47	
v/s Ratio Perm			c0.13			0.02			0.20			0.06
v/c Ratio			0.56			0.07		0.61	0.31		0.75	0.09
Uniform Delay, d1			19.9			17.6		6.5	5.0		7.5	4.2
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2			1.9			0.1		2.5	0.9		4.7	0.2
Delay (s)			21.8			17.6		9.0	5.8		12.2	4.4
Level of Service			C			B		A	A		B	A
Approach Delay (s)		21.8			17.6			7.7			11.1	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.3			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			58.6			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			70.7%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2032 FT w Recom Sc1> PM Peak Hour

06/30/2020

























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	295	60	0	176	329	35	92	0	555	156	184
Future Volume (vph)	266	295	60	0	176	329	35	92	0	555	156	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes	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	
Frt	1.00	0.97			0.91			1.00		1.00	0.92	
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1644	1680			1578			1707		1644	1590	
Flt Permitted	0.12	1.00			1.00			0.83		0.55	1.00	
Satd. Flow (perm)	210	1680			1578			1431		956	1590	
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)	289	321	65	0	191	358	38	100	0	603	170	200
RTOR Reduction (vph)	0	7	0	0	67	0	0	0	0	0	42	0
Lane Group Flow (vph)	289	379	0	0	482	0	0	138	0	603	328	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.9	46.9			29.9			22.0		41.0	41.0	
Effective Green, g (s)	46.9	48.9			31.9			24.0		41.0	43.0	
Actuated g/C Ratio	0.47	0.49			0.32			0.24		0.41	0.43	
Clearance Time (s)	3.0	6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	299	822			503			343		502	684	
v/s Ratio Prot	c0.14	0.23			0.31					c0.19	0.21	
v/s Ratio Perm	c0.32							0.10		c0.30		
v/c Ratio	0.97	0.46			0.96			0.40		1.20	0.48	
Uniform Delay, d1	27.8	16.8			33.3			31.9		28.9	20.4	
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2	42.5	0.4			29.3			3.5		108.4	2.4	
Delay (s)	70.4	17.2			62.6			35.4		137.3	22.8	
Level of Service	E	B			E			D		F	C	
Approach Delay (s)		40.0			62.6			35.4			93.8	
Approach LOS		D			E			D			F	

Intersection Summary		
HCM 2000 Control Delay	67.4	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	1.09	E
Actuated Cycle Length (s)	99.9	Sum of lost time (s)
Intersection Capacity Utilization	102.9%	14.0
Analysis Period (min)	15	ICU Level of Service
c Critical Lane Group		G

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT w Recom Sc1> PM Peak Hour

06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	39	54	17	320	31	316	0	519	211	476	586	16	
Future Volume (vph)	39	54	17	320	31	316	0	519	211	476	586	16	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.97	1.00		
Frbp, ped/bikes	1.00	0.99		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	1.00		
Frt	1.00	0.96		1.00	0.86			1.00	0.85	1.00	1.00		
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1661		1550	1494			1731	1388	3010	1724		
Flt Permitted	0.54	1.00		0.59	1.00			1.00	1.00	0.95	1.00		
Satd. Flow (perm)	878	1661		968	1494			1731	1388	3010	1724		
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)	42	59	18	348	34	343	0	564	229	517	637	17	
RTOR Reduction (vph)	0	12	0	0	227	0	0	0	126	0	1	0	
Lane Group Flow (vph)	42	65	0	348	150	0	0	564	103	517	653	0	
Confl. Peds. (#/hr)			1	1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4			8			2		2				
Actuated Green, G (s)	15.7	15.7		29.4	29.4			31.4	31.4	17.0	51.4		
Effective Green, g (s)	18.7	18.7		29.4	32.4			35.1	35.1	17.0	55.1		
Actuated g/C Ratio	0.20	0.20		0.31	0.34			0.37	0.37	0.18	0.58		
Clearance Time (s)	7.0	7.0		3.0	7.0			7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	171	325		363	506			636	510	535	994		
v/s Ratio Prot		0.04		c0.11	0.10			c0.33		c0.17	0.38		
v/s Ratio Perm	0.05			c0.19					0.07				
v/c Ratio	0.25	0.20		0.96	0.30			0.89	0.20	0.97	0.66		
Uniform Delay, d1	32.4	32.1		31.5	23.2			28.3	20.6	39.0	13.8		
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.8	0.3		36.0	0.3			16.7	0.9	30.2	3.4		
Delay (s)	33.2	32.4		67.5	23.5			45.0	21.5	69.2	17.2		
Level of Service	C	C		E	C			D	C	E	B		
Approach Delay (s)		32.7			44.6			38.2			40.1		
Approach LOS		C			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			40.4									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.93										
Actuated Cycle Length (s)			95.5									Sum of lost time (s)	14.0
Intersection Capacity Utilization			96.4%									ICU Level of Service	F
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT w Recom Sc1> PM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	82	337	364	465	453	157	216	195	297	112	309	61	
Future Volume (vph)	82	337	364	465	453	157	216	195	297	112	309	61	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		
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	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	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1731	1471	1644	1731	1471	1644	1731	1471	1644	1682		
Flt Permitted	0.48	1.00	1.00	0.16	1.00	1.00	0.14	1.00	1.00	0.63	1.00		
Satd. Flow (perm)	837	1731	1471	269	1731	1471	247	1731	1471	1082	1682		
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)	89	366	396	505	492	171	235	212	323	122	336	66	
RTOR Reduction (vph)	0	0	255	0	0	56	0	0	196	0	7	0	
Lane Group Flow (vph)	89	366	141	505	492	115	235	212	127	122	395	0	
Confl. Peds. (#/hr)							1					1	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		
Protected Phases		4		3	8		5	2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	22.7	22.7	22.7	55.4	55.4	55.4	41.0	41.0	41.0	25.0	25.0		
Effective Green, g (s)	25.7	25.7	25.7	55.4	58.4	58.4	41.0	43.0	43.0	27.0	27.0		
Actuated g/C Ratio	0.23	0.23	0.23	0.51	0.53	0.53	0.37	0.39	0.39	0.25	0.25		
Clearance Time (s)	7.0	7.0	7.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	196	406	345	509	924	785	258	680	578	267	415		
v/s Ratio Prot		0.21		c0.27	0.28		c0.11	0.12			c0.24		
v/s Ratio Perm	0.11		0.10	c0.23		0.08	0.23		0.09	0.11			
v/c Ratio	0.45	0.90	0.41	0.99	0.53	0.15	0.91	0.31	0.22	0.46	0.95		
Uniform Delay, d1	35.8	40.6	35.4	30.8	16.6	12.9	27.8	23.0	22.1	35.0	40.6		
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	22.6	0.8	37.7	0.6	0.1	33.3	1.2	0.9	5.5	33.7		
Delay (s)	37.5	63.2	36.2	68.4	17.2	13.0	61.1	24.2	22.9	40.5	74.3		
Level of Service	D	E	D	E	B	B	E	C	C	D	E		
Approach Delay (s)		48.0			38.7			34.9			66.4		
Approach LOS		D			D			C			E		
Intersection Summary													
HCM 2000 Control Delay			44.6		HCM 2000 Level of Service						D		
HCM 2000 Volume to Capacity ratio			0.97										
Actuated Cycle Length (s)			109.4		Sum of lost time (s)						14.0		
Intersection Capacity Utilization			95.3%		ICU Level of Service						F		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2032 FT w Recom Sc1> PM Peak Hour
06/30/2020














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	109	516	647	44	90	121
Future Volume (vph)	109	516	647	44	90	121
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1731	1731	1388	1644	1471
Flt Permitted	0.25	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	436	1731	1731	1388	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	561	703	48	98	132
RTOR Reduction (vph)	0	0	0	21	0	95
Lane Group Flow (vph)	118	561	703	27	98	37
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	24.3	24.3	24.3	24.3	11.3	11.3
Effective Green, g (s)	26.3	26.3	26.3	26.3	13.3	13.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.28	0.28
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	956	956	766	459	411
v/s Ratio Prot		0.32	c0.41		c0.06	
v/s Ratio Perm	0.27			0.02		0.03
v/c Ratio	0.49	0.59	0.74	0.03	0.21	0.09
Uniform Delay, d1	6.5	7.1	8.0	4.9	13.1	12.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.9	3.0	0.0	1.1	0.4
Delay (s)	8.1	8.0	11.0	4.9	14.2	13.1
Level of Service	A	A	B	A	B	B
Approach Delay (s)		8.0	10.6		13.6	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay		10.0	HCM 2000 Level of Service A
HCM 2000 Volume to Capacity ratio		0.56	
Actuated Cycle Length (s)		47.6	Sum of lost time (s) 8.0
Intersection Capacity Utilization		63.6%	ICU Level of Service B
Analysis Period (min)		15	

c Critical Lane Group













HCM Signalized Intersection Capacity Analysis
13: Canal Bank Street & North Access

<2032 FT w Recom Sc1> PM Peak Hour
06/30/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	169	539	41	280	858
Future Volume (vph)	25	169	539	41	280	858
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1714		1644	1731
Flt Permitted	0.95	1.00	1.00		0.37	1.00
Satd. Flow (perm)	1644	1471	1714		636	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	184	586	45	304	933
RTOR Reduction (vph)	0	152	3	0	0	0
Lane Group Flow (vph)	27	32	628	0	304	933
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	10.4	10.4	49.6		49.6	49.6
Effective Green, g (s)	12.4	12.4	51.6		51.6	51.6
Actuated g/C Ratio	0.17	0.17	0.72		0.72	0.72
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	283	253	1228		455	1240
v/s Ratio Prot	0.02		0.37			c0.54
v/s Ratio Perm		c0.02			0.48	
v/c Ratio	0.10	0.13	0.51		0.67	0.75
Uniform Delay, d1	25.1	25.2	4.6		5.5	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.2	1.5		7.6	4.2
Delay (s)	25.2	25.4	6.1		13.1	10.5
Level of Service	C	C	A		B	B
Approach Delay (s)	25.4		6.1			11.2
Approach LOS	C		A			B
Intersection Summary						
HCM 2000 Control Delay			11.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			72.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			68.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						



















HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2032 FT w Recom Sc1> PM Peak Hour
 06/30/2020










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	98	48	532	153	64	819
Future Volume (vph)	98	48	532	153	64	819
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.41	1.00
Satd. Flow (perm)	1644	1471	1731	1471	702	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	52	578	166	70	890
RTOR Reduction (vph)	0	44	0	25	0	0
Lane Group Flow (vph)	107	8	578	141	70	890
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.9	8.9	51.9	51.9	51.9	51.9
Effective Green, g (s)	10.9	10.9	53.9	53.9	53.9	53.9
Actuated g/C Ratio	0.15	0.15	0.74	0.74	0.74	0.74
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	246	220	1281	1089	519	1281
v/s Ratio Prot	c0.07		0.33			c0.51
v/s Ratio Perm		0.01		0.10	0.10	
v/c Ratio	0.43	0.04	0.45	0.13	0.13	0.69
Uniform Delay, d1	28.1	26.5	3.7	2.7	2.7	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	1.1	0.2	0.5	3.1
Delay (s)	29.4	26.5	4.8	3.0	3.3	8.2
Level of Service	C	C	A	A	A	A
Approach Delay (s)	28.4		4.4			7.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			8.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			72.8		Sum of lost time (s)	8.0
Intersection Capacity Utilization			61.8%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	178	76	352	209	44	16
Future Volume (Veh/h)	178	76	352	209	44	16
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)	193	83	383	227	48	17
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			276		1228	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			276		1228	234
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		66	98
cM capacity (veh/h)			1299		140	810
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	276	610	65			
Volume Left	0	383	48			
Volume Right	83	0	17			
cSH	1700	1299	179			
Volume to Capacity	0.16	0.29	0.36			
Queue Length 95th (m)	0.0	9.4	11.8			
Control Delay (s)	0.0	6.7	36.2			
Lane LOS			A	E		
Approach Delay (s)	0.0	6.7	36.2			
Approach LOS			E			
Intersection Summary						
Average Delay			6.8			
Intersection Capacity Utilization			62.0%	ICU Level of Service		B
Analysis Period (min)			15			



















													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	420	0	0	93	0	722	226	0	425	51	
Future Volume (vph)	0	0	420	0	0	93	0	722	226	0	425	51	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Frt			0.86			0.86		1.00	0.85		1.00	0.85	
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1497			1497		1731	1471		1731	1471	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1497			1497		1731	1471		1731	1471	
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)	0	0	457	0	0	101	0	785	246	0	462	55	
RTOR Reduction (vph)	0	0	310	0	0	78	0	0	91	0	0	20	
Lane Group Flow (vph)	0	0	147	0	0	23	0	785	155	0	462	35	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			11.3			11.3		34.0	34.0		34.0	34.0	
Effective Green, g (s)			13.3			13.3		36.0	36.0		36.0	36.0	
Actuated g/C Ratio			0.23			0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			347			347		1087	924		1087	924	
v/s Ratio Prot								c0.45			0.27		
v/s Ratio Perm			c0.10			0.02			0.11			0.02	
v/c Ratio			0.42			0.07		0.72	0.17		0.43	0.04	
Uniform Delay, d1			18.7			17.2		7.2	4.4		5.4	4.1	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2			0.8			0.1		4.2	0.4		1.2	0.1	
Delay (s)			19.6			17.2		11.4	4.8		6.6	4.1	
Level of Service			B			B		B	A		A	A	
Approach Delay (s)		19.6			17.2			9.8			6.4		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay			11.4									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67										
Actuated Cycle Length (s)			57.3									Sum of lost time (s)	10.0
Intersection Capacity Utilization			59.2%									ICU Level of Service	B
Analysis Period (min)			15										























c Critical Lane Group

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	117	80	14	478	85	150
Future Volume (Veh/h)	117	80	14	478	85	150
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)	127	87	15	520	92	163
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			214		720	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			214		720	170
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		77	81
cM capacity (veh/h)			1368		393	879
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	214	535	255			
Volume Left	0	15	92			
Volume Right	87	0	163			
cSH	1700	1368	608			
Volume to Capacity	0.13	0.01	0.42			
Queue Length 95th (m)	0.0	0.3	15.7			
Control Delay (s)	0.0	0.3	15.1			
Lane LOS			A			C
Approach Delay (s)	0.0	0.3	15.1			
Approach LOS			C			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			61.4%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2032 FT w Recom & Reduc Sc1> AM Peak Hour
06/30/2020

























														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	167	80	19	0	244	464	59	157	0	144	64	280		
Future Volume (vph)	167	80	19	0	244	464	59	157	0	144	64	280		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		6.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	1.00	1.00			0.98			1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00			
Frt	1.00	0.97			0.91			1.00		1.00	0.88			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1644	1672			1553			1707		1644	1520			
Flt Permitted	0.13	1.00			1.00			0.51		0.51	1.00			
Satd. Flow (perm)	219	1672			1553			889		878	1520			
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)	182	87	21	0	265	504	64	171	0	157	70	304		
RTOR Reduction (vph)	0	8	0	0	75	0	0	0	0	0	175	0		
Lane Group Flow (vph)	182	100	0	0	694	0	0	235	0	157	199	0		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA			
Protected Phases	7	4			8			2				6		
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	54.0	54.0			44.0			23.0		23.0	23.0			
Effective Green, g (s)	54.0	56.0			46.0			25.0		23.0	25.0			
Actuated g/C Ratio	0.61	0.63			0.52			0.28		0.26	0.28			
Clearance Time (s)	3.0	6.0			6.0			6.0		6.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	244	1052			802			249		226	426			
v/s Ratio Prot	c0.06	0.06			c0.45						0.13			
v/s Ratio Perm	0.39							c0.26		0.18				
v/c Ratio	0.75	0.10			0.86			0.94		0.69	0.47			
Uniform Delay, d1	15.3	6.5			18.8			31.3		29.8	26.5			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	11.7	0.2			12.0			41.5		8.9	0.8			
Delay (s)	27.0	6.7			30.8			72.8		38.7	27.3			
Level of Service	C	A			C			E		D	C			
Approach Delay (s)		19.4			30.8			72.8			30.7			
Approach LOS		B			C			E			C			
Intersection Summary														
HCM 2000 Control Delay			34.4									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.88											
Actuated Cycle Length (s)			89.0								11.0			
Intersection Capacity Utilization			111.6%										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)	19	20	7	129	43	450	16	514	312	195	363	17
Future Volume (vph)	19	20	7	129	43	450	16	514	312	195	363	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.97	1.00	
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1661		1552	1494		1552	1731	1388	3010	1719	
Fl _t Permitted	0.16	1.00		0.74	1.00		0.52	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	268	1661		1205	1494		850	1731	1388	3010	1719	
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)	21	22	8	140	47	489	17	559	339	212	395	18
RTOR Reduction (vph)	0	5	0	0	243	0	0	0	199	0	2	0
Lane Group Flow (vph)	21	25	0	140	293	0	17	559	140	212	411	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	21.4	21.4		21.4	21.4		26.3	26.3	26.3	7.0	36.3	
Effective Green, g (s)	24.4	24.4		24.4	24.4		30.0	30.0	30.0	7.0	40.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.41	0.41	0.41	0.10	0.55	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	90	559		406	503		352	717	575	291	949	
v/s Ratio Prot		0.01			c0.20			c0.32		c0.07	0.24	
v/s Ratio Perm	0.08			0.12			0.02		0.10			
v/c Ratio	0.23	0.04		0.34	0.58		0.05	0.78	0.24	0.73	0.43	
Uniform Delay, d ₁	17.3	16.2		18.0	19.8		12.7	18.3	13.8	31.8	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	1.3	0.0		0.5	1.7		0.3	8.2	1.0	8.8	1.4	
Delay (s)	18.6	16.2		18.5	21.5		12.9	26.5	14.8	40.6	11.0	
Level of Service	B	B		B	C		B	C	B	D	B	
Approach Delay (s)		17.2			20.9			21.9			21.0	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			72.4			Sum of lost time (s)			11.0			
Intersection Capacity Utilization			81.2%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT w Recom & Reduc Sc1> AM Peak Hour
06/30/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	71	354	150	201	259	124	350	285	450	118	117	16	
Future Volume (vph)	71	354	150	201	259	124	350	285	450	118	117	16	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1731	1471	1644	1731	1471	1644	1731	1471	1644	1700		
Flt Permitted	0.52	1.00	1.00	0.41	1.00	1.00	0.67	1.00	1.00	0.50	1.00		
Satd. Flow (perm)	896	1731	1471	707	1731	1471	1151	1731	1471	872	1700		
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)	77	385	163	218	282	135	380	310	489	128	127	17	
RTOR Reduction (vph)	0	0	94	0	0	78	0	0	225	0	5	0	
Lane Group Flow (vph)	77	385	69	218	282	57	380	310	264	128	139	0	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	26.7	26.7	26.7	26.7	26.7	26.7	30.3	30.3	30.3	30.3	30.3		
Effective Green, g (s)	29.7	29.7	29.7	29.7	29.7	29.7	32.3	32.3	32.3	32.3	32.3		
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42	0.46	0.46	0.46	0.46	0.46		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	380	734	624	299	734	624	531	798	678	402	784		
v/s Ratio Prot		0.22			0.16			0.18			0.08		
v/s Ratio Perm	0.09		0.05	c0.31		0.04	c0.33		0.18	0.15			
v/c Ratio	0.20	0.52	0.11	0.73	0.38	0.09	0.72	0.39	0.39	0.32	0.18		
Uniform Delay, d1	12.7	14.9	12.2	16.8	13.9	12.1	15.2	12.4	12.4	11.9	11.1		
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	0.3	0.7	0.1	8.6	0.3	0.1	8.0	1.4	1.7	2.1	0.5		
Delay (s)	13.0	15.6	12.3	25.4	14.2	12.1	23.2	13.8	14.1	14.0	11.6		
Level of Service	B	B	B	C	B	B	C	B	B	B	B		
Approach Delay (s)		14.4			17.6			16.9			12.7		
Approach LOS		B			B			B			B		
Intersection Summary													
HCM 2000 Control Delay			16.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.72										
Actuated Cycle Length (s)			70.0									Sum of lost time (s)	8.0
Intersection Capacity Utilization			79.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	170	578	422	60	30	61
Future Volume (vph)	170	578	422	60	30	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1731	1731	1388	1644	1471
Flt Permitted	0.43	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	737	1731	1731	1388	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	628	459	65	33	66
RTOR Reduction (vph)	0	0	0	31	0	46
Lane Group Flow (vph)	185	628	459	34	33	20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	22.8	22.8	22.8	22.8	12.3	12.3
Effective Green, g (s)	24.8	24.8	24.8	24.8	14.3	14.3
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.30	0.30
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	388	911	911	730	499	446
v/s Ratio Prot		c0.36	0.27		c0.02	
v/s Ratio Perm	0.25			0.02		0.01
v/c Ratio	0.48	0.69	0.50	0.05	0.07	0.04
Uniform Delay, d1	7.0	8.3	7.2	5.4	11.7	11.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.2	0.4	0.0	0.3	0.2
Delay (s)	8.0	10.5	7.6	5.4	11.9	11.8
Level of Service	A	B	A	A	B	B
Approach Delay (s)		9.9	7.4		11.8	
Approach LOS		A	A		B	










Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	47.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		










c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2032 FT w Recom & Reduc Sc1> AM Peak Hour
 06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	99	3	5	1	213	4	6	1	3	8
Future Volume (Veh/h)	4	6	99	3	5	1	213	4	6	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	108	3	5	1	232	4	7	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			115			91	81	61	90	134	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			115			91	81	61	90	134	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			74	100	99	100	100	99
cM capacity (veh/h)	1628			1487			885	809	1010	888	757	1083
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	119	9	243	13								
Volume Left	4	3	232	1								
Volume Right	108	1	7	9								
cSH	1628	1487	887	970								
Volume to Capacity	0.00	0.00	0.27	0.01								
Queue Length 95th (m)	0.1	0.0	8.5	0.3								
Control Delay (s)	0.3	2.5	10.6	8.8								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.3	2.5	10.6	8.8								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.1									
Intersection Capacity Utilization			34.1%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	797	4	5	471
Future Volume (Veh/h)	11	17	797	4	5	471
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)	12	18	866	4	5	512
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	199			389		
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	1390	868			870	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1386	844			846	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			99	
cM capacity (veh/h)	153	353			770	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	870	517			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	231	1700	770			
Volume to Capacity	0.13	0.51	0.01			
Queue Length 95th (m)	3.3	0.0	0.1			
Control Delay (s)	22.9	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	22.9	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			55.8%	ICU Level of Service		B
Analysis Period (min)			15			












						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	784	4	5	477
Future Volume (Veh/h)	11	17	784	4	5	477
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)	12	18	852	4	5	518
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	101					
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	1382	854			856	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1368	776			779	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			99	
cM capacity (veh/h)	145	357			756	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	856	523			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	225	1700	756			
Volume to Capacity	0.13	0.50	0.01			
Queue Length 95th (m)	3.4	0.0	0.2			
Control Delay (s)	23.4	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	23.4	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			55.1%	ICU Level of Service		B
Analysis Period (min)			15			

























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	148	50	155	0	0	454
Future Volume (Veh/h)	148	50	155	0	0	454
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)	161	54	168	0	0	493
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	168				544	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				544	168
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				100	44
cM capacity (veh/h)	1422				447	881
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	161	54	168	493		
Volume Left	161	0	0	0		
Volume Right	0	0	0	493		
cSH	1422	1700	1700	881		
Volume to Capacity	0.11	0.03	0.10	0.56		
Queue Length 95th (m)	2.9	0.0	0.0	27.0		
Control Delay (s)	7.9	0.0	0.0	14.1		
Lane LOS	A			B		
Approach Delay (s)	5.9		0.0	14.1		
Approach LOS				B		
Intersection Summary						
Average Delay			9.4			
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			





















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Volume (veh/h)	49	0	0	0	0	151
Future Volume (Veh/h)	49	0	0	0	0	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)	53	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				106	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				106	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	85
cM capacity (veh/h)	1636				868	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	53	0	164			
Volume Left	53	0	0			
Volume Right	0	0	164			
cSH	1636	1700	1091			
Volume to Capacity	0.03	0.00	0.15			
Queue Length 95th (m)	0.8	0.0	4.0			
Control Delay (s)	7.3	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization		20.2%		ICU Level of Service		A
Analysis Period (min)			15			











						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	41	277	808	16	114	354
Future Volume (vph)	41	277	808	16	114	354
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1726		1644	1731
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1644	1471	1726		341	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	301	878	17	124	385
RTOR Reduction (vph)	0	124	1	0	0	0
Lane Group Flow (vph)	45	177	894	0	124	385
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	14.1	14.1	46.7		46.7	46.7
Effective Green, g (s)	16.1	16.1	48.7		48.7	48.7
Actuated g/C Ratio	0.22	0.22	0.67		0.67	0.67
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	363	325	1154		228	1157
v/s Ratio Prot	0.03		c0.52			0.22
v/s Ratio Perm		c0.12			0.36	
v/c Ratio	0.12	0.55	0.77		0.54	0.33
Uniform Delay, d1	22.7	25.1	8.3		6.3	5.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	1.9	5.1		9.0	0.8
Delay (s)	22.9	27.0	13.4		15.3	5.9
Level of Service	C	C	B		B	A
Approach Delay (s)	26.4		13.4			8.2
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			14.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			72.8		Sum of lost time (s)	8.0
Intersection Capacity Utilization			73.9%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	180	113	711	103	99	296
Future Volume (vph)	180	113	711	103	99	296
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.27	1.00
Satd. Flow (perm)	1644	1471	1731	1471	463	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	123	773	112	108	322
RTOR Reduction (vph)	0	96	0	16	0	0
Lane Group Flow (vph)	196	27	773	96	108	322
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	14.1	14.1	48.1	48.1	48.1	48.1
Effective Green, g (s)	16.1	16.1	50.1	50.1	50.1	50.1
Actuated g/C Ratio	0.22	0.22	0.68	0.68	0.68	0.68
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	356	319	1168	993	312	1168
v/s Ratio Prot	c0.12		c0.45			0.19
v/s Ratio Perm		0.02		0.07	0.23	
v/c Ratio	0.55	0.08	0.66	0.10	0.35	0.28
Uniform Delay, d1	25.8	23.2	7.1	4.2	5.1	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	0.1	3.0	0.2	3.0	0.6
Delay (s)	27.7	23.3	10.0	4.4	8.1	5.4
Level of Service	C	C	B	A	A	A
Approach Delay (s)	26.0		9.3			6.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			11.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			74.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			69.8%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	243	94	219	168	107	21
Future Volume (Veh/h)	243	94	219	168	107	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)	264	102	238	183	116	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			366			974 315
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			366			974 315
tC, single (s)			4.1			6.4 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.5 3.3
p0 queue free %			80			49 97
cM capacity (veh/h)			1204			226 730
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	366	421	139			
Volume Left	0	238	116			
Volume Right	102	0	23			
cSH	1700	1204	255			
Volume to Capacity	0.22	0.20	0.54			
Queue Length 95th (m)	0.0	5.6	22.6			
Control Delay (s)	0.0	5.8	34.8			
Lane LOS			A	D		
Approach Delay (s)	0.0	5.8	34.8			
Approach LOS			D			
Intersection Summary						
Average Delay			7.8			
Intersection Capacity Utilization			60.7%	ICU Level of Service		B
Analysis Period (min)			15			



















													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	302	0	0	94	0	613	402	0	750	120	
Future Volume (vph)	0	0	302	0	0	94	0	613	402	0	750	120	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Fr _t			0.86			0.86		1.00	0.85		1.00	0.85	
Fl _t Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1497			1497		1731	1471		1731	1471	
Fl _t Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1497			1497		1731	1471		1731	1471	
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)	0	0	328	0	0	102	0	666	437	0	815	130	
RTOR Reduction (vph)	0	0	149	0	0	79	0	0	160	0	0	48	
Lane Group Flow (vph)	0	0	179	0	0	23	0	666	277	0	815	82	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			11.4			11.4		35.0	35.0		35.0	35.0	
Effective Green, g (s)			13.4			13.4		37.0	37.0		37.0	37.0	
Actuated g/C Ratio			0.23			0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			343			343		1096	931		1096	931	
v/s Ratio Prot								0.38			c0.47		
v/s Ratio Perm			c0.12			0.02			0.19			0.06	
v/c Ratio			0.52			0.07		0.61	0.30		0.74	0.09	
Uniform Delay, d ₁			19.7			17.6		6.4	4.8		7.4	4.2	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d ₂			1.4			0.1		2.5	0.8		4.6	0.2	
Delay (s)			21.1			17.7		8.9	5.6		12.0	4.3	
Level of Service			C			B		A	A		B	A	
Approach Delay (s)		21.1			17.7			7.6			10.9		
Approach LOS		C			B			A			B		
Intersection Summary													
HCM 2000 Control Delay			11.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.71										
Actuated Cycle Length (s)			58.4									Sum of lost time (s)	10.0
Intersection Capacity Utilization			69.8%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	196	70	27	328	58	351
Future Volume (Veh/h)	196	70	27	328	58	351
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)	213	76	29	357	63	382
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			289		666	251
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			289		666	251
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		85	52
cM capacity (veh/h)			1284		418	793
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	289	386	445			
Volume Left	0	29	63			
Volume Right	76	0	382			
cSH	1700	1284	703			
Volume to Capacity	0.17	0.02	0.63			
Queue Length 95th (m)	0.0	0.5	34.4			
Control Delay (s)	0.0	0.8	18.5			
Lane LOS			A		C	
Approach Delay (s)	0.0	0.8	18.5			
Approach LOS			C			
Intersection Summary						
Average Delay			7.6			
Intersection Capacity Utilization			73.2%	ICU Level of Service		D
Analysis Period (min)			15			























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

























<2032 FT w Recom & Reduc Sc1> PM Peak Hour
06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	266	266	60	0	160	300	35	92	0	505	156	184		
Future Volume (vph)	266	266	60	0	160	300	35	92	0	505	156	184		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		3.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	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			
Frt	1.00	0.97			0.91			1.00		1.00	0.92			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1644	1675			1578			1707		1644	1590			
Flt Permitted	0.11	1.00			1.00			0.82		0.50	1.00			
Satd. Flow (perm)	190	1675			1578			1413		872	1590			
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)	289	289	65	0	174	326	38	100	0	549	170	200		
RTOR Reduction (vph)	0	7	0	0	54	0	0	0	0	0	34	0		
Lane Group Flow (vph)	289	347	0	0	446	0	0	138	0	549	336	0		
Confl. Peds. (#/hr)			2	2										
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	pm+pt	NA			NA		Perm	NA		pm+pt	NA			
Protected Phases	7	4			8			2		1	6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	57.7	57.7			33.5			22.0		54.5	54.5			
Effective Green, g (s)	57.7	59.7			35.5			24.0		54.5	56.5			
Actuated g/C Ratio	0.46	0.48			0.29			0.19		0.44	0.45			
Clearance Time (s)	3.0	6.0			6.0			6.0		3.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	336	805			451			273		566	723			
v/s Ratio Prot	c0.15	0.21			c0.28					c0.23	0.21			
v/s Ratio Perm	0.25							0.10		c0.20				
v/c Ratio	0.86	0.43			0.99			0.51		0.97	0.47			
Uniform Delay, d1	34.9	21.1			44.2			44.8		31.8	23.4			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	19.5	0.4			39.3			6.5		29.9	2.1			
Delay (s)	54.4	21.5			83.4			51.3		61.7	25.5			
Level of Service	D	C			F			D		E	C			
Approach Delay (s)		36.3			83.4			51.3			47.1			
Approach LOS		D			F			D			D			
Intersection Summary														
HCM 2000 Control Delay			52.5									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.96											
Actuated Cycle Length (s)			124.2								14.0		Sum of lost time (s)	
Intersection Capacity Utilization			96.9%										ICU Level of Service	F
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
 5: Highway 58 & Townline Tunnel Road

<2032 FT w Recom & Reduc Sc1> PM Peak Hour
 06/30/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	52	17	320	30	305	0	519	211	457	586	16		
Future Volume (vph)	39	52	17	320	30	305	0	519	211	457	586	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.97	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Frt	1.00	0.96		1.00	0.86			1.00	0.85	1.00	1.00			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1659		1550	1494			1731	1388	3010	1724			
Flt Permitted	0.54	1.00		0.59	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (perm)	888	1659		970	1494			1731	1388	3010	1724			
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)	42	57	18	348	33	332	0	564	229	497	637	17		
RTOR Reduction (vph)	0	13	0	0	219	0	0	0	126	0	1	0		
Lane Group Flow (vph)	42	62	0	348	146	0	0	564	103	497	653	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA			
Protected Phases		4		3	8			2		1	6			
Permitted Phases	4			8			2		2					
Actuated Green, G (s)	15.7	15.7		29.4	29.4			31.4	31.4	17.0	51.4			
Effective Green, g (s)	18.7	18.7		29.4	32.4			35.1	35.1	17.0	55.1			
Actuated g/C Ratio	0.20	0.20		0.31	0.34			0.37	0.37	0.18	0.58			
Clearance Time (s)	7.0	7.0		3.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	173	324		363	506			636	510	535	994			
v/s Ratio Prot		0.04		c0.11	0.10			c0.33		c0.17	0.38			
v/s Ratio Perm	0.05			c0.19					0.07					
v/c Ratio	0.24	0.19		0.96	0.29			0.89	0.20	0.93	0.66			
Uniform Delay, d1	32.4	32.1		31.5	23.1			28.3	20.6	38.7	13.8			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.7	0.3		36.0	0.3			16.7	0.9	22.5	3.4			
Delay (s)	33.2	32.4		67.5	23.4			45.0	21.5	61.2	17.2			
Level of Service	C	C		E	C			D	C	E	B			
Approach Delay (s)		32.7			44.9			38.2			36.2			
Approach LOS		C			D			D			D			
Intersection Summary														
HCM 2000 Control Delay			38.9									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.92											
Actuated Cycle Length (s)			95.5								14.0			
Intersection Capacity Utilization			96.4%										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)	82	337	343	445	453	157	204	189	286	112	300	61		
Future Volume (vph)	82	337	343	445	453	157	204	189	286	112	300	61		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0			
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	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	1.00	1.00	1.00	1.00			
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1644	1731	1471	1644	1731	1471	1644	1731	1471	1644	1680			
Flt Permitted	0.48	1.00	1.00	0.16	1.00	1.00	0.14	1.00	1.00	0.63	1.00			
Satd. Flow (perm)	837	1731	1471	271	1731	1471	245	1731	1471	1089	1680			
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)	89	366	373	484	492	171	222	205	311	122	326	66		
RTOR Reduction (vph)	0	0	262	0	0	57	0	0	187	0	7	0		
Lane Group Flow (vph)	89	366	111	484	492	114	222	205	124	122	385	0		
Confl. Peds. (#/hr)							1					1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA			
Protected Phases		4		3	8		5	2			6			
Permitted Phases	4		4	8		8	2		2	6				
Actuated Green, G (s)	22.5	22.5	22.5	54.2	54.2	54.2	41.0	41.0	41.0	25.3	25.3			
Effective Green, g (s)	25.5	25.5	25.5	54.2	57.2	57.2	41.0	43.0	43.0	27.3	27.3			
Actuated g/C Ratio	0.24	0.24	0.24	0.50	0.53	0.53	0.38	0.40	0.40	0.25	0.25			
Clearance Time (s)	7.0	7.0	7.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	197	407	346	499	915	777	257	687	584	274	423			
v/s Ratio Prot		0.21		c0.26	0.28		c0.10	0.12			c0.23			
v/s Ratio Perm	0.11		0.08	c0.23		0.08	0.23		0.08	0.11				
v/c Ratio	0.45	0.90	0.32	0.97	0.54	0.15	0.86	0.30	0.21	0.45	0.91			
Uniform Delay, d1	35.4	40.1	34.2	29.9	16.8	13.0	26.9	22.3	21.4	34.1	39.3			
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	1.6	21.9	0.5	32.2	0.6	0.1	24.6	1.1	0.8	5.2	26.3			
Delay (s)	37.0	62.0	34.7	62.1	17.4	13.1	51.5	23.4	22.3	39.2	65.5			
Level of Service	D	E	C	E	B	B	D	C	C	D	E			
Approach Delay (s)		47.0			35.6			31.4			59.3			
Approach LOS		D			D			C			E			
Intersection Summary														
HCM 2000 Control Delay			41.4									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.93											
Actuated Cycle Length (s)			108.2								14.0			
Intersection Capacity Utilization			92.8%										ICU Level of Service	F
Analysis Period (min)			15											

c Critical Lane Group



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	107	507	631	44	90	117
Future Volume (vph)	107	507	631	44	90	117
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1731	1731	1388	1644	1471
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	452	1731	1731	1388	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	551	686	48	98	127
RTOR Reduction (vph)	0	0	0	22	0	91
Lane Group Flow (vph)	116	551	686	26	98	36
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	23.8	23.8	23.8	23.8	11.3	11.3
Effective Green, g (s)	25.8	25.8	25.8	25.8	13.3	13.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.28	0.28
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	948	948	760	464	415
v/s Ratio Prot		0.32	c0.40		c0.06	
v/s Ratio Perm	0.26			0.02		0.02
v/c Ratio	0.47	0.58	0.72	0.03	0.21	0.09
Uniform Delay, d1	6.5	7.1	8.0	4.9	12.9	12.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.9	2.8	0.0	1.0	0.4
Delay (s)	7.9	8.0	10.7	4.9	13.9	12.8
Level of Service	A	A	B	A	B	B
Approach Delay (s)		8.0	10.4		13.3	
Approach LOS		A	B		B	










Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	47.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		










c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2032 FT w Recom & Reduc Sc1> PM Peak Hour
 06/30/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	9	196	8	14	0	146	0	6	1	3	6
Future Volume (Veh/h)	2	9	196	8	14	0	146	0	6	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	10	213	9	15	0	159	0	7	1	3	7
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	15			223			162	154	116	160	260	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			223			162	154	116	160	260	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			80	100	99	100	100	99
cM capacity (veh/h)	1616			1358			795	736	941	799	643	1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	225	24	166	11								
Volume Left	2	9	159	1								
Volume Right	213	0	7	7								
cSH	1616	1358	800	883								
Volume to Capacity	0.00	0.01	0.21	0.01								
Queue Length 95th (m)	0.0	0.2	5.9	0.3								
Control Delay (s)	0.1	2.9	10.7	9.1								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.9	10.7	9.1								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			36.3%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	645	12	19	848
Future Volume (Veh/h)	8	11	645	12	19	848
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)	9	12	701	13	21	922
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	199					
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	1672	708			714	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1692	614			621	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	97			98	
cM capacity (veh/h)	90	443			867	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	714	943			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	166	1700	867			
Volume to Capacity	0.13	0.42	0.02			
Queue Length 95th (m)	3.2	0.0	0.6			
Control Delay (s)	29.8	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	29.8	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay	0.8					
Intersection Capacity Utilization	75.0%		ICU Level of Service		D	
Analysis Period (min)	15					












						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	646	12	19	837
Future Volume (Veh/h)	8	11	646	12	19	837
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)	9	12	702	13	21	910
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	104					
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1660	708			715	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1688	571			578	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	97			98	
cM capacity (veh/h)	86	447			856	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	715	931			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	160	1700	856			
Volume to Capacity	0.13	0.42	0.02			
Queue Length 95th (m)	3.4	0.0	0.6			
Control Delay (s)	30.8	0.0	0.7			
Lane LOS	D		A			
Approach Delay (s)	30.8	0.0	0.7			
Approach LOS	D					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			74.4%	ICU Level of Service		D
Analysis Period (min)			15			















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	499	170	101	0	0	293
Future Volume (Veh/h)	499	170	101	0	0	293
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)	542	185	110	0	0	318
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110				1379	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110				1379	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	64				100	66
cM capacity (veh/h)	1493				102	949
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	542	185	110	318		
Volume Left	542	0	0	0		
Volume Right	0	0	0	318		
cSH	1493	1700	1700	949		
Volume to Capacity	0.36	0.11	0.06	0.34		
Queue Length 95th (m)	12.8	0.0	0.0	11.3		
Control Delay (s)	8.8	0.0	0.0	10.7		
Lane LOS	A			B		
Approach Delay (s)	6.5		0.0	10.7		
Approach LOS				B		
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			63.0%		ICU Level of Service	B
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	166	0	0	0	0	98
Future Volume (Veh/h)	166	0	0	0	0	98
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)	180	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				360	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				360	0
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				100	90
cM capacity (veh/h)	1636				572	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	180	0	107			
Volume Left	180	0	0			
Volume Right	0	0	107			
cSH	1636	1700	1091			
Volume to Capacity	0.11	0.00	0.10			
Queue Length 95th (m)	2.8	0.0	2.5			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			23.2%		ICU Level of Service	A
Analysis Period (min)			15			










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	169	510	41	280	808
Future Volume (vph)	25	169	510	41	280	808
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1713		1644	1731
Flt Permitted	0.95	1.00	1.00		0.39	1.00
Satd. Flow (perm)	1644	1471	1713		668	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	184	554	45	304	878
RTOR Reduction (vph)	0	152	3	0	0	0
Lane Group Flow (vph)	27	32	596	0	304	878
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	10.4	10.4	49.6		49.6	49.6
Effective Green, g (s)	12.4	12.4	51.6		51.6	51.6
Actuated g/C Ratio	0.17	0.17	0.72		0.72	0.72
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	283	253	1227		478	1240
v/s Ratio Prot	0.02		0.35			c0.51
v/s Ratio Perm		c0.02			0.46	
v/c Ratio	0.10	0.13	0.49		0.64	0.71
Uniform Delay, d1	25.1	25.2	4.4		5.3	5.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.2	1.4		6.3	3.4
Delay (s)	25.2	25.4	5.8		11.6	9.3
Level of Service	C	C	A		B	A
Approach Delay (s)	25.4		5.8			9.9
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.59			
Actuated Cycle Length (s)			72.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			67.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	98	48	503	153	64	769
Future Volume (vph)	98	48	503	153	64	769
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1644	1471	1731	1471	733	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	52	547	166	70	836
RTOR Reduction (vph)	0	44	0	26	0	0
Lane Group Flow (vph)	107	8	547	140	70	836
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.9	8.9	51.9	51.9	51.9	51.9
Effective Green, g (s)	10.9	10.9	53.9	53.9	53.9	53.9
Actuated g/C Ratio	0.15	0.15	0.74	0.74	0.74	0.74
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	246	220	1281	1089	542	1281
v/s Ratio Prot	c0.07		0.32			c0.48
v/s Ratio Perm		0.01		0.09	0.10	
v/c Ratio	0.43	0.04	0.43	0.13	0.13	0.65
Uniform Delay, d1	28.1	26.5	3.6	2.7	2.7	4.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	1.0	0.2	0.5	2.6
Delay (s)	29.4	26.5	4.6	3.0	3.2	7.3
Level of Service	C	C	A	A	A	A
Approach Delay (s)	28.4		4.2			7.0
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			7.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			72.8		Sum of lost time (s)	8.0
Intersection Capacity Utilization			58.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

***C-12 2032 FUTURE
TOTAL SC2***



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2032 FT Sc2> AM Peak Hour
 07/06/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	200	56	3	84	161	53
Future Volume (Veh/h)	200	56	3	84	161	53
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)	217	61	3	91	175	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)						
pX, platoon unblocked						
vC, conflicting volume			278			248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			278			248
tC, single (s)			4.1			6.3
tC, 2 stage (s)						
tF (s)			2.2			3.4
p0 queue free %			100			92
cM capacity (veh/h)			1296			765
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	278	94	233			
Volume Left	0	3	175			
Volume Right	61	0	58			
cSH	1700	1296	655			
Volume to Capacity	0.16	0.00	0.36			
Queue Length 95th (m)	0.0	0.1	12.2			
Control Delay (s)	0.0	0.3	13.5			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.3	13.5			
Approach LOS			B			
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization			35.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FT Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	61	0	0	230	0	774	71	0	783	226
Future Volume (Veh/h)	0	0	61	0	0	230	0	774	71	0	783	226
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	66	0	0	250	0	841	77	0	851	246
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	1942	1769	851	1692	1692	841	851			918		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1942	1769	851	1692	1692	841	851			918		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	81	100	100	30	100			100		
cM capacity (veh/h)	15	84	344	60	94	359	796			752		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	66	250	841	77	851	246						
Volume Left	0	0	0	0	0	0						
Volume Right	66	250	0	77	0	246						
cSH	344	359	1700	1700	1700	1700						
Volume to Capacity	0.19	0.70	0.49	0.05	0.50	0.14						
Queue Length 95th (m)	5.3	38.3	0.0	0.0	0.0	0.0						
Control Delay (s)	17.9	35.2	0.0	0.0	0.0	0.0						
Lane LOS	C	E										
Approach Delay (s)	17.9	35.2	0.0		0.0							
Approach LOS	C	E										
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			66.4%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2032 FT Sc2> AM Peak Hour
 07/06/2020




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	82	184	60	19	67	5
Future Volume (Veh/h)	82	184	60	19	67	5
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)	89	200	65	21	73	5
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			289		340	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			289		340	189
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			95		88	99
cM capacity (veh/h)			1256		611	858
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	289	86	78			
Volume Left	0	65	73			
Volume Right	200	0	5			
cSH	1700	1256	622			
Volume to Capacity	0.17	0.05	0.13			
Queue Length 95th (m)	0.0	1.2	3.2			
Control Delay (s)	0.0	6.2	11.6			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.2	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			36.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2032 FT Sc2> AM Peak Hour

07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	1	0	0	768	1	219	2	257	106	2
Future Volume (vph)	2	0	1	0	0	768	1	219	2	257	106	2
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		0.99			1.00			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.95			0.86			1.00		1.00	1.00	
Flt Protected		0.97			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1190			1439			1711		1391	1645	
Flt Permitted		0.70			1.00			1.00		0.38	1.00	
Satd. Flow (perm)		859			1439			1710		560	1645	
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)	2	0	1	0	0	835	1	238	2	279	115	2
RTOR Reduction (vph)	0	2	0	0	341	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	1	0	0	494	0	0	240	0	279	116	0
Confl. Peds. (#/hr)			2	2					5	5		
Heavy Vehicles (%)	50%	0%	0%	0%	0%	4%	0%	1%	0%	18%	5%	0%
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		25.1			25.1			14.1		25.1	25.1	
Effective Green, g (s)		27.1			27.1			16.1		25.1	27.1	
Actuated g/C Ratio		0.44			0.44			0.26		0.40	0.44	
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		374			626			442		332	716	
v/s Ratio Prot					c0.34					c0.11	0.07	
v/s Ratio Perm		0.00						0.14		c0.23		
v/c Ratio		0.00			0.79			0.54		0.84	0.16	
Uniform Delay, d1		9.9			15.1			19.9		15.8	10.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			9.8			1.4		17.1	0.1	
Delay (s)		9.9			24.9			21.2		33.0	10.8	
Level of Service		A			C			C		C	B	
Approach Delay (s)		9.9			24.9			21.2			26.4	
Approach LOS		A			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			24.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			62.2				Sum of lost time (s)		11.0			
Intersection Capacity Utilization			90.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	20	7	663	55	467	23	515	495	242	361	20
Future Volume (vph)	11	20	7	663	55	467	23	515	495	242	361	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.96		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1537		1437	1434		1492	1697	1274	1506	1669	
Flt Permitted	0.27	1.00		0.74	1.00		0.52	1.00	1.00	0.13	1.00	
Satd. Flow (perm)	398	1537		1116	1434		810	1697	1274	203	1669	
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	22	8	721	60	508	25	560	538	263	392	22
RTOR Reduction (vph)	0	4	0	0	185	0	0	0	299	0	2	0
Lane Group Flow (vph)	12	26	0	721	383	0	25	560	239	263	412	0
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	46.7	46.7		46.7	46.7		28.3	28.3	28.3	41.3	41.3	
Effective Green, g (s)	49.7	49.7		49.7	49.7		32.0	32.0	32.0	41.3	45.0	
Actuated g/C Ratio	0.48	0.48		0.48	0.48		0.31	0.31	0.31	0.40	0.44	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	192	743		540	693		252	528	396	208	731	
v/s Ratio Prot		0.02			0.27			0.33		c0.12	0.25	
v/s Ratio Perm	0.03			c0.65			0.03		0.19	c0.39		
v/c Ratio	0.06	0.03		1.34	0.55		0.10	1.06	0.60	1.26	0.56	
Uniform Delay, d1	14.1	13.9		26.5	18.7		25.1	35.4	30.0	26.0	21.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.0		163.1	1.0		0.8	56.2	6.6	151.5	3.1	
Delay (s)	14.2	13.9		189.6	19.6		25.9	91.6	36.6	177.5	24.6	
Level of Service	B	B		F	B		C	F	D	F	C	
Approach Delay (s)		14.0			114.7			63.8			84.0	
Approach LOS		B			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			88.5									F
HCM 2000 Volume to Capacity ratio			1.29									
Actuated Cycle Length (s)			102.7							11.0		
Intersection Capacity Utilization			100.5%									G
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	326	365	192	294	114	874	302	433	96	111	15
Future Volume (vph)	29	326	365	192	294	114	874	302	433	96	111	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1581	1648	1471	1596	1588	1471	1644	1713	1471	1644	1685	
Flt Permitted	0.47	1.00	1.00	0.44	1.00	1.00	0.67	1.00	1.00	0.49	1.00	
Satd. Flow (perm)	789	1648	1471	735	1588	1471	1159	1713	1471	846	1685	
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)	32	354	397	209	320	124	950	328	471	104	121	16
RTOR Reduction (vph)	0	0	231	0	0	72	0	0	241	0	5	0
Lane Group Flow (vph)	32	354	166	209	320	52	950	328	230	104	132	0
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	25.9	25.9	25.9	25.9	25.9	25.9	30.3	30.3	30.3	30.3	30.3	30.3
Effective Green, g (s)	28.9	28.9	28.9	28.9	28.9	28.9	32.3	32.3	32.3	32.3	32.3	32.3
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42	0.47	0.47	0.47	0.47	0.47	0.47
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	329	688	614	306	663	614	540	799	686	394	786	
v/s Ratio Prot		0.21			0.20			0.19			0.08	
v/s Ratio Perm	0.04		0.11	c0.28		0.04	c0.82		0.16	0.12		
v/c Ratio	0.10	0.51	0.27	0.68	0.48	0.08	1.76	0.41	0.34	0.26	0.17	
Uniform Delay, d1	12.2	14.9	13.2	16.4	14.7	12.2	18.5	12.2	11.7	11.2	10.7	
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	0.1	0.7	0.2	6.2	0.6	0.1	349.2	1.6	1.3	1.6	0.5	
Delay (s)	12.4	15.6	13.5	22.6	15.3	12.2	367.7	13.7	13.0	12.9	11.1	
Level of Service	B	B	B	C	B	B	F	B	B	B	B	
Approach Delay (s)		14.4			17.0			205.8			11.9	
Approach LOS		B			B			F			B	
Intersection Summary												
HCM 2000 Control Delay			112.4				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.25									
Actuated Cycle Length (s)			69.2				Sum of lost time (s)		8.0			
Intersection Capacity Utilization			109.5%				ICU Level of Service		H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2032 FT Sc2> AM Peak Hour
07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↑	↗	↙	↗
Traffic Volume (veh/h)	169	641	422	60	32	66
Future Volume (Veh/h)	169	641	422	60	32	66
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)	184	697	459	65	35	72
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	524				1524	459
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	524				1524	459
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	82				65	88
cM capacity (veh/h)	1027				101	606
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	184	697	459	65	35	72
Volume Left	184	0	0	0	35	0
Volume Right	0	0	0	65	0	72
cSH	1027	1700	1700	1700	101	606
Volume to Capacity	0.18	0.41	0.27	0.04	0.35	0.12
Queue Length 95th (m)	4.9	0.0	0.0	0.0	10.4	3.1
Control Delay (s)	9.3	0.0	0.0	0.0	58.4	11.7
Lane LOS	A				F	B
Approach Delay (s)	1.9		0.0		27.0	
Approach LOS					D	
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			47.6%		ICU Level of Service	A
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2032 FT Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	6	97	3	4	0	224	0	5	0	1	7
Future Volume (Veh/h)	1	6	97	3	4	0	224	0	5	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	7	105	3	4	0	243	0	5	0	1	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	4			112			80	72	60	76	124	4
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			112			80	72	60	76	124	4
tC, single (s)	4.1			4.6			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			73	100	100	100	100	99
cM capacity (veh/h)	1631			1227			889	820	1012	911	768	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	113	7	248	9								
Volume Left	1	3	243	0								
Volume Right	105	0	5	8								
cSH	1631	1227	891	1038								
Volume to Capacity	0.00	0.00	0.28	0.01								
Queue Length 95th (m)	0.0	0.1	8.7	0.2								
Control Delay (s)	0.1	3.4	10.6	8.5								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	3.4	10.6	8.5								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			34.1%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2032 FT Sc2> AM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	998	4	5	348
Future Volume (Veh/h)	11	17	998	4	5	348
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)	12	18	1085	4	5	378
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	199					
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	1475	1087			1089	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1473	1049			1051	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	93			99	
cM capacity (veh/h)	128	255			614	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	1089	383			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	183	1700	614			
Volume to Capacity	0.16	0.64	0.01			
Queue Length 95th (m)	4.3	0.0	0.2			
Control Delay (s)	28.5	0.0	0.3			
Lane LOS	D		A			
Approach Delay (s)	28.5	0.0	0.3			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			67.3%	ICU Level of Service		C
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2032 FT Sc2> AM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	985	4	5	354
Future Volume (Veh/h)	11	17	985	4	5	354
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)	12	18	1071	4	5	385
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			101			
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	1468	1073			1075	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1464	1021			1023	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	93			99	
cM capacity (veh/h)	126	258			612	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	1075	390			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	182	1700	612			
Volume to Capacity	0.16	0.63	0.01			
Queue Length 95th (m)	4.4	0.0	0.2			
Control Delay (s)	28.6	0.0	0.3			
Lane LOS	D		A			
Approach Delay (s)	28.6	0.0	0.3			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			66.5%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2032 FT Sc2> AM Peak Hour
 07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	166	56	173	0	0	506
Future Volume (Veh/h)	166	56	173	0	0	506
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)	180	61	188	0	0	550
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	188				609	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				609	188
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				100	36
cM capacity (veh/h)	1398				402	859
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	180	61	188	550		
Volume Left	180	0	0	0		
Volume Right	0	0	0	550		
cSH	1398	1700	1700	859		
Volume to Capacity	0.13	0.04	0.11	0.64		
Queue Length 95th (m)	3.4	0.0	0.0	36.1		
Control Delay (s)	8.0	0.0	0.0	16.3		
Lane LOS	A			C		
Approach Delay (s)	5.9		0.0	16.3		
Approach LOS				C		
Intersection Summary						
Average Delay			10.6			
Intersection Capacity Utilization			63.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2032 FT Sc2> AM Peak Hour
 07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	55	0	0	0	0	169
Future Volume (Veh/h)	55	0	0	0	0	169
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)	60	0	0	0	0	184
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	0				120	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				120	0
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				100	83
cM capacity (veh/h)	1636				848	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	60	0	184			
Volume Left	60	0	0			
Volume Right	0	0	184			
cSH	1636	1700	1091			
Volume to Capacity	0.04	0.00	0.17			
Queue Length 95th (m)	0.9	0.0	4.6			
Control Delay (s)	7.3	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			21.4%	ICU Level of Service		A
Analysis Period (min)			15			












HCM Unsignalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT Sc2> AM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	374	1235	4	169	499
Future Volume (Veh/h)	3	374	1235	4	169	499
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)	3	407	1342	4	184	542
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	2254	1344			1346	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2254	1344			1346	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	0			64	
cM capacity (veh/h)	30	187			518	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	3	407	1346	184	542	
Volume Left	3	0	0	184	0	
Volume Right	0	407	4	0	0	
cSH	30	187	1700	518	1700	
Volume to Capacity	0.10	2.17	0.79	0.36	0.32	
Queue Length 95th (m)	2.3	244.6	0.0	12.1	0.0	
Control Delay (s)	139.1	584.6	0.0	15.7	0.0	
Lane LOS	F	F		C		
Approach Delay (s)	581.4		0.0	4.0		
Approach LOS	F					
Intersection Summary						
Average Delay			97.2			
Intersection Capacity Utilization			102.6%	ICU Level of Service	G	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2032 FT Sc2> AM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	229	1010	5	154	348
Future Volume (Veh/h)	5	229	1010	5	154	348
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)	5	249	1098	5	167	378
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	1812	1100			1103	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1812	1100			1103	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	4			74	
cM capacity (veh/h)	64	260			640	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	5	249	1103	167	378	
Volume Left	5	0	0	167	0	
Volume Right	0	249	5	0	0	
cSH	64	260	1700	640	1700	
Volume to Capacity	0.08	0.96	0.65	0.26	0.22	
Queue Length 95th (m)	1.9	68.3	0.0	7.9	0.0	
Control Delay (s)	65.5	86.8	0.0	12.6	0.0	
Lane LOS	F	F		B		
Approach Delay (s)	86.4		0.0	3.9		
Approach LOS	F					
Intersection Summary						
Average Delay			12.6			
Intersection Capacity Utilization			80.6%	ICU Level of Service	D	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2032 FT Sc2> PM Peak Hour
 07/06/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖		
Traffic Volume (veh/h)	218	99	1	57	183	48
Future Volume (Veh/h)	218	99	1	57	183	48
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)	237	108	1	62	199	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)						
pX, platoon unblocked						
vC, conflicting volume			345		355	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			345		355	291
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		69	93
cM capacity (veh/h)			1225		633	753
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	345	63	251			
Volume Left	0	1	199			
Volume Right	108	0	52			
cSH	1700	1225	654			
Volume to Capacity	0.20	0.00	0.38			
Queue Length 95th (m)	0.0	0.0	13.7			
Control Delay (s)	0.0	0.1	13.9			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.1	13.9			
Approach LOS			B			
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			39.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FT Sc2> PM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	90	0	0	265	0	896	49	0	894	184
Future Volume (Veh/h)	0	0	90	0	0	265	0	896	49	0	894	184
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	98	0	0	288	0	974	53	0	972	200
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	2234	1999	972	1946	1946	974	972			1027		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2234	1999	972	1946	1946	974	972			1027		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	67	100	100	6	100			100		
cM capacity (veh/h)	2	61	301	33	66	306	717			684		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	98	288	974	53	972	200						
Volume Left	0	0	0	0	0	0						
Volume Right	98	288	0	53	0	200						
cSH	301	306	1700	1700	1700	1700						
Volume to Capacity	0.33	0.94	0.57	0.03	0.57	0.12						
Queue Length 95th (m)	10.4	71.1	0.0	0.0	0.0	0.0						
Control Delay (s)	22.6	75.8	0.0	0.0	0.0	0.0						
Lane LOS	C	F										
Approach Delay (s)	22.6	75.8	0.0		0.0							
Approach LOS	C	F										
Intersection Summary												
Average Delay			9.3									
Intersection Capacity Utilization			75.7%		ICU Level of Service					D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2032 FT Sc2> PM Peak Hour
 07/06/2020




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	74	197	77	14	49	4
Future Volume (Veh/h)	74	197	77	14	49	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)	80	214	84	15	53	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			294		370	187
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			294		370	187
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		91	100
cM capacity (veh/h)			1279		587	860
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	294	99	57			
Volume Left	0	84	53			
Volume Right	214	0	4			
cSH	1700	1279	600			
Volume to Capacity	0.17	0.07	0.09			
Queue Length 95th (m)	0.0	1.6	2.4			
Control Delay (s)	0.0	6.9	11.6			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.9	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			36.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2032 FT Sc2> PM Peak Hour























07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	0	0	499	0	133	1	832	259	1
Future Volume (vph)	1	0	0	0	0	499	0	133	1	832	259	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		1.00			0.98			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		1.00			0.86			1.00		1.00	1.00	
Flt Protected		0.95			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1643			1356			1729		1644	1730	
Flt Permitted		0.33			1.00			1.00		0.56	1.00	
Satd. Flow (perm)		577			1356			1729		976	1730	
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)	1	0	0	0	0	542	0	145	1	904	282	1
RTOR Reduction (vph)	0	0	0	0	459	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	83	0	0	146	0	904	283	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.0			10.0			22.0		56.0	56.0	
Effective Green, g (s)		12.0			12.0			24.0		56.0	58.0	
Actuated g/C Ratio		0.15			0.15			0.31		0.72	0.74	
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		88			208			532		966	1286	
v/s Ratio Prot					c0.06			0.08		c0.37	0.16	
v/s Ratio Perm		0.00								c0.30		
v/c Ratio		0.01			0.40			0.27		0.94	0.22	
Uniform Delay, d1		28.0			29.8			20.4		7.3	3.1	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.3			1.3		15.6	0.4	
Delay (s)		28.0			31.0			21.7		23.0	3.5	
Level of Service		C			C			C		C	A	
Approach Delay (s)		28.0			31.0			21.7			18.3	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			22.3									C
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			78.0							11.0		
Intersection Capacity Utilization			102.0%									G
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT Sc2> PM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	52	16	572	22	306	2	457	713	509	627	14
Future Volume (vph)	32	52	16	572	22	306	2	457	713	509	627	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr _t	1.00	0.97		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1671		1506	1422		1552	1713	1335	1506	1706	
Fl _t Permitted	0.41	1.00		0.71	1.00		0.34	1.00	1.00	0.15	1.00	
Satd. Flow (perm)	667	1671		1124	1422		559	1713	1335	232	1706	
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)	35	57	17	622	24	333	2	497	775	553	682	15
RTOR Reduction (vph)	0	10	0	0	195	0	0	0	451	0	1	0
Lane Group Flow (vph)	35	64	0	622	162	0	2	497	324	553	696	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	39.7	39.7		39.7	39.7		24.3	24.3	24.3	48.3	48.3	
Effective Green, g (s)	42.7	42.7		42.7	42.7		28.0	28.0	28.0	48.3	52.0	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.27	0.27	0.27	0.47	0.51	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	277	694		467	591		152	467	363	369	863	
v/s Ratio Prot		0.04			0.11			0.29		c0.31	0.41	
v/s Ratio Perm	0.05			c0.55			0.00		0.24	c0.40		
v/c Ratio	0.13	0.09		1.33	0.27		0.01	1.06	0.89	1.50	0.81	
Uniform Delay, d ₁	18.5	18.2		30.0	19.8		27.3	37.4	35.9	29.6	21.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	0.2	0.1		163.5	0.3		0.2	59.8	26.6	238.2	8.0	
Delay (s)	18.7	18.3		193.5	20.0		27.4	97.1	62.5	267.8	29.1	
Level of Service	B	B		F	C		C	F	E	F	C	
Approach Delay (s)		18.4			130.2			76.0			134.7	
Approach LOS		B			F			E			F	
Intersection Summary												
HCM 2000 Control Delay			109.3				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.40									
Actuated Cycle Length (s)			102.7			Sum of lost time (s)				11.0		
Intersection Capacity Utilization			107.8%			ICU Level of Service				G		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT Sc2> PM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	326	896	451	356	147	540	163	264	100	301	49
Future Volume (vph)	46	326	896	451	356	147	540	163	264	100	301	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	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	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1596	1648	1471	1644	1633	1456	1641	1731	1471	1644	1682	1750
Flt Permitted	0.45	1.00	1.00	0.48	1.00	1.00	0.37	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	750	1648	1471	822	1633	1456	647	1731	1471	1063	1682	1750
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)	50	354	974	490	387	160	587	177	287	109	327	53
RTOR Reduction (vph)	0	0	173	0	0	77	0	0	176	0	7	0
Lane Group Flow (vph)	50	354	801	490	387	83	587	177	111	109	373	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	40.0	40.0	40.0	40.0	40.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0
Effective Green, g (s)	43.0	43.0	43.0	43.0	43.0	43.0	32.0	32.0	32.0	32.0	32.0	32.0
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	388	853	762	425	846	754	249	667	567	409	648	648
v/s Ratio Prot		0.21			0.24			0.10				0.22
v/s Ratio Perm	0.07		0.54	c0.60		0.06	c0.91		0.08	0.10		
v/c Ratio	0.13	0.42	1.05	1.15	0.46	0.11	2.36	0.27	0.20	0.27	0.58	
Uniform Delay, d1	10.3	12.3	20.0	20.0	12.6	10.2	25.5	17.5	16.9	17.5	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	0.2	0.3	47.1	92.6	0.4	0.1	623.1	1.0	0.8	1.6	3.7	
Delay (s)	10.5	12.6	67.1	112.6	13.0	10.3	648.6	18.4	17.7	19.1	23.8	
Level of Service	B	B	E	F	B	B	F	B	B	B	C	
Approach Delay (s)		51.0			59.6			370.2			22.8	
Approach LOS		D			E			F			C	

Intersection Summary

HCM 2000 Control Delay	134.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.66		
Actuated Cycle Length (s)	83.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road













<2032 FT Sc2> PM Peak Hour
07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	114	576	639	30	76	120
Future Volume (Veh/h)	114	576	639	30	76	120
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)	124	626	695	33	83	130
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	728				1569	695
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728				1569	695
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	86				20	71
cM capacity (veh/h)	862				104	446
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	124	626	695	33	83	130
Volume Left	124	0	0	0	83	0
Volume Right	0	0	0	33	0	130
cSH	862	1700	1700	1700	104	446
Volume to Capacity	0.14	0.37	0.41	0.02	0.80	0.29
Queue Length 95th (m)	3.8	0.0	0.0	0.0	33.4	9.1
Control Delay (s)	9.9	0.0	0.0	0.0	113.7	16.4
Lane LOS	A				F	C
Approach Delay (s)	1.6		0.0		54.3	
Approach LOS					F	
Intersection Summary						
Average Delay			7.6			
Intersection Capacity Utilization			57.9%		ICU Level of Service	B
Analysis Period (min)			15			










HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2032 FT Sc2> PM Peak Hour
 07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	3	6	194	4	9	0	140	2	8	0	1	1
Future Volume (Veh/h)	3	6	194	4	9	0	140	2	8	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	211	4	10	0	152	2	9	0	1	1
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	10			218			138	136	112	146	242	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			218			138	136	112	146	242	10
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			81	100	99	100	100	100
cM capacity (veh/h)	1429			1364			821	754	946	814	660	1077
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	221	14	163	2								
Volume Left	3	4	152	0								
Volume Right	211	0	9	1								
cSH	1429	1364	826	818								
Volume to Capacity	0.00	0.00	0.20	0.00								
Queue Length 95th (m)	0.0	0.1	5.6	0.1								
Control Delay (s)	0.1	2.2	10.4	9.4								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.2	10.4	9.4								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			36.0%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2032 FT Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	620	12	19	1095
Future Volume (Veh/h)	8	11	620	12	19	1095
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)	9	12	674	13	21	1190
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			199			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	1912	680			687	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1919	667			673	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	97			98	
cM capacity (veh/h)	72	455			912	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	687	1211			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	139	1700	912			
Volume to Capacity	0.15	0.40	0.02			
Queue Length 95th (m)	3.9	0.0	0.5			
Control Delay (s)	35.6	0.0	0.8			
Lane LOS	E		A			
Approach Delay (s)	35.6	0.0	0.8			
Approach LOS	E					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			89.1%		ICU Level of Service	E
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2032 FT Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	621	12	19	1084
Future Volume (Veh/h)	8	11	621	12	19	1084
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)	9	12	675	13	21	1178
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	104					
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	1902	682			688	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1922	639			646	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	97			98	
cM capacity (veh/h)	69	456			902	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	688	1199			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	134	1700	902			
Volume to Capacity	0.16	0.40	0.02			
Queue Length 95th (m)	4.1	0.0	0.5			
Control Delay (s)	36.7	0.0	0.8			
Lane LOS	E		A			
Approach Delay (s)	36.7	0.0	0.8			
Approach LOS	E					
Intersection Summary						
Average Delay	0.9					
Intersection Capacity Utilization	88.5%		ICU Level of Service		E	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2032 FT Sc2> PM Peak Hour
 07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	190	112	0	0	327
Future Volume (Veh/h)	558	190	112	0	0	327
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)	607	207	122	0	0	355
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	122				1543	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				1543	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	59				100	62
cM capacity (veh/h)	1478				75	935
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	607	207	122	355		
Volume Left	607	0	0	0		
Volume Right	0	0	0	355		
cSH	1478	1700	1700	935		
Volume to Capacity	0.41	0.12	0.07	0.38		
Queue Length 95th (m)	15.6	0.0	0.0	13.6		
Control Delay (s)	9.1	0.0	0.0	11.2		
Lane LOS	A			B		
Approach Delay (s)	6.8		0.0	11.2		
Approach LOS				B		
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			68.9%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2032 FT Sc2> PM Peak Hour
 07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	186	0	0	0	0	109
Future Volume (Veh/h)	186	0	0	0	0	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)	202	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				404	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				404	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				100	89
cM capacity (veh/h)	1636				532	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	202	0	118			
Volume Left	202	0	0			
Volume Right	0	0	118			
cSH	1636	1700	1091			
Volume to Capacity	0.12	0.00	0.11			
Queue Length 95th (m)	3.2	0.0	2.8			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			25.2%		ICU Level of Service	A
Analysis Period (min)			15			












HCM Unsignalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	223	744	1	362	1286
Future Volume (Veh/h)	1	223	744	1	362	1286
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)	1	242	809	1	393	1398
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	2994	810			810	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2994	810			810	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	37			52	
cM capacity (veh/h)	8	383			825	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	1	242	810	393	1398	
Volume Left	1	0	0	393	0	
Volume Right	0	242	1	0	0	
cSH	8	383	1700	825	1700	
Volume to Capacity	0.12	0.63	0.48	0.48	0.82	
Queue Length 95th (m)	2.4	31.6	0.0	19.8	0.0	
Control Delay (s)	504.8	29.2	0.0	13.3	0.0	
Lane LOS	F	D		B		
Approach Delay (s)	31.1		0.0	2.9		
Approach LOS	D					
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			83.5%	ICU Level of Service	E	
Analysis Period (min)			15			



















HCM Unsignalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2032 FT Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	115	630	1	174	1113
Future Volume (Veh/h)	1	115	630	1	174	1113
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)	1	125	685	1	189	1210
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	2274	686			686	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2274	686			686	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	72			79	
cM capacity (veh/h)	36	451			917	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	1	125	686	189	1210	
Volume Left	1	0	0	189	0	
Volume Right	0	125	1	0	0	
cSH	36	451	1700	917	1700	
Volume to Capacity	0.03	0.28	0.40	0.21	0.71	
Queue Length 95th (m)	0.6	8.5	0.0	5.9	0.0	
Control Delay (s)	109.0	16.0	0.0	9.9	0.0	
Lane LOS	F	C		A		
Approach Delay (s)	16.7		0.0	1.3		
Approach LOS	C					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			73.6%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access























<2032 FT w Recom Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	61	0	0	230	0	774	71	0	783	226
Future Volume (vph)	0	0	61	0	0	230	0	774	71	0	783	226
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00
Frt			0.86			0.86		1.00	0.85		1.00	0.85
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)			1325			1412		1664	1325		1664	1325
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)			1325			1412		1664	1325		1664	1325
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)	0	0	66	0	0	250	0	841	77	0	851	246
RTOR Reduction (vph)	0	0	55	0	0	195	0	0	22	0	0	70
Lane Group Flow (vph)	0	0	11	0	0	55	0	841	55	0	851	176
Heavy Vehicles (%)	0%	0%	13%	0%	0%	6%	0%	4%	11%	0%	4%	11%
Turn Type			Perm			Perm		NA	Perm		NA	Perm
Protected Phases								2			6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)			10.0			10.0		48.0	48.0		48.0	48.0
Effective Green, g (s)			12.0			12.0		50.0	50.0		50.0	50.0
Actuated g/C Ratio			0.17			0.17		0.71	0.71		0.71	0.71
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)			227			242		1188	946		1188	946
v/s Ratio Prot								0.51			c0.51	
v/s Ratio Perm			0.01			c0.04			0.04			0.13
v/c Ratio			0.05			0.23		0.71	0.06		0.72	0.19
Uniform Delay, d1			24.2			25.0		5.8	3.0		5.9	3.3
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2			0.1			0.5		3.6	0.1		3.7	0.4
Delay (s)			24.3			25.5		9.4	3.1		9.6	3.7
Level of Service			C			C		A	A		A	A
Approach Delay (s)		24.3			25.5			8.8			8.3	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			70.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			66.4%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2032 FT w Recom Sc2> AM Peak Hour
07/06/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	11	20	7	663	55	467	23	515	495	242	361	20	
Future Volume (vph)	11	20	7	663	55	467	23	515	495	242	361	20	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0		
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	1.00	1.00	0.97	1.00		
Flt	1.00	0.96		1.00	0.87		1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1424	1537		2787	1434		1492	1697	1274	2923	1669		
Flt Permitted	0.45	1.00		0.95	1.00		0.52	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	676	1537		2787	1434		816	1697	1274	2923	1669		
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	22	8	721	60	508	25	560	538	263	392	22	
RTOR Reduction (vph)	0	7	0	0	197	0	0	0	175	0	1	0	
Lane Group Flow (vph)	12	23	0	721	371	0	25	560	363	263	413	0	
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%	
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA		
Protected Phases		4		3	8			2	3	1	6		
Permitted Phases	4						2		2				
Actuated Green, G (s)	11.0	11.0		32.4	47.4		39.9	39.9	72.3	12.2	56.1		
Effective Green, g (s)	14.0	14.0		32.4	50.4		43.6	43.6	79.7	12.2	59.8		
Actuated g/C Ratio	0.12	0.12		0.27	0.43		0.37	0.37	0.67	0.10	0.51		
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	80	182		763	611		300	625	859	301	844		
v/s Ratio Prot		0.01		c0.26	c0.26			c0.33	0.13	c0.09	0.25		
v/s Ratio Perm	0.02						0.03		0.16				
v/c Ratio	0.15	0.13		0.94	0.61		0.08	0.90	0.42	0.87	0.49		
Uniform Delay, d1	46.8	46.6		42.0	26.2		24.3	35.2	8.8	52.2	19.2		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.9	0.3		20.2	1.7		0.5	17.9	0.3	23.3	2.0		
Delay (s)	47.6	46.9		62.2	27.9		24.8	53.1	9.1	75.5	21.2		
Level of Service	D	D		E	C		C	D	A	E	C		
Approach Delay (s)		47.1			47.1			31.4			42.3		
Approach LOS		D			D			C			D		
Intersection Summary													
HCM 2000 Control Delay			40.4									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.88										
Actuated Cycle Length (s)			118.2									Sum of lost time (s)	16.0
Intersection Capacity Utilization			83.1%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT w Recom Sc2> AM Peak Hour
07/06/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	326	365	192	294	114	874	302	433	96	111	15
Future Volume (vph)	29	326	365	192	294	114	874	302	433	96	111	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1581	1648	1471	3097	1588	1471	3189	1713	1471	1644	1685	
Flt Permitted	0.57	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	943	1648	1471	3097	1588	1471	3189	1713	1471	973	1685	
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)	32	354	397	209	320	124	950	328	471	104	121	16
RTOR Reduction (vph)	0	0	0	0	0	57	0	0	165	0	4	0
Lane Group Flow (vph)	32	354	397	209	320	67	950	328	306	104	133	0
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		Free			8			2	6		
Actuated Green, G (s)	25.4	25.4	119.4	9.0	38.4	38.4	37.4	68.0	68.0	26.6	26.6	
Effective Green, g (s)	28.4	28.4	119.4	9.0	41.4	41.4	37.4	70.0	70.0	28.6	28.6	
Actuated g/C Ratio	0.24	0.24	1.00	0.08	0.35	0.35	0.31	0.59	0.59	0.24	0.24	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	224	391	1471	233	550	510	998	1004	862	233	403	
v/s Ratio Prot		c0.21		c0.07	0.20		c0.30	0.19			0.08	
v/s Ratio Perm	0.03		0.27			0.05			0.21	c0.11		
v/c Ratio	0.14	0.91	0.27	0.90	0.58	0.13	0.95	0.33	0.36	0.45	0.33	
Uniform Delay, d1	35.9	44.2	0.0	54.7	31.9	26.7	40.1	12.6	12.9	38.7	37.5	
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	0.3	23.8	0.5	32.6	1.6	0.1	18.0	0.9	1.1	6.1	2.2	
Delay (s)	36.2	67.9	0.5	87.3	33.5	26.8	58.1	13.5	14.1	44.7	39.7	
Level of Service	D	E	A	F	C	C	E	B	B	D	D	
Approach Delay (s)		32.4			49.4			37.9			41.9	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			119.4		Sum of lost time (s)					16.0		
Intersection Capacity Utilization			82.2%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2032 FT w Recom Sc2> AM Peak Hour
07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	169	641	422	60	32	66
Future Volume (vph)	169	641	422	60	32	66
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1633	1664	1310	1468	1471
Flt Permitted	0.41	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	671	1633	1664	1310	1468	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	697	459	65	35	72
RTOR Reduction (vph)	0	0	0	32	0	47
Lane Group Flow (vph)	184	697	459	33	35	25
Heavy Vehicles (%)	5%	6%	4%	6%	12%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	26.9	26.9	26.9	26.9	17.2	17.2
Effective Green, g (s)	28.9	28.9	28.9	28.9	19.2	19.2
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.34	0.34
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	345	841	857	674	502	503
v/s Ratio Prot		c0.43	0.28		c0.02	
v/s Ratio Perm	0.27			0.03		0.02
v/c Ratio	0.53	0.83	0.54	0.05	0.07	0.05
Uniform Delay, d1	9.1	11.5	9.1	6.8	12.4	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	6.8	0.6	0.0	0.3	0.2
Delay (s)	10.7	18.3	9.8	6.8	12.7	12.5
Level of Service	B	B	A	A	B	B
Approach Delay (s)		16.7	9.4		12.6	
Approach LOS		B	A		B	

Intersection Summary

HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	56.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
13: Canal Bank Street & North Access

<2032 FT w Recom Sc2> AM Peak Hour
07/06/2020














Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↗	↑↑		↘	↑↑
Traffic Volume (vph)	3	374	1235	4	169	499
Future Volume (vph)	3	374	1235	4	169	499
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3287		1644	3288
Flt Permitted	0.95	1.00	1.00		0.10	1.00
Satd. Flow (perm)	1644	1471	3287		175	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	407	1342	4	184	542
RTOR Reduction (vph)	0	196	0	0	0	0
Lane Group Flow (vph)	3	211	1346	0	184	542
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.3	17.3	46.7		59.4	59.4
Effective Green, g (s)	19.3	19.3	48.7		59.4	61.4
Actuated g/C Ratio	0.22	0.22	0.55		0.67	0.69
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	357	320	1804		277	2276
v/s Ratio Prot	0.00		c0.41		c0.07	0.16
v/s Ratio Perm		c0.14			0.37	
v/c Ratio	0.01	0.66	0.75		0.66	0.24
Uniform Delay, d1	27.2	31.7	15.3		13.7	5.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	5.0	2.9		5.9	0.2
Delay (s)	27.2	36.8	18.1		19.6	5.3
Level of Service	C	D	B		B	A
Approach Delay (s)	36.7		18.1			8.9
Approach LOS	D		B			A

Intersection Summary

HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street



















<2032 FT w Recom Sc2> AM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	229	1010	5	154	348
Future Volume (vph)	5	229	1010	5	154	348
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3286		1644	3288
Flt Permitted	0.95	1.00	1.00		0.19	1.00
Satd. Flow (perm)	1644	1471	3286		334	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	249	1098	5	167	378
RTOR Reduction (vph)	0	212	0	0	0	0
Lane Group Flow (vph)	5	37	1103	0	167	378
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	10.8	10.8	52.9		64.0	64.0
Effective Green, g (s)	12.8	12.8	54.9		64.0	66.0
Actuated g/C Ratio	0.15	0.15	0.63		0.74	0.76
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	242	216	2078		368	2500
v/s Ratio Prot	0.00		c0.34		c0.04	0.11
v/s Ratio Perm		c0.02			0.29	
v/c Ratio	0.02	0.17	0.53		0.45	0.15
Uniform Delay, d1	31.6	32.4	8.8		5.2	2.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	1.0		0.9	0.1
Delay (s)	31.7	32.7	9.8		6.1	2.9
Level of Service	C	C	A		A	A
Approach Delay (s)	32.7		9.8			3.9
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			11.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.46			
Actuated Cycle Length (s)			86.8		Sum of lost time (s)	11.0
Intersection Capacity Utilization			58.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2032 FT w Recom Sc2> PM Peak Hour

07/06/2020


























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	90	0	0	265	0	896	49	0	894	184	
Future Volume (vph)	0	0	90	0	0	265	0	896	49	0	894	184	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Frt			0.86			0.86		1.00	0.85		1.00	0.85	
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1412			1468		1713	1247		1713	1428	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1412			1468		1713	1247		1713	1428	
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)	0	0	98	0	0	288	0	974	53	0	972	200	
RTOR Reduction (vph)	0	0	82	0	0	155	0	0	14	0	0	51	
Lane Group Flow (vph)	0	0	16	0	0	133	0	974	39	0	972	149	
Heavy Vehicles (%)	0%	0%	6%	0%	0%	2%	0%	1%	18%	0%	1%	3%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			12.4			12.4		63.0	63.0		63.0	63.0	
Effective Green, g (s)			14.4			14.4		65.0	65.0		65.0	65.0	
Actuated g/C Ratio			0.16			0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			232			241		1273	927		1273	1062	
v/s Ratio Prot								c0.57			0.57		
v/s Ratio Perm			0.01			c0.09			0.03			0.10	
v/c Ratio			0.07			0.55		0.77	0.04		0.76	0.14	
Uniform Delay, d1			30.8			33.5		6.7	3.0		6.6	3.2	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2			0.1			2.7		4.4	0.1		4.4	0.3	
Delay (s)			31.0			36.2		11.1	3.1		11.0	3.5	
Level of Service			C			D		B	A		B	A	
Approach Delay (s)		31.0			36.2			10.7			9.7		
Approach LOS		C			D			B			A		
Intersection Summary													
HCM 2000 Control Delay			13.9									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			87.4									Sum of lost time (s)	10.0
Intersection Capacity Utilization			75.7%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2032 FT w Recom Sc2> PM Peak Hour

07/06/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations				 					 	 			
Traffic Volume (vph)	32	52	16	572	22	306	2	457	713	509	627	14	
Future Volume (vph)	32	52	16	572	22	306	2	457	713	509	627	14	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0		
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	1.00	1.00	0.97	1.00		
Fr _t	1.00	0.97		1.00	0.86		1.00	1.00	0.85	1.00	1.00		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1671		2923	1422		1552	1713	1335	2923	1706		
Fl _t Permitted	0.55	1.00		0.95	1.00		0.35	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	895	1671		2923	1422		578	1713	1335	2923	1706		
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)	35	57	17	622	24	333	2	497	775	553	682	15	
RTOR Reduction (vph)	0	9	0	0	198	0	0	0	176	0	0	0	
Lane Group Flow (vph)	35	65	0	622	159	0	2	497	599	553	697	0	
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%	
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA		
Protected Phases		4		3	8			2	3	1	6		
Permitted Phases	4						2		2				
Actuated Green, G (s)	15.3	15.3		27.3	46.6		32.7	32.7	60.0	24.2	60.9		
Effective Green, g (s)	18.3	18.3		27.3	49.6		36.4	36.4	67.4	24.2	64.6		
Actuated g/C Ratio	0.15	0.15		0.22	0.41		0.30	0.30	0.55	0.20	0.53		
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	134	250		653	577		172	510	736	578	901		
v/s Ratio Prot		0.04		c0.21	c0.11			c0.29	0.21	c0.19	0.41		
v/s Ratio Perm	0.04						0.00		0.24				
v/c Ratio	0.26	0.26		0.95	0.28		0.01	0.97	0.81	0.96	0.77		
Uniform Delay, d ₁	46.0	46.0		46.8	24.3		30.2	42.4	22.3	48.5	23.0		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	1.0	0.6		24.0	0.3		0.1	34.0	6.9	26.7	6.4		
Delay (s)	47.0	46.5		70.8	24.5		30.3	76.5	29.2	75.2	29.4		
Level of Service	D	D		E	C		C	E	C	E	C		
Approach Delay (s)		46.7			53.9			47.6			49.6		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			50.0									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			122.2									Sum of lost time (s)	16.0
Intersection Capacity Utilization			92.3%									ICU Level of Service	F
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2032 FT w Recom Sc2> PM Peak Hour
07/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	326	896	451	356	147	540	163	264	100	301	49
Future Volume (vph)	46	326	896	451	356	147	540	163	264	100	301	49
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1596	1648	1471	3189	1633	1456	3189	1731	1471	1644	1684	1684
Flt Permitted	0.53	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.65	1.00	1.00
Satd. Flow (perm)	895	1648	1471	3189	1633	1456	3189	1731	1471	1117	1684	1684
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)	50	354	974	490	387	160	587	177	287	109	327	53
RTOR Reduction (vph)	0	0	0	0	0	62	0	0	145	0	5	0
Lane Group Flow (vph)	50	354	974	490	387	98	587	177	142	109	375	0
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	NA
Protected Phases		4		3	8		5	2				6
Permitted Phases	4		Free			8			2	6		
Actuated Green, G (s)	25.4	25.4	119.2	19.8	49.2	49.2	23.0	57.0	57.0	30.0	30.0	30.0
Effective Green, g (s)	28.4	28.4	119.2	19.8	52.2	52.2	23.0	59.0	59.0	32.0	32.0	32.0
Actuated g/C Ratio	0.24	0.24	1.00	0.17	0.44	0.44	0.19	0.49	0.49	0.27	0.27	0.27
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	213	392	1471	529	715	637	615	856	728	299	452	452
v/s Ratio Prot		c0.21		c0.15	0.24		c0.18	0.10				c0.22
v/s Ratio Perm	0.06		0.66			0.07			0.10	0.10		
v/c Ratio	0.23	0.90	0.66	0.93	0.54	0.15	0.95	0.21	0.20	0.36	0.83	0.83
Uniform Delay, d1	36.6	44.1	0.0	49.0	24.7	20.2	47.6	16.9	16.8	35.4	41.0	41.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	23.4	2.4	22.3	0.8	0.1	25.3	0.5	0.6	3.4	16.0	16.0
Delay (s)	37.2	67.5	2.4	71.3	25.5	20.3	72.9	17.5	17.4	38.8	57.0	57.0
Level of Service	D	E	A	E	C	C	E	B	B	D	E	E
Approach Delay (s)		20.3			46.3			48.4			53.0	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			38.6									D
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			119.2								16.0	
Intersection Capacity Utilization			87.5%									E
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2032 FT w Recom Sc2> PM Peak Hour
07/06/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	114	576	639	30	76	120
Future Volume (vph)	114	576	639	30	76	120
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1697	1664	1388	1612	1471
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	341	1697	1664	1388	1612	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	626	695	33	83	130
RTOR Reduction (vph)	0	0	0	16	0	84
Lane Group Flow (vph)	124	626	695	17	83	46
Heavy Vehicles (%)	5%	2%	4%	0%	2%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	26.3	26.3	26.3	26.3	18.1	18.1
Effective Green, g (s)	28.3	28.3	28.3	28.3	20.1	20.1
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.36	0.36
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	851	834	696	574	524
v/s Ratio Prot		0.37	c0.42		c0.05	
v/s Ratio Perm	0.36			0.01		0.03
v/c Ratio	0.73	0.74	0.83	0.02	0.14	0.09
Uniform Delay, d1	11.0	11.1	12.0	7.1	12.3	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.2	3.3	7.2	0.0	0.5	0.3
Delay (s)	25.2	14.4	19.2	7.1	12.8	12.4
Level of Service	C	B	B	A	B	B
Approach Delay (s)		16.2	18.7		12.6	
Approach LOS		B	B		B	












Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group












HCM Signalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2032 FT w Recom Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	223	744	1	362	1286
Future Volume (vph)	1	223	744	1	362	1286
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3287		1644	3288
Flt Permitted	0.95	1.00	1.00		0.27	1.00
Satd. Flow (perm)	1644	1471	3287		461	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	242	809	1	393	1398
RTOR Reduction (vph)	0	207	0	0	0	0
Lane Group Flow (vph)	1	35	810	0	393	1398
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	10.8	10.8	46.7		66.0	66.0
Effective Green, g (s)	12.8	12.8	48.7		66.0	68.0
Actuated g/C Ratio	0.14	0.14	0.55		0.74	0.77
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	236	212	1802		559	2517
v/s Ratio Prot	0.00		0.25		c0.13	0.43
v/s Ratio Perm		c0.02			c0.39	
v/c Ratio	0.00	0.16	0.45		0.70	0.56
Uniform Delay, d1	32.5	33.3	12.0		6.0	4.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	0.8		4.0	0.9
Delay (s)	32.5	33.7	12.8		10.0	5.1
Level of Service	C	C	B		A	A
Approach Delay (s)	33.7		12.8			6.2
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			10.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			88.8		Sum of lost time (s)	11.0
Intersection Capacity Utilization			62.5%		ICU Level of Service	B
Analysis Period (min)			15			
c	Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street











<2032 FT w Recom Sc2> PM Peak Hour
 07/06/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1	115	630	1	174	1113
Future Volume (vph)	1	115	630	1	174	1113
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3287		1644	3288
Flt Permitted	0.95	1.00	1.00		0.34	1.00
Satd. Flow (perm)	1644	1471	3287		594	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	125	685	1	189	1210
RTOR Reduction (vph)	0	107	0	0	0	0
Lane Group Flow (vph)	1	18	686	0	189	1210
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	10.1	10.1	53.0		64.1	64.1
Effective Green, g (s)	12.1	12.1	55.0		64.1	66.1
Actuated g/C Ratio	0.14	0.14	0.64		0.74	0.77
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	206	2097		540	2521
v/s Ratio Prot	0.00		0.21		0.03	c0.37
v/s Ratio Perm		c0.01			0.23	
v/c Ratio	0.00	0.09	0.33		0.35	0.48
Uniform Delay, d1	31.9	32.2	7.1		3.6	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	0.4		0.4	0.7
Delay (s)	31.9	32.4	7.6		4.0	4.4
Level of Service	C	C	A		A	A
Approach Delay (s)	32.4		7.6			4.3
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.44			
Actuated Cycle Length (s)			86.2		Sum of lost time (s)	11.0
Intersection Capacity Utilization			48.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

***C-13 2037 FUTURE
TOTAL SC1***



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2037 FT w Reduc Sc1> AM Peak Hour
 07/07/2020










						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	208	84	379	229	49	17
Future Volume (Veh/h)	208	84	379	229	49	17
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)	226	91	412	249	53	18
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			317	1344		272
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			317	1344		272
tC, single (s)			4.1	6.5		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.6		3.3
p0 queue free %			67	51		98
cM capacity (veh/h)			1255	108		772
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	317	661	71			
Volume Left	0	412	53			
Volume Right	91	0	18			
cSH	1700	1255	139			
Volume to Capacity	0.19	0.33	0.51			
Queue Length 95th (m)	0.0	11.0	18.6			
Control Delay (s)	0.0	7.1	55.5			
Lane LOS			A	F		
Approach Delay (s)	0.0	7.1	55.5			
Approach LOS			F			
Intersection Summary						
Average Delay			8.2			
Intersection Capacity Utilization			67.4%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access

<2037 FT w Reduc Sc1> AM Peak Hour
 07/07/2020



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	455	0	0	102	0	797	279	0	469	56
Future Volume (vph)	0	0	455	0	0	102	0	797	279	0	469	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00
Frt			0.86			0.86		1.00	0.85		1.00	0.85
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)			1349			1453		1713	1337		1697	1401
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)			1349			1453		1713	1337		1697	1401
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)	0	0	495	0	0	111	0	866	303	0	510	61
RTOR Reduction (vph)	0	0	274	0	0	84	0	0	116	0	0	23
Lane Group Flow (vph)	0	0	221	0	0	27	0	866	187	0	510	38
Heavy Vehicles (%)	0%	0%	11%	0%	0%	3%	0%	1%	10%	0%	2%	5%
Turn Type			Perm			Perm		NA	Perm		NA	Perm
Protected Phases								2			6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)			12.3			12.3		34.0	34.0		34.0	34.0
Effective Green, g (s)			14.3			14.3		36.0	36.0		36.0	36.0
Actuated g/C Ratio			0.25			0.25		0.62	0.62		0.62	0.62
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)			330			356		1057	825		1047	865
v/s Ratio Prot								c0.51			0.30	
v/s Ratio Perm			c0.16			0.02			0.14			0.03
v/c Ratio			0.67			0.08		0.82	0.23		0.49	0.04
Uniform Delay, d1			19.9			16.9		8.6	5.0		6.1	4.4
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2			5.1			0.1		7.1	0.6		1.6	0.1
Delay (s)			25.0			17.0		15.7	5.6		7.7	4.5
Level of Service			C			B		B	A		A	A
Approach Delay (s)		25.0			17.0			13.1			7.4	
Approach LOS		C			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.4			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			58.3			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			64.1%			ICU Level of Service			C			
Analysis Period (min)			15									























c Critical Lane Group

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	141	88	15	516	94	195
Future Volume (Veh/h)	141	88	15	516	94	195
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)	153	96	16	561	102	212
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			249			794 201
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			249			794 201
tC, single (s)			4.1			6.5 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.6 3.3
p0 queue free %			99			71 75
cM capacity (veh/h)			1328			347 845
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	249	577	314			
Volume Left	0	16	102			
Volume Right	96	0	212			
cSH	1700	1328	577			
Volume to Capacity	0.15	0.01	0.54			
Queue Length 95th (m)	0.0	0.3	24.8			
Control Delay (s)	0.0	0.4	18.5			
Lane LOS			A		C	
Approach Delay (s)	0.0	0.4	18.5			
Approach LOS			C			
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			68.0%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w Reduc Sc1> AM Peak Hour
07/07/2020

























														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	227	80	19	0	244	464	59	166	0	144	68	314		
Future Volume (vph)	227	80	19	0	244	464	59	166	0	144	68	314		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		6.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	1.00	1.00			0.98			1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00			
Frt	1.00	0.97			0.91			1.00		1.00	0.88			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1628	1628			1475			1671		1442	1473			
Flt Permitted	0.10	1.00			1.00			0.46		0.50	1.00			
Satd. Flow (perm)	166	1628			1475			777		759	1473			
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)	247	87	21	0	265	504	64	180	0	157	74	341		
RTOR Reduction (vph)	0	8	0	0	76	0	0	0	0	0	184	0		
Lane Group Flow (vph)	247	100	0	0	693	0	0	244	0	157	231	0		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	1%	0%	14%	0%	0%	8%	0%	3%	0%	14%	3%	3%		
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA			
Protected Phases	7	4			8			2			6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	54.0	54.0			42.0			24.0		24.0	24.0			
Effective Green, g (s)	54.0	56.0			44.0			26.0		24.0	26.0			
Actuated g/C Ratio	0.60	0.62			0.49			0.29		0.27	0.29			
Clearance Time (s)	3.0	6.0			6.0			6.0		6.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	245	1012			721			224		202	425			
v/s Ratio Prot	c0.10	0.06			0.47						0.16			
v/s Ratio Perm	c0.50							c0.31		0.21				
v/c Ratio	1.01	0.10			0.96			1.09		0.78	0.54			
Uniform Delay, d1	24.7	6.8			22.2			32.0		30.5	27.0			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	59.6	0.2			25.2			86.0		17.0	1.4			
Delay (s)	84.3	7.0			47.4			118.0		47.5	28.4			
Level of Service	F	A			D			F		D	C			
Approach Delay (s)		60.8			47.4			118.0			33.6			
Approach LOS		E			D			F			C			
Intersection Summary														
HCM 2000 Control Delay			54.7									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			1.04											
Actuated Cycle Length (s)			90.0								11.0			
Intersection Capacity Utilization			114.6%										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)	19	23	7	143	46	492	16	567	344	249	401	17
Future Volume (vph)	19	23	7	143	46	492	16	567	344	249	401	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.97	1.00	
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1668		1411	1480		1552	1713	1375	2951	1704	
Fl _t Permitted	0.16	1.00		0.74	1.00		0.50	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	265	1668		1092	1480		818	1713	1375	2951	1704	
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)	21	25	8	155	50	535	17	616	374	271	436	18
RTOR Reduction (vph)	0	5	0	0	240	0	0	0	225	0	2	0
Lane Group Flow (vph)	21	28	0	155	345	0	17	616	149	271	452	0
Heavy Vehicles (%)	0%	0%	0%	10%	0%	1%	0%	1%	1%	2%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	21.7	21.7		21.7	21.7		25.3	25.3	25.3	8.0	36.3	
Effective Green, g (s)	24.7	24.7		24.7	24.7		29.0	29.0	29.0	8.0	40.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.40	0.40	0.40	0.11	0.55	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	90	566		371	502		326	683	548	324	937	
v/s Ratio Prot		0.02			c0.23			c0.36		c0.09	0.27	
v/s Ratio Perm	0.08			0.14			0.02		0.11			
v/c Ratio	0.23	0.05		0.42	0.69		0.05	0.90	0.27	0.84	0.48	
Uniform Delay, d ₁	17.2	16.1		18.5	20.7		13.4	20.5	14.7	31.7	10.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	1.3	0.0		0.8	3.9		0.3	17.4	1.2	16.8	1.8	
Delay (s)	18.5	16.2		19.2	24.6		13.7	37.9	16.0	48.5	11.8	
Level of Service	B	B		B	C		B	D	B	D	B	
Approach Delay (s)		17.1			23.5			29.3			25.5	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			26.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			72.7			Sum of lost time (s)			11.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT w Reduc Sc1> AM Peak Hour
07/07/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	78	391	200	248	286	137	380	298	476	130	139	18	
Future Volume (vph)	78	391	200	248	286	137	380	298	476	130	139	18	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1545	1290	1566	1531	1414	1348	1680	1442	1628	1596		
Flt Permitted	0.48	1.00	1.00	0.37	1.00	1.00	0.64	1.00	1.00	0.48	1.00		
Satd. Flow (perm)	839	1545	1290	614	1531	1414	903	1680	1442	818	1596		
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)	85	425	217	270	311	149	413	324	517	141	151	20	
RTOR Reduction (vph)	0	0	120	0	0	83	0	0	172	0	6	0	
Lane Group Flow (vph)	85	425	97	270	311	66	413	324	345	141	165	0	
Heavy Vehicles (%)	0%	12%	14%	5%	13%	4%	22%	3%	2%	1%	5%	18%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2		2	6			
Actuated Green, G (s)	34.0	34.0	34.0	34.0	34.0	34.0	36.0	36.0	36.0	36.0	36.0		
Effective Green, g (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	38.0	38.0		
Actuated g/C Ratio	0.45	0.45	0.45	0.45	0.45	0.45	0.46	0.46	0.46	0.46	0.46		
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	374	688	575	273	682	630	413	769	660	374	730		
v/s Ratio Prot		0.28			0.20			0.19			0.10		
v/s Ratio Perm	0.10		0.07	c0.44		0.05	c0.46		0.24	0.17			
v/c Ratio	0.23	0.62	0.17	0.99	0.46	0.11	1.00	0.42	0.52	0.38	0.23		
Uniform Delay, d1	14.2	17.6	13.8	22.8	16.0	13.4	22.5	15.1	16.0	14.7	13.6		
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	0.3	1.7	0.1	50.9	0.5	0.1	44.3	1.7	2.9	2.9	0.7		
Delay (s)	14.5	19.2	13.9	73.7	16.5	13.4	66.8	16.8	19.0	17.6	14.3		
Level of Service	B	B	B	E	B	B	E	B	B	B	B		
Approach Delay (s)		17.1			37.0			34.2			15.8		
Approach LOS		B			D			C			B		
Intersection Summary													
HCM 2000 Control Delay			28.9									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.99										
Actuated Cycle Length (s)			83.0									Sum of lost time (s)	8.0
Intersection Capacity Utilization			84.3%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	183	631	492	66	34	73
Future Volume (vph)	183	631	492	66	34	73
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1697	1697	1361	1644	1337
Flt Permitted	0.37	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	630	1697	1697	1361	1644	1337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	199	686	535	72	37	79
RTOR Reduction (vph)	0	0	0	33	0	56
Lane Group Flow (vph)	199	686	535	39	37	23
Heavy Vehicles (%)	2%	2%	2%	2%	0%	10%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	24.9	24.9	24.9	24.9	12.3	12.3
Effective Green, g (s)	26.9	26.9	26.9	26.9	14.3	14.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.29	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	344	927	927	744	477	388
v/s Ratio Prot		c0.40	0.32		c0.02	
v/s Ratio Perm	0.32			0.03		0.02
v/c Ratio	0.58	0.74	0.58	0.05	0.08	0.06
Uniform Delay, d1	7.4	8.5	7.4	5.2	12.7	12.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	3.2	0.9	0.0	0.3	0.3
Delay (s)	9.7	11.7	8.3	5.2	13.0	12.9
Level of Service	A	B	A	A	B	B
Approach Delay (s)		11.3	7.9		12.9	
Approach LOS		B	A		B	










Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		










c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2037 FT w Reduc Sc1> AM Peak Hour
 07/07/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	7	115	3	6	1	231	4	7	1	3	8
Future Volume (Veh/h)	4	7	115	3	6	1	231	4	7	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	8	125	3	7	1	251	4	8	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	8			133			102	92	70	102	154	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			133			102	92	70	102	154	8
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			71	99	99	100	100	99
cM capacity (veh/h)	1625			1464			864	798	998	870	631	979
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	137	11	263	13								
Volume Left	4	3	251	1								
Volume Right	125	1	8	9								
cSH	1625	1464	866	861								
Volume to Capacity	0.00	0.00	0.30	0.02								
Queue Length 95th (m)	0.1	0.0	9.8	0.3								
Control Delay (s)	0.2	2.0	11.0	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.2	2.0	11.0	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.2									
Intersection Capacity Utilization			36.4%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	866	4	5	509
Future Volume (Veh/h)	11	17	866	4	5	509
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)	12	18	941	4	5	553
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	199			389		
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	1506	943			945	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1507	895			897	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	94			99	
cM capacity (veh/h)	123	315			705	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	945	558			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	194	1700	705			
Volume to Capacity	0.15	0.56	0.01			
Queue Length 95th (m)	4.1	0.0	0.2			
Control Delay (s)	26.9	0.0	0.2			
Lane LOS	D		A			
Approach Delay (s)	26.9	0.0	0.2			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			59.7%	ICU Level of Service		B
Analysis Period (min)			15			

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	853	4	5	515
Future Volume (Veh/h)	11	17	853	4	5	515
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)	12	18	927	4	5	560
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	101					
pX, platoon unblocked	0.86	0.86			0.86	
vC, conflicting volume	1499	929			931	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1499	836			838	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	94			99	
cM capacity (veh/h)	116	318			692	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	931	565			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	188	1700	692			
Volume to Capacity	0.16	0.55	0.01			
Queue Length 95th (m)	4.2	0.0	0.2			
Control Delay (s)	27.8	0.0	0.2			
Lane LOS	D		A			
Approach Delay (s)	27.8	0.0	0.2			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			59.0%	ICU Level of Service		B
Analysis Period (min)			15			














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	148	50	155	0	0	454
Future Volume (Veh/h)	148	50	155	0	0	454
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)	161	54	168	0	0	493
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	168				544	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				544	168
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				100	44
cM capacity (veh/h)	1422				447	881
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	161	54	168	493		
Volume Left	161	0	0	0		
Volume Right	0	0	0	493		
cSH	1422	1700	1700	881		
Volume to Capacity	0.11	0.03	0.10	0.56		
Queue Length 95th (m)	2.9	0.0	0.0	27.0		
Control Delay (s)	7.9	0.0	0.0	14.1		
Lane LOS	A			B		
Approach Delay (s)	5.9		0.0	14.1		
Approach LOS				B		
Intersection Summary						
Average Delay			9.4			
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			













HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access

<2037 FT w Reduc Sc1> AM Peak Hour
 07/07/2020













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Volume (veh/h)	49	0	0	0	0	151
Future Volume (Veh/h)	49	0	0	0	0	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)	53	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				106	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				106	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	85
cM capacity (veh/h)	1636				868	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	53	0	164			
Volume Left	53	0	0			
Volume Right	0	0	164			
cSH	1636	1700	1091			
Volume to Capacity	0.03	0.00	0.15			
Queue Length 95th (m)	0.8	0.0	4.0			
Control Delay (s)	7.3	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			20.2%		ICU Level of Service	A
Analysis Period (min)			15			

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	307	847	20	149	438
Future Volume (vph)	44	307	847	20	149	438
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1725		1644	1731
Flt Permitted	0.95	1.00	1.00		0.16	1.00
Satd. Flow (perm)	1644	1471	1725		275	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	334	921	22	162	476
RTOR Reduction (vph)	0	110	1	0	0	0
Lane Group Flow (vph)	48	224	942	0	162	476
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	15.6	15.6	46.3		46.3	46.3
Effective Green, g (s)	17.6	17.6	48.3		48.3	48.3
Actuated g/C Ratio	0.24	0.24	0.65		0.65	0.65
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	391	350	1127		179	1131
v/s Ratio Prot	0.03		0.55			0.28
v/s Ratio Perm		c0.15			c0.59	
v/c Ratio	0.12	0.64	0.84		0.91	0.42
Uniform Delay, d1	22.1	25.3	9.8		10.9	6.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	3.8	7.4		46.1	1.2
Delay (s)	22.2	29.1	17.2		57.0	7.3
Level of Service	C	C	B		E	A
Approach Delay (s)	28.2		17.2			19.9
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			20.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.83			
Actuated Cycle Length (s)			73.9		Sum of lost time (s)	8.0
Intersection Capacity Utilization			77.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	215	152	715	168	183	299
Future Volume (vph)	215	152	715	168	183	299
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.25	1.00
Satd. Flow (perm)	1644	1471	1731	1471	438	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	165	777	183	199	325
RTOR Reduction (vph)	0	126	0	27	0	0
Lane Group Flow (vph)	234	39	777	156	199	325
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	15.6	15.6	46.6	46.6	46.6	46.6
Effective Green, g (s)	17.6	17.6	48.6	48.6	48.6	48.6
Actuated g/C Ratio	0.24	0.24	0.65	0.65	0.65	0.65
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	389	348	1133	963	286	1133
v/s Ratio Prot	c0.14		0.45			0.19
v/s Ratio Perm		0.03		0.11	c0.45	
v/c Ratio	0.60	0.11	0.69	0.16	0.70	0.29
Uniform Delay, d1	25.2	22.2	8.0	4.9	8.1	5.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.1	3.4	0.4	13.1	0.6
Delay (s)	27.8	22.3	11.4	5.3	21.2	6.1
Level of Service	C	C	B	A	C	A
Approach Delay (s)	25.5		10.2			11.8
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			13.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			74.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			74.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020










						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	270	104	272	196	118	22
Future Volume (Veh/h)	270	104	272	196	118	22
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)	293	113	296	213	128	24
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			406	1154		350
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			406	1154		350
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			75	20		97
cM capacity (veh/h)			1164	161		698
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	406	509	152			
Volume Left	0	296	128			
Volume Right	113	0	24			
cSH	1700	1164	183			
Volume to Capacity	0.24	0.25	0.83			
Queue Length 95th (m)	0.0	7.7	44.5			
Control Delay (s)	0.0	6.4	80.2			
Lane LOS	A		F			
Approach Delay (s)	0.0	6.4	80.2			
Approach LOS	A		F			
Intersection Summary						
Average Delay			14.5			
Intersection Capacity Utilization			68.4%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020



















													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	364	0	0	103	0	676	441	0	828	131	
Future Volume (vph)	0	0	364	0	0	103	0	676	441	0	828	131	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Flt			0.86			0.86		1.00	0.85		1.00	0.85	
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1497			1412		1713	1414		1713	1401	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1497			1412		1713	1414		1713	1401	
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)	0	0	396	0	0	112	0	735	479	0	900	142	
RTOR Reduction (vph)	0	0	121	0	0	85	0	0	181	0	0	54	
Lane Group Flow (vph)	0	0	275	0	0	27	0	735	298	0	900	88	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%	0%	1%	4%	0%	1%	5%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			12.4			12.4		35.0	35.0		35.0	35.0	
Effective Green, g (s)			14.4			14.4		37.0	37.0		37.0	37.0	
Actuated g/C Ratio			0.24			0.24		0.62	0.62		0.62	0.62	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			362			342		1067	880		1067	872	
v/s Ratio Prot								0.43			c0.53		
v/s Ratio Perm			c0.18			0.02			0.21			0.06	
v/c Ratio			0.76			0.08		0.69	0.34		0.84	0.10	
Uniform Delay, d1			20.9			17.4		7.4	5.4		8.9	4.5	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2			8.8			0.1		3.6	1.0		8.1	0.2	
Delay (s)			29.7			17.5		11.0	6.4		17.0	4.7	
Level of Service			C			B		B	A		B	A	
Approach Delay (s)		29.7			17.5			9.2			15.4		
Approach LOS		C			B			A			B		
Intersection Summary													
HCM 2000 Control Delay			14.8									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			59.4									Sum of lost time (s)	10.0
Intersection Capacity Utilization			78.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	217	77	29	404	64	385
Future Volume (Veh/h)	217	77	29	404	64	385
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)	236	84	32	439	70	418
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			320			781 278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			320			781 278
tC, single (s)			4.1			6.5 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.6 3.3
p0 queue free %			97			80 45
cM capacity (veh/h)			1251			345 766
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	320	471	488			
Volume Left	0	32	70			
Volume Right	84	0	418			
cSH	1700	1251	651			
Volume to Capacity	0.19	0.03	0.75			
Queue Length 95th (m)	0.0	0.6	51.2			
Control Delay (s)	0.0	0.8	25.1			
Lane LOS			A		D	
Approach Delay (s)	0.0	0.8	25.1			
Approach LOS			D			
Intersection Summary						
Average Delay			9.9			
Intersection Capacity Utilization			82.0%	ICU Level of Service		D
Analysis Period (min)			15			























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w Reduc Sc1> PM Peak Hour
07/07/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	311	266	60	0	160	300	35	104	0	505	169	253	
Future Volume (vph)	311	266	60	0	160	300	35	104	0	505	169	253	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)	3.0	4.0			4.0			4.0		3.0	4.0		
Lane Util. Factor	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		
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00		
Fr _t	1.00	0.97			0.91			1.00		1.00	0.91		
Fl _t Protected	0.95	1.00			1.00			0.99		0.95	1.00		
Satd. Flow (prot)	1628	1675			1578			1675		1644	1559		
Fl _t Permitted	0.11	1.00			1.00			0.80		0.47	1.00		
Satd. Flow (perm)	188	1675			1578			1365		818	1559		
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)	338	289	65	0	174	326	38	113	0	549	184	275	
RTOR Reduction (vph)	0	7	0	0	54	0	0	0	0	0	43	0	
Lane Group Flow (vph)	338	347	0	0	446	0	0	151	0	549	416	0	
Confl. Peds. (#/hr)			2	2									
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	8%	0%	0%	0%	1%	1%	
Turn Type	pm+pt	NA			NA		Perm	NA		pm+pt	NA		
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)	58.5	58.5			33.5			22.0		54.5	54.5		
Effective Green, g (s)	58.5	60.5			35.5			24.0		54.5	56.5		
Actuated g/C Ratio	0.47	0.48			0.28			0.19		0.44	0.45		
Clearance Time (s)	3.0	6.0			6.0			6.0		3.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0		
Lane Grp Cap (vph)	341	810			448			262		551	704		
v/s Ratio Prot	c0.17	0.21			0.28					c0.23	0.27		
v/s Ratio Perm	c0.29							0.11		c0.20			
v/c Ratio	0.99	0.43			1.00			0.58		1.00	0.59		
Uniform Delay, d1	38.5	21.0			44.7			45.9		32.6	25.6		
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00		
Incremental Delay, d2	46.2	0.4			41.3			8.9		37.2	3.6		
Delay (s)	84.7	21.4			85.9			54.8		69.8	29.2		
Level of Service	F	C			F			D		E	C		
Approach Delay (s)		52.3			85.9			54.8			51.3		
Approach LOS		D			F			D			D		
Intersection Summary													
HCM 2000 Control Delay			59.2									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.00										
Actuated Cycle Length (s)			125.0									Sum of lost time (s)	14.0
Intersection Capacity Utilization			97.5%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

























HCM Signalized Intersection Capacity Analysis
 5: Highway 58 & Townline Tunnel Road

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	56	17	353	36	374	0	572	232	512	645	16
Future Volume (vph)	39	56	17	353	36	374	0	572	232	512	645	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.97	1.00	
Frbp, ped/bikes	1.00	0.99		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	1.00	
Frt	1.00	0.97		1.00	0.86			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1663		1505	1404			1731	1298	2980	1708	
Flt Permitted	0.45	1.00		0.59	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	742	1663		938	1404			1731	1298	2980	1708	
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)	42	61	18	384	39	407	0	622	252	557	701	17
RTOR Reduction (vph)	0	12	0	0	265	0	0	0	126	0	1	0
Lane Group Flow (vph)	42	67	0	384	181	0	0	622	126	557	717	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	0%	3%	0%	7%	0%	0%	7%	1%	1%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	15.6	15.6		30.2	30.2			31.4	31.4	16.0	50.4	
Effective Green, g (s)	18.6	18.6		30.2	33.2			35.1	35.1	16.0	54.1	
Actuated g/C Ratio	0.20	0.20		0.32	0.35			0.37	0.37	0.17	0.57	
Clearance Time (s)	7.0	7.0		3.0	7.0			7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	144	324		366	489			637	478	500	969	
v/s Ratio Prot		0.04		c0.13	0.13			c0.36		c0.19	0.42	
v/s Ratio Perm	0.06			c0.20					0.10			
v/c Ratio	0.29	0.21		1.05	0.37			0.98	0.26	1.11	0.74	
Uniform Delay, d1	32.7	32.2		31.5	23.2			29.7	21.1	39.6	15.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.3		60.5	0.5			30.3	1.3	75.3	5.1	
Delay (s)	33.9	32.5		92.0	23.7			60.0	22.4	114.9	20.4	
Level of Service	C	C		F	C			E	C	F	C	
Approach Delay (s)		33.0			55.3			49.2			61.7	
Approach LOS		C			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			55.3			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			95.3			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			99.8%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT w Reduc Sc1> PM Peak Hour
07/07/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	372	386	484	500	174	267	216	344	123	319	67
Future Volume (vph)	91	372	386	484	500	174	267	216	344	123	319	67
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
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	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	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1644	1559	1471	1644	1559	1442	1644	1697	1471	1596	1638	
Flt Permitted	0.46	1.00	1.00	0.15	1.00	1.00	0.14	1.00	1.00	0.61	1.00	
Satd. Flow (perm)	799	1559	1471	266	1559	1442	247	1697	1471	1029	1638	
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)	99	404	420	526	543	189	290	235	374	134	347	73
RTOR Reduction (vph)	0	0	247	0	0	57	0	0	228	0	7	0
Lane Group Flow (vph)	99	404	173	526	543	132	290	235	146	134	413	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	11%	0%	0%	11%	2%	0%	2%	0%	3%	3%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	23.0	23.0	23.0	56.0	56.0	56.0	41.0	41.0	41.0	25.0	25.0	
Effective Green, g (s)	26.0	26.0	26.0	56.0	59.0	59.0	41.0	43.0	43.0	27.0	27.0	
Actuated g/C Ratio	0.24	0.24	0.24	0.51	0.54	0.54	0.37	0.39	0.39	0.25	0.25	
Clearance Time (s)	7.0	7.0	7.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	188	368	347	511	836	773	257	663	575	252	402	
v/s Ratio Prot		c0.26		c0.28	0.35		c0.13	0.14			0.25	
v/s Ratio Perm	0.12		0.12	0.24		0.09	c0.29		0.10	0.13		
v/c Ratio	0.53	1.10	0.50	1.03	0.65	0.17	1.13	0.35	0.25	0.53	1.03	
Uniform Delay, d1	36.6	42.0	36.3	31.2	18.1	13.0	29.5	23.7	22.7	36.0	41.5	
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	2.7	75.9	1.1	47.5	1.8	0.1	95.2	1.5	1.1	7.8	52.2	
Delay (s)	39.3	117.9	37.5	78.8	19.9	13.1	124.7	25.2	23.7	43.8	93.7	
Level of Service	D	F	D	E	B	B	F	C	C	D	F	
Approach Delay (s)		72.9			43.5			56.7			81.6	
Approach LOS		E			D			E			F	
Intersection Summary												
HCM 2000 Control Delay			60.0									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			110.0								14.0	
Intersection Capacity Utilization			102.4%									ICU Level of Service G
Analysis Period (min)			15									

c Critical Lane Group















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	124	589	700	49	99	127
Future Volume (vph)	124	589	700	49	99	127
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	1.00	1.00	1.00	0.85	1.00	0.85
Fl _t Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1596	1697	1680	1274	1644	1471
Fl _t Permitted	0.23	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	383	1697	1680	1274	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	640	761	53	108	138
RTOR Reduction (vph)	0	0	0	22	0	102
Lane Group Flow (vph)	135	640	761	31	108	36
Heavy Vehicles (%)	3%	2%	3%	9%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	27.4	27.4	27.4	27.4	11.3	11.3
Effective Green, g (s)	29.4	29.4	29.4	29.4	13.3	13.3
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	222	984	974	738	431	385
v/s Ratio Prot		0.38	c0.45		c0.07	
v/s Ratio Perm	0.35			0.02		0.02
v/c Ratio	0.61	0.65	0.78	0.04	0.25	0.09
Uniform Delay, d ₁	6.9	7.2	8.2	4.6	14.8	14.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	4.7	1.6	4.1	0.0	1.4	0.5
Delay (s)	11.6	8.7	12.3	4.6	16.2	14.6
Level of Service	B	A	B	A	B	B
Approach Delay (s)		9.2	11.8		15.3	
Approach LOS		A	B		B	










Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	50.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road










<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	2	10	214	8	15	0	167	0	7	1	3	6
Future Volume (Veh/h)	2	10	214	8	15	0	167	0	7	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	11	233	9	16	0	182	0	8	1	3	7
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	16			244			174	166	128	174	282	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			244			174	166	128	174	282	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			76	100	99	100	100	99
cM capacity (veh/h)	1615			1334			772	725	928	782	625	1069
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	246	25	190	11								
Volume Left	2	9	182	1								
Volume Right	233	0	8	7								
cSH	1615	1334	777	871								
Volume to Capacity	0.00	0.01	0.24	0.01								
Queue Length 95th (m)	0.0	0.2	7.3	0.3								
Control Delay (s)	0.1	2.8	11.1	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.8	11.1	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.9									
Intersection Capacity Utilization			38.9%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	702	12	19	930
Future Volume (Veh/h)	8	11	702	12	19	930
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)	9	12	763	13	21	1011
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			199			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1822	770			776	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1878	644			651	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	97			97	
cM capacity (veh/h)	66	407			806	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	776	1032			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	127	1700	806			
Volume to Capacity	0.17	0.46	0.03			
Queue Length 95th (m)	4.3	0.0	0.6			
Control Delay (s)	39.0	0.0	0.8			
Lane LOS	E		A			
Approach Delay (s)	39.0	0.0	0.8			
Approach LOS	E					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	703	12	19	919
Future Volume (Veh/h)	8	11	703	12	19	919
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)	9	12	764	13	21	999
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			104			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	1812	770			777	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1882	605			613	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	97			97	
cM capacity (veh/h)	63	409			796	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	777	1020			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	121	1700	796			
Volume to Capacity	0.17	0.46	0.03			
Queue Length 95th (m)	4.6	0.0	0.6			
Control Delay (s)	40.8	0.0	0.8			
Lane LOS	E		A			
Approach Delay (s)	40.8	0.0	0.8			
Approach LOS	E					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			79.1%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	499	170	101	0	0	293
Future Volume (Veh/h)	499	170	101	0	0	293
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)	542	185	110	0	0	318
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110				1379	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110				1379	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	64				100	66
cM capacity (veh/h)	1493				102	949
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	542	185	110	318		
Volume Left	542	0	0	0		
Volume Right	0	0	0	318		
cSH	1493	1700	1700	949		
Volume to Capacity	0.36	0.11	0.06	0.34		
Queue Length 95th (m)	12.8	0.0	0.0	11.3		
Control Delay (s)	8.8	0.0	0.0	10.7		
Lane LOS	A			B		
Approach Delay (s)	6.5		0.0	10.7		
Approach LOS				B		
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			63.0%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	166	0	0	0	0	98
Future Volume (Veh/h)	166	0	0	0	0	98
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)	180	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				360	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				360	0
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				100	90
cM capacity (veh/h)	1636				572	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	180	0	107			
Volume Left	180	0	0			
Volume Right	0	0	107			
cSH	1636	1700	1091			
Volume to Capacity	0.11	0.00	0.10			
Queue Length 95th (m)	2.8	0.0	2.5			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			23.2%		ICU Level of Service	A
Analysis Period (min)			15			

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	28	202	625	39	278	911
Future Volume (vph)	28	202	625	39	278	911
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1717		1644	1731
Flt Permitted	0.95	1.00	1.00		0.32	1.00
Satd. Flow (perm)	1644	1471	1717		547	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	220	679	42	302	990
RTOR Reduction (vph)	0	181	2	0	0	0
Lane Group Flow (vph)	30	39	719	0	302	990
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	10.5	10.5	48.6		48.6	48.6
Effective Green, g (s)	12.5	12.5	50.6		50.6	50.6
Actuated g/C Ratio	0.18	0.18	0.71		0.71	0.71
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	289	258	1221		389	1231
v/s Ratio Prot	0.02		0.42			c0.57
v/s Ratio Perm		c0.03			0.55	
v/c Ratio	0.10	0.15	0.59		0.78	0.80
Uniform Delay, d1	24.6	24.8	5.1		6.6	6.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.3	2.1		14.1	5.6
Delay (s)	24.8	25.1	7.2		20.7	12.6
Level of Service	C	C	A		C	B
Approach Delay (s)	25.0		7.2			14.5
Approach LOS	C		A			B
Intersection Summary						
HCM 2000 Control Delay			13.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			71.1		Sum of lost time (s)	8.0
Intersection Capacity Utilization			73.3%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						




















HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2037 FT w Reduc Sc1> PM Peak Hour
 07/07/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	244	207	457	256	234	705
Future Volume (vph)	244	207	457	256	234	705
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	1731	1471	1644	1731
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1644	1471	1731	1471	727	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	225	497	278	254	766
RTOR Reduction (vph)	0	169	0	67	0	0
Lane Group Flow (vph)	265	56	497	211	254	766
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.6	16.6	46.1	46.1	46.1	46.1
Effective Green, g (s)	18.6	18.6	48.1	48.1	48.1	48.1
Actuated g/C Ratio	0.25	0.25	0.64	0.64	0.64	0.64
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	409	366	1114	947	468	1114
v/s Ratio Prot	c0.16		0.29			c0.44
v/s Ratio Perm		0.04		0.14	0.35	
v/c Ratio	0.65	0.15	0.45	0.22	0.54	0.69
Uniform Delay, d1	25.1	21.9	6.6	5.5	7.3	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.2	1.3	0.5	4.5	3.5
Delay (s)	28.6	22.1	7.9	6.1	11.7	12.0
Level of Service	C	C	A	A	B	B
Approach Delay (s)	25.6		7.3			11.9
Approach LOS	C		A			B
Intersection Summary						
HCM 2000 Control Delay			13.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			74.7		Sum of lost time (s)	8.0
Intersection Capacity Utilization			64.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road












<2037 FT w Recom & Reduc Sc1> AM Peak Hour
07/07/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	227	80	19	0	244	464	59	166	0	144	68	314		
Future Volume (vph)	227	80	19	0	244	464	59	166	0	144	68	314		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		6.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	1.00	1.00			0.98			1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00			
Frt	1.00	0.97			0.91			1.00		1.00	0.88			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1628	1628			1474			1671		1442	1473			
Flt Permitted	0.09	1.00			1.00			0.47		0.50	1.00			
Satd. Flow (perm)	158	1628			1474			803		763	1473			
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)	247	87	21	0	265	504	64	180	0	157	74	341		
RTOR Reduction (vph)	0	7	0	0	56	0	0	0	0	0	139	0		
Lane Group Flow (vph)	247	101	0	0	713	0	0	244	0	157	276	0		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	1%	0%	14%	0%	0%	8%	0%	3%	0%	14%	3%	3%		
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA			
Protected Phases	7	4			8			2			6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	72.0	72.0			56.0			35.0		35.0	35.0			
Effective Green, g (s)	72.0	74.0			58.0			37.0		35.0	37.0			
Actuated g/C Ratio	0.61	0.62			0.49			0.31		0.29	0.31			
Clearance Time (s)	3.0	6.0			6.0			6.0		6.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	256	1012			718			249		224	457			
v/s Ratio Prot	c0.11	0.06			c0.48						0.19			
v/s Ratio Perm	0.48							c0.30		0.21				
v/c Ratio	0.96	0.10			0.99			0.98		0.70	0.60			
Uniform Delay, d1	33.6	9.1			30.3			40.6		37.3	34.8			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	46.1	0.2			31.8			50.8		9.5	2.2			
Delay (s)	79.7	9.3			62.1			91.4		46.8	37.0			
Level of Service	E	A			E			F		D	D			
Approach Delay (s)		58.3			62.1			91.4			39.7			
Approach LOS		E			E			F			D			
Intersection Summary														
HCM 2000 Control Delay			58.5									HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio			0.98											
Actuated Cycle Length (s)			119.0							11.0				
Intersection Capacity Utilization			114.6%										ICU Level of Service	H
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road



















<2037 FT w Recom & Reduc Sc1> AM Peak Hour
07/07/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	78	391	200	248	286	137	380	298	476	130	139	18	
Future Volume (vph)	78	391	200	248	286	137	380	298	476	130	139	18	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	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	1.00	0.85	1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1644	1545	1290	3038	1531	1414	1348	1680	1442	1628	1596		
Flt Permitted	0.57	1.00	1.00	0.95	1.00	1.00	0.47	1.00	1.00	0.56	1.00		
Satd. Flow (perm)	989	1545	1290	3038	1531	1414	669	1680	1442	967	1596		
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)	85	425	217	270	311	149	413	324	517	141	151	20	
RTOR Reduction (vph)	0	0	150	0	0	79	0	0	215	0	5	0	
Lane Group Flow (vph)	85	425	67	270	311	70	413	324	302	141	166	0	
Heavy Vehicles (%)	0%	12%	14%	5%	13%	4%	22%	3%	2%	1%	5%	18%	
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA		
Protected Phases		4		3	8		5	2			6		
Permitted Phases	4		4			8	2		2	6			
Actuated Green, G (s)	30.6	30.6	30.6	11.0	44.6	44.6	51.1	51.1	51.1	24.8	24.8		
Effective Green, g (s)	33.6	33.6	33.6	11.0	47.6	47.6	51.1	53.1	53.1	26.8	26.8		
Actuated g/C Ratio	0.31	0.31	0.31	0.10	0.44	0.44	0.47	0.49	0.49	0.25	0.25		
Clearance Time (s)	7.0	7.0	7.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	305	477	398	307	670	619	460	820	704	238	393		
v/s Ratio Prot		c0.28		c0.09	0.20		c0.19	0.19			0.10		
v/s Ratio Perm	0.09		0.05			0.05	c0.23		0.21	0.15			
v/c Ratio	0.28	0.89	0.17	0.88	0.46	0.11	0.90	0.40	0.43	0.59	0.42		
Uniform Delay, d1	28.4	35.8	27.4	48.2	21.6	18.1	23.1	17.6	18.0	36.1	34.5		
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	0.5	18.5	0.2	23.6	0.5	0.1	19.8	1.4	1.9	10.4	3.3		
Delay (s)	28.9	54.3	27.6	71.8	22.1	18.2	42.9	19.0	19.9	46.5	37.8		
Level of Service	C	D	C	E	C	B	D	B	B	D	D		
Approach Delay (s)		43.3			39.7			27.3			41.7		
Approach LOS		D			D			C			D		
Intersection Summary													
HCM 2000 Control Delay			35.6									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.90										
Actuated Cycle Length (s)			108.7									Sum of lost time (s)	14.0
Intersection Capacity Utilization			78.7%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	307	847	20	149	438
Future Volume (vph)	44	307	847	20	149	438
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	1725		1644	1731
Flt Permitted	0.95	1.00	1.00		0.14	1.00
Satd. Flow (perm)	1644	1471	1725		237	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	334	921	22	162	476
RTOR Reduction (vph)	0	202	1	0	0	0
Lane Group Flow (vph)	48	132	942	0	162	476
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	14.1	14.1	61.2		71.2	71.2
Effective Green, g (s)	16.1	16.1	63.2		71.2	73.2
Actuated g/C Ratio	0.17	0.17	0.65		0.73	0.75
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	272	243	1120		274	1302
v/s Ratio Prot	0.03		c0.55		c0.04	0.28
v/s Ratio Perm		c0.09			0.39	
v/c Ratio	0.18	0.54	0.84		0.59	0.37
Uniform Delay, d1	34.9	37.2	13.2		13.6	4.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.3	2.5	7.7		3.4	0.8
Delay (s)	35.2	39.7	20.9		17.0	4.9
Level of Service	D	D	C		B	A
Approach Delay (s)	39.1		20.9			8.0
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			20.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			97.3		Sum of lost time (s)	11.0
Intersection Capacity Utilization			77.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w Recom & Reduc Sc1> PM Peak Hour
07/07/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	311	266	60	0	160	300	35	104	0	505	169	253		
Future Volume (vph)	311	266	60	0	160	300	35	104	0	505	169	253		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0			4.0		3.0	4.0			
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes	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			
Frt	1.00	0.97			0.91			1.00		1.00	0.91			
Flt Protected	0.95	1.00			1.00			0.99		0.95	1.00			
Satd. Flow (prot)	1628	1675			1578			1675		1644	1559			
Flt Permitted	0.10	1.00			1.00			0.80		0.45	1.00			
Satd. Flow (perm)	171	1675			1578			1359		782	1559			
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)	338	289	65	0	174	326	38	113	0	549	184	275		
RTOR Reduction (vph)	0	6	0	0	50	0	0	0	0	0	40	0		
Lane Group Flow (vph)	338	348	0	0	450	0	0	151	0	549	419	0		
Confl. Peds. (#/hr)			2	2										
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	8%	0%	0%	0%	1%	1%		
Turn Type	pm+pt	NA			NA		Perm	NA		pm+pt	NA			
Protected Phases	7	4			8			2		1	6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)	64.5	64.5			37.0			22.0		58.5	58.5			
Effective Green, g (s)	64.5	66.5			39.0			24.0		58.5	60.5			
Actuated g/C Ratio	0.48	0.49			0.29			0.18		0.43	0.45			
Clearance Time (s)	3.0	6.0			6.0			6.0		3.0	6.0			
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	346	825			455			241		552	698			
v/s Ratio Prot	c0.18	0.21			0.29					c0.25	0.27			
v/s Ratio Perm	c0.29							0.11		c0.18				
v/c Ratio	0.98	0.42			0.99			0.63		0.99	0.60			
Uniform Delay, d1	42.2	21.9			47.8			51.4		35.0	28.1			
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2	41.7	0.3			39.0			11.7		36.7	3.8			
Delay (s)	84.0	22.3			86.8			63.1		71.7	31.9			
Level of Service	F	C			F			E		E	C			
Approach Delay (s)		52.4			86.8			63.1			53.6			
Approach LOS		D			F			E			D			
Intersection Summary														
HCM 2000 Control Delay			60.9									HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio			0.99											
Actuated Cycle Length (s)			135.0								14.0		Sum of lost time (s)	
Intersection Capacity Utilization			97.5%										ICU Level of Service	F
Analysis Period (min)			15											
c Critical Lane Group														

























HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FT w Recom & Reduc Sc1> PM Peak Hour
07/07/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	39	56	17	353	36	374	0	572	232	512	645	16	
Future Volume (vph)	39	56	17	353	36	374	0	572	232	512	645	16	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	4.0	3.0	4.0		
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.97	1.00		
Frbp, ped/bikes	1.00	0.99		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	1.00		
Frt	1.00	0.97		1.00	0.86			1.00	0.85	1.00	1.00		
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1552	1663		1505	1404			1731	1298	2980	1708		
Flt Permitted	0.50	1.00		0.58	1.00			1.00	1.00	0.95	1.00		
Satd. Flow (perm)	824	1663		914	1404			1731	1298	2980	1708		
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)	42	61	18	384	39	407	0	622	252	557	701	17	
RTOR Reduction (vph)	0	9	0	0	264	0	0	0	105	0	1	0	
Lane Group Flow (vph)	42	70	0	384	182	0	0	622	147	557	717	0	
Confl. Peds. (#/hr)			1	1									
Heavy Vehicles (%)	0%	0%	0%	3%	0%	7%	0%	0%	7%	1%	1%	0%	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4			8			2		2				
Actuated Green, G (s)	15.5	15.5		36.8	36.8			37.5	37.5	21.6	62.1		
Effective Green, g (s)	18.5	18.5		36.8	39.8			41.2	41.2	21.6	65.8		
Actuated g/C Ratio	0.16	0.16		0.32	0.35			0.36	0.36	0.19	0.58		
Clearance Time (s)	7.0	7.0		3.0	7.0			7.7	7.7	3.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	134	270		391	491			627	470	566	989		
v/s Ratio Prot		0.04		c0.16	0.13			c0.36		c0.19	0.42		
v/s Ratio Perm	0.05			c0.16					0.11				
v/c Ratio	0.31	0.26		0.98	0.37			0.99	0.31	0.98	0.73		
Uniform Delay, d1	41.9	41.6		36.4	27.5			36.0	26.0	45.8	17.3		
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.3	0.5		40.5	0.5			34.0	1.7	33.5	4.6		
Delay (s)	43.3	42.1		77.0	28.0			70.1	27.8	79.3	22.0		
Level of Service	D	D		E	C			E	C	E	C		
Approach Delay (s)		42.5			50.7			57.9			47.0		
Approach LOS		D			D			E			D		
Intersection Summary													
HCM 2000 Control Delay			50.9									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			113.6									Sum of lost time (s)	14.0
Intersection Capacity Utilization			99.8%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road











<2037 FT w Recom & Reduc Sc1> PM Peak Hour
07/07/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	372	386	484	500	174	267	216	344	123	319	67
Future Volume (vph)	91	372	386	484	500	174	267	216	344	123	319	67
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	0.0	3.0	4.0	4.0	3.0	4.0	4.0	6.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	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	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	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1644	1559	1471	3189	1559	1442	1644	1697	1471	1596	1638	
Flt Permitted	0.46	1.00	1.00	0.95	1.00	1.00	0.16	1.00	1.00	0.61	1.00	
Satd. Flow (perm)	799	1559	1471	3189	1559	1442	278	1697	1471	1029	1638	
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)	99	404	420	526	543	189	290	235	374	134	347	73
RTOR Reduction (vph)	0	0	82	0	0	56	0	0	204	0	7	0
Lane Group Flow (vph)	99	404	338	526	543	133	290	235	170	134	413	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	11%	0%	0%	11%	2%	0%	2%	0%	3%	3%	0%
Turn Type	Perm	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4	5	3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	27.0	27.0	42.0	19.0	49.0	49.0	48.0	48.0	48.0	30.0	30.0	
Effective Green, g (s)	30.0	30.0	48.0	19.0	52.0	52.0	48.0	50.0	50.0	30.0	32.0	
Actuated g/C Ratio	0.27	0.27	0.44	0.17	0.47	0.47	0.44	0.45	0.45	0.27	0.29	
Clearance Time (s)	7.0	7.0	3.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	217	425	641	550	736	681	307	771	668	280	476	
v/s Ratio Prot		c0.26	0.09	c0.16	0.35		c0.13	0.14			0.25	
v/s Ratio Perm	0.12		0.14			0.09	c0.28		0.12	0.13		
v/c Ratio	0.46	0.95	0.53	0.96	0.74	0.19	0.94	0.30	0.25	0.48	0.87	
Uniform Delay, d1	33.2	39.3	22.7	45.1	23.5	16.8	25.6	19.0	18.5	33.5	37.0	
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	1.5	31.2	0.8	27.5	3.9	0.1	36.6	1.0	0.9	5.8	18.8	
Delay (s)	34.7	70.5	23.5	72.6	27.4	17.0	62.2	20.0	19.4	39.2	55.8	
Level of Service	C	E	C	E	C	B	E	C	B	D	E	
Approach Delay (s)		45.3			44.7			33.4			51.8	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			43.1									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			110.0									Sum of lost time (s) 14.0
Intersection Capacity Utilization			97.3%									ICU Level of Service F
Analysis Period (min)			15									

c Critical Lane Group



















HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road

<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	210	84	399	234	49	17
Future Volume (Veh/h)	210	84	399	234	49	17
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)	228	91	434	254	53	18
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			319		1396	274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			319		1396	274
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			65		46	98
cM capacity (veh/h)			1252		98	770
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	319	688	71			
Volume Left	0	434	53			
Volume Right	91	0	18			
cSH	1700	1252	126			
Volume to Capacity	0.19	0.35	0.56			
Queue Length 95th (m)	0.0	11.9	21.0			
Control Delay (s)	0.0	7.3	65.3			
Lane LOS		A	F			
Approach Delay (s)	0.0	7.3	65.3			
Approach LOS			F			
Intersection Summary						
Average Delay			9.0			
Intersection Capacity Utilization			69.0%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access











<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	475	0	0	102	0	797	286	0	469	56
Future Volume (vph)	0	0	475	0	0	102	0	797	286	0	469	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00
Fr _t			0.86			0.86		1.00	0.85		1.00	0.85
Fl _t Protected			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)			1349			1453		1713	1337		1697	1401
Fl _t Permitted			1.00			1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)			1349			1453		1713	1337		1697	1401
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)	0	0	516	0	0	111	0	866	311	0	510	61
RTOR Reduction (vph)	0	0	273	0	0	83	0	0	120	0	0	23
Lane Group Flow (vph)	0	0	243	0	0	28	0	866	191	0	510	38
Heavy Vehicles (%)	0%	0%	11%	0%	0%	3%	0%	1%	10%	0%	2%	5%
Turn Type			Perm			Perm		NA	Perm		NA	Perm
Protected Phases								2			6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)			12.5			12.5		34.0	34.0		34.0	34.0
Effective Green, g (s)			14.5			14.5		36.0	36.0		36.0	36.0
Actuated g/C Ratio			0.25			0.25		0.62	0.62		0.62	0.62
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)			334			360		1054	822		1044	862
v/s Ratio Prot								c0.51			0.30	
v/s Ratio Perm			c0.18			0.02			0.14			0.03
v/c Ratio			0.73			0.08		0.82	0.23		0.49	0.04
Uniform Delay, d ₁			20.2			16.9		8.8	5.1		6.2	4.4
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d ₂			7.7			0.1		7.2	0.7		1.6	0.1
Delay (s)			27.9			17.0		16.0	5.7		7.8	4.5
Level of Service			C			B		B	A		A	A
Approach Delay (s)		27.9			17.0			13.3			7.5	
Approach LOS		C			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			58.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			65.4%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	143	88	15	541	94	202
Future Volume (Veh/h)	143	88	15	541	94	202
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)	155	96	16	588	102	220
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			251		823	203
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			251		823	203
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			99		69	74
cM capacity (veh/h)			1326		334	843
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	251	604	322			
Volume Left	0	16	102			
Volume Right	96	0	220			
cSH	1700	1326	568			
Volume to Capacity	0.15	0.01	0.57			
Queue Length 95th (m)	0.0	0.3	26.7			
Control Delay (s)	0.0	0.3	19.3			
Lane LOS			A	C		
Approach Delay (s)	0.0	0.3	19.3			
Approach LOS			C			
Intersection Summary						
Average Delay			5.5			
Intersection Capacity Utilization			69.8%	ICU Level of Service		C
Analysis Period (min)			15			























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w widening Sc1> AM Peak Hour
07/08/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	227	89	19	0	269	509	59	166	0	159	68	314		
Future Volume (vph)	227	89	19	0	269	509	59	166	0	159	68	314		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)	3.0	4.0			4.0	6.0		4.0		6.0	4.0	6.0		
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00		
Frbp, ped/bikes	1.00	1.00			1.00	0.99		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		
Frt	1.00	0.97			1.00	0.85		1.00		1.00	1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00		
Satd. Flow (prot)	1627	1637			1731	1343		1671		1442	1680	1428		
Flt Permitted	0.45	1.00			1.00	1.00		0.90		0.53	1.00	1.00		
Satd. Flow (perm)	773	1637			1731	1343		1530		810	1680	1428		
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)	247	97	21	0	292	553	64	180	0	173	74	341		
RTOR Reduction (vph)	0	8	0	0	0	335	0	0	0	0	0	246		
Lane Group Flow (vph)	247	110	0	0	292	218	0	244	0	173	74	95		
Confl. Peds. (#/hr)	2		2	2		2								
Heavy Vehicles (%)	1%	0%	14%	0%	0%	8%	0%	3%	0%	14%	3%	3%		
Turn Type	pm+pt	NA			NA	Perm	Perm	NA		Perm	NA	Perm		
Protected Phases	7	4			8			2			6			
Permitted Phases	4			8		8	2			6		6		
Actuated Green, G (s)	38.4	38.4			27.5	27.5		19.4		19.4	19.4	19.4		
Effective Green, g (s)	38.4	40.4			29.5	27.5		21.4		19.4	21.4	19.4		
Actuated g/C Ratio	0.55	0.58			0.42	0.39		0.31		0.28	0.31	0.28		
Clearance Time (s)	3.0	6.0			6.0	6.0		6.0		6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0		
Lane Grp Cap (vph)	521	947			731	529		469		225	515	396		
v/s Ratio Prot	c0.05	0.07			0.17						0.04			
v/s Ratio Perm	c0.21					0.16		0.16		c0.21		0.07		
v/c Ratio	0.47	0.12			0.40	0.41		0.52		0.77	0.14	0.24		
Uniform Delay, d1	8.8	6.6			14.0	15.3		20.0		23.1	17.6	19.5		
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00		
Incremental Delay, d2	0.7	0.2			1.6	2.4		1.0		14.6	0.1	0.3		
Delay (s)	9.5	6.9			15.6	17.7		21.0		37.7	17.7	19.8		
Level of Service	A	A			B	B		C		D	B	B		
Approach Delay (s)		8.6			17.0			21.0			24.8			
Approach LOS		A			B			C			C			
Intersection Summary														
HCM 2000 Control Delay			18.2									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.56											
Actuated Cycle Length (s)			69.8							11.0				
Intersection Capacity Utilization			77.5%										ICU Level of Service	D
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
 5: Highway 58 & Townline Tunnel Road

























<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	24	7	143	48	509	16	567	344	255	401	17
Future Volume (vph)	19	24	7	143	48	509	16	567	344	255	401	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.97	1.00	
Fr _t	1.00	0.96		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1669		1411	1480		1552	1713	1375	2951	1704	
Fl _t Permitted	0.15	1.00		0.73	1.00		0.50	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	252	1669		1091	1480		818	1713	1375	2951	1704	
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)	21	26	8	155	52	553	17	616	374	277	436	18
RTOR Reduction (vph)	0	6	0	0	275	0	0	0	203	0	2	0
Lane Group Flow (vph)	21	28	0	155	330	0	17	616	171	277	452	0
Heavy Vehicles (%)	0%	0%	0%	10%	0%	1%	0%	1%	1%	2%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	22.9	22.9		22.9	22.9		36.6	36.6	36.6	10.8	50.4	
Effective Green, g (s)	25.9	25.9		25.9	25.9		40.3	40.3	40.3	10.8	54.1	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.46	0.46	0.46	0.12	0.61	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.7	7.7	7.7	3.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	74	491		321	435		374	784	629	362	1047	
v/s Ratio Prot		0.02			c0.22			c0.36		c0.09	0.27	
v/s Ratio Perm	0.08			0.14			0.02		0.12			
v/c Ratio	0.28	0.06		0.48	0.76		0.05	0.79	0.27	0.77	0.43	
Uniform Delay, d ₁	23.9	22.3		25.5	28.2		13.2	20.2	14.8	37.4	8.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	2.1	0.0		1.1	7.5		0.2	7.8	1.1	9.3	1.3	
Delay (s)	26.0	22.3		26.7	35.7		13.4	28.0	15.8	46.7	10.2	
Level of Service	C	C		C	D		B	C	B	D	B	
Approach Delay (s)		23.7			33.9			23.2			24.0	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay	26.6			HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio	0.77											
Actuated Cycle Length (s)	88.0			Sum of lost time (s)				11.0				
Intersection Capacity Utilization	87.6%			ICU Level of Service				E				
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT w widening Sc1> AM Peak Hour
07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	391	207	254	286	137	399	306	494	130	141	18
Future Volume (vph)	78	391	207	254	286	137	399	306	494	130	141	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1644	1545	1290	3038	1531	1414	1348	3192	1442	1628	3034	
Flt Permitted	0.57	1.00	1.00	0.95	1.00	1.00	0.56	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	989	1545	1290	3038	1531	1414	801	3192	1442	944	3034	
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)	85	425	225	276	311	149	434	333	537	141	153	20
RTOR Reduction (vph)	0	0	155	0	0	79	0	0	215	0	9	0
Lane Group Flow (vph)	85	425	70	276	311	70	434	333	322	141	164	0
Heavy Vehicles (%)	0%	12%	14%	5%	13%	4%	22%	3%	2%	1%	5%	18%
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	30.6	30.6	30.6	11.0	44.6	44.6	51.0	51.0	51.0	24.7	24.7	
Effective Green, g (s)	33.6	33.6	33.6	11.0	47.6	47.6	51.0	53.0	53.0	26.7	26.7	
Actuated g/C Ratio	0.31	0.31	0.31	0.10	0.44	0.44	0.47	0.49	0.49	0.25	0.25	
Clearance Time (s)	7.0	7.0	7.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	305	478	399	307	671	619	493	1557	703	232	745	
v/s Ratio Prot		c0.28		c0.09	0.20		c0.19	0.10			0.05	
v/s Ratio Perm	0.09		0.05			0.05	c0.22		0.22	0.15		
v/c Ratio	0.28	0.89	0.17	0.90	0.46	0.11	0.88	0.21	0.46	0.61	0.22	
Uniform Delay, d1	28.3	35.7	27.4	48.3	21.5	18.0	23.3	15.9	18.3	36.3	32.6	
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	0.5	17.9	0.2	27.0	0.5	0.1	16.6	0.3	2.1	11.3	0.7	
Delay (s)	28.8	53.7	27.6	75.2	22.0	18.1	39.9	16.2	20.5	47.6	33.3	
Level of Service	C	D	C	E	C	B	D	B	C	D	C	
Approach Delay (s)		42.8			41.2			25.8			39.7	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			34.9									C
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			108.6						14.0			
Intersection Capacity Utilization			79.0%									D
Analysis Period (min)			15									
c Critical Lane Group												



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	187	645	497	66	34	74
Future Volume (vph)	187	645	497	66	34	74
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1697	1697	1361	1644	1337
Flt Permitted	0.37	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	626	1697	1697	1361	1644	1337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	701	540	72	37	80
RTOR Reduction (vph)	0	0	0	32	0	57
Lane Group Flow (vph)	203	701	540	40	37	23
Heavy Vehicles (%)	2%	2%	2%	2%	0%	10%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	25.4	25.4	25.4	25.4	12.3	12.3
Effective Green, g (s)	27.4	27.4	27.4	27.4	14.3	14.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.29	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	345	935	935	750	473	384
v/s Ratio Prot		c0.41	0.32		c0.02	
v/s Ratio Perm	0.32			0.03		0.02
v/c Ratio	0.59	0.75	0.58	0.05	0.08	0.06
Uniform Delay, d1	7.4	8.5	7.3	5.2	12.9	12.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	3.3	0.9	0.0	0.3	0.3
Delay (s)	10.0	11.9	8.2	5.2	13.2	13.1
Level of Service	A	B	A	A	B	B
Approach Delay (s)		11.4	7.9		13.2	
Approach LOS		B	A		B	












Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road












<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	7	116	3	6	1	235	4	7	1	3	8
Future Volume (Veh/h)	4	7	116	3	6	1	235	4	7	1	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	8	126	3	7	1	255	4	8	1	3	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	8			134			103	93	71	102	156	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			134			103	93	71	102	156	8
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	7.2	6.6
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.6	3.6
p0 queue free %	100			100			70	99	99	100	100	99
cM capacity (veh/h)	1625			1463			863	797	997	869	630	979
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	138	11	267	13								
Volume Left	4	3	255	1								
Volume Right	126	1	8	9								
cSH	1625	1463	866	860								
Volume to Capacity	0.00	0.00	0.31	0.02								
Queue Length 95th (m)	0.1	0.0	10.0	0.3								
Control Delay (s)	0.2	2.0	11.0	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.2	2.0	11.0	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			36.7%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	11	17	911	4	5	524
Future Volume (Veh/h)	11	17	911	4	5	524
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)	12	18	990	4	5	570
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			199			389
pX, platoon unblocked						
vC, conflicting volume	1287	497			994	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1287	497			994	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	97			99	
cM capacity (veh/h)	157	524			704	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	30	660	334	195	380	
Volume Left	12	0	0	5	0	
Volume Right	18	0	4	0	0	
cSH	271	1700	1700	704	1700	
Volume to Capacity	0.11	0.39	0.20	0.01	0.22	
Queue Length 95th (m)	2.8	0.0	0.0	0.2	0.0	
Control Delay (s)	19.9	0.0	0.0	0.3	0.0	
Lane LOS	C			A		
Approach Delay (s)	19.9	0.0		0.1		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			37.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	11	17	898	4	5	530
Future Volume (Veh/h)	11	17	898	4	5	530
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)	12	18	976	4	5	576
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)			101			
pX, platoon unblocked						
vC, conflicting volume	1276	490			980	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1276	490			980	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	97			99	
cM capacity (veh/h)	160	529			712	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	30	651	329	197	384	
Volume Left	12	0	0	5	0	
Volume Right	18	0	4	0	0	
cSH	275	1700	1700	712	1700	
Volume to Capacity	0.11	0.38	0.19	0.01	0.23	
Queue Length 95th (m)	2.8	0.0	0.0	0.2	0.0	
Control Delay (s)	19.7	0.0	0.0	0.3	0.0	
Lane LOS	C			A		
Approach Delay (s)	19.7	0.0			0.1	
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			37.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	166	56	173	0	0	506
Future Volume (Veh/h)	166	56	173	0	0	506
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)	180	61	188	0	0	550
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	188				609	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				609	188
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				100	36
cM capacity (veh/h)	1398				402	859
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	180	61	188	550		
Volume Left	180	0	0	0		
Volume Right	0	0	0	550		
cSH	1398	1700	1700	859		
Volume to Capacity	0.13	0.04	0.11	0.64		
Queue Length 95th (m)	3.4	0.0	0.0	36.1		
Control Delay (s)	8.0	0.0	0.0	16.3		
Lane LOS	A			C		
Approach Delay (s)	5.9		0.0	16.3		
Approach LOS				C		
Intersection Summary						
Average Delay			10.6			
Intersection Capacity Utilization			63.9%		ICU Level of Service	B
Analysis Period (min)			15			













HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access

<2037 FT w widening Sc1> AM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	55	0	0	0	0	169
Future Volume (Veh/h)	55	0	0	0	0	169
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)	60	0	0	0	0	184
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	0				120	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				120	0
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				100	83
cM capacity (veh/h)	1636				848	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	60	0	184			
Volume Left	60	0	0			
Volume Right	0	0	184			
cSH	1636	1700	1091			
Volume to Capacity	0.04	0.00	0.17			
Queue Length 95th (m)	0.9	0.0	4.6			
Control Delay (s)	7.3	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			21.4%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	307	892	20	149	453
Future Volume (vph)	44	307	892	20	149	453
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3277		1644	3288
Flt Permitted	0.95	1.00	1.00		0.23	1.00
Satd. Flow (perm)	1644	1471	3277		398	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	334	970	22	162	492
RTOR Reduction (vph)	0	189	1	0	0	0
Lane Group Flow (vph)	48	145	991	0	162	492
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	14.5	14.5	61.2		71.2	71.2
Effective Green, g (s)	16.5	16.5	63.2		71.2	73.2
Actuated g/C Ratio	0.17	0.17	0.65		0.73	0.75
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	277	248	2119		379	2463
v/s Ratio Prot	0.03		c0.30		c0.03	0.15
v/s Ratio Perm		c0.10			0.28	
v/c Ratio	0.17	0.58	0.47		0.43	0.20
Uniform Delay, d1	34.8	37.4	8.7		5.3	3.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.3	3.5	0.7		0.8	0.2
Delay (s)	35.1	40.9	9.5		6.1	3.8
Level of Service	D	D	A		A	A
Approach Delay (s)	40.2		9.5			4.4
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			13.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			97.7		Sum of lost time (s)	11.0
Intersection Capacity Utilization			54.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	215	152	760	168	183	314
Future Volume (vph)	215	152	760	168	183	314
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	3288	1471	1644	3288
Flt Permitted	0.95	1.00	1.00	1.00	0.31	1.00
Satd. Flow (perm)	1644	1471	3288	1471	539	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	165	826	183	199	341
RTOR Reduction (vph)	0	126	0	49	0	0
Lane Group Flow (vph)	234	39	826	134	199	341
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	15.6	15.6	46.6	46.6	46.6	46.6
Effective Green, g (s)	17.6	17.6	48.6	48.6	48.6	48.6
Actuated g/C Ratio	0.24	0.24	0.65	0.65	0.65	0.65
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	389	348	2153	963	353	2153
v/s Ratio Prot	c0.14		0.25			0.10
v/s Ratio Perm		0.03		0.09	c0.37	
v/c Ratio	0.60	0.11	0.38	0.14	0.56	0.16
Uniform Delay, d1	25.2	22.2	5.9	4.9	7.0	4.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.1	0.5	0.3	6.4	0.2
Delay (s)	27.8	22.3	6.4	5.2	13.4	5.1
Level of Service	C	C	A	A	B	A
Approach Delay (s)	25.5		6.2			8.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			74.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			56.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	277	104	285	199	118	22
Future Volume (Veh/h)	277	104	285	199	118	22
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)	301	113	310	216	128	24
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			414		1194	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			414		1194	358
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		14	97
cM capacity (veh/h)			1156		150	691
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	414	526	152			
Volume Left	0	310	128			
Volume Right	113	0	24			
cSH	1700	1156	171			
Volume to Capacity	0.24	0.27	0.89			
Queue Length 95th (m)	0.0	8.3	49.2			
Control Delay (s)	0.0	6.6	96.6			
Lane LOS		A	F			
Approach Delay (s)	0.0	6.6	96.6			
Approach LOS			F			
Intersection Summary						
Average Delay			16.6			
Intersection Capacity Utilization			69.8%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access










<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	377	0	0	103	0	676	463	0	828	131	
Future Volume (vph)	0	0	377	0	0	103	0	676	463	0	828	131	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Frt			0.86			0.86		1.00	0.85		1.00	0.85	
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1497			1412		1713	1414		1713	1401	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1497			1412		1713	1414		1713	1401	
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)	0	0	410	0	0	112	0	735	503	0	900	142	
RTOR Reduction (vph)	0	0	121	0	0	85	0	0	190	0	0	54	
Lane Group Flow (vph)	0	0	289	0	0	27	0	735	313	0	900	88	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%	0%	1%	4%	0%	1%	5%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			12.4			12.4		35.0	35.0		35.0	35.0	
Effective Green, g (s)			14.4			14.4		37.0	37.0		37.0	37.0	
Actuated g/C Ratio			0.24			0.24		0.62	0.62		0.62	0.62	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			362			342		1067	880		1067	872	
v/s Ratio Prot								0.43			c0.53		
v/s Ratio Perm			c0.19			0.02			0.22			0.06	
v/c Ratio			0.80			0.08		0.69	0.36		0.84	0.10	
Uniform Delay, d1			21.1			17.4		7.4	5.4		8.9	4.5	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2			11.6			0.1		3.6	1.1		8.1	0.2	
Delay (s)			32.7			17.5		11.0	6.6		17.0	4.7	
Level of Service			C			B		B	A		B	A	
Approach Delay (s)		32.7			17.5			9.2			15.4		
Approach LOS		C			B			A			B		
Intersection Summary													
HCM 2000 Control Delay			15.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			59.4									Sum of lost time (s)	10.0
Intersection Capacity Utilization			79.3%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	224	77	29	420	64	407
Future Volume (Veh/h)	224	77	29	420	64	407
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)	243	84	32	457	70	442
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			327			806 285
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			327			806 285
tC, single (s)			4.1			6.5 6.2
tC, 2 stage (s)						
tF (s)			2.2			3.6 3.3
p0 queue free %			97			79 42
cM capacity (veh/h)			1244			333 759
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	327	489	512			
Volume Left	0	32	70			
Volume Right	84	0	442			
cSH	1700	1244	646			
Volume to Capacity	0.19	0.03	0.79			
Queue Length 95th (m)	0.0	0.6	59.4			
Control Delay (s)	0.0	0.8	28.5			
Lane LOS			A	D		
Approach Delay (s)	0.0	0.8	28.5			
Approach LOS			D			
Intersection Summary						
Average Delay			11.3			
Intersection Capacity Utilization			84.8%	ICU Level of Service		E
Analysis Period (min)			15			























HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w widening Sc1> PM Peak Hour
07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	311	295	60	0	176	329	35	104	0	555	169	253	
Future Volume (vph)	311	295	60	0	176	329	35	104	0	555	169	253	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)	3.0	4.0			4.0	6.0		4.0		3.0	4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00	
Frbp, ped/bikes	1.00	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	1.00	
Frt	1.00	0.97			1.00	0.85		1.00		1.00	1.00	0.85	
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1628	1680			1731	1471		1675		1644	1713	1456	
Flt Permitted	0.34	1.00			1.00	1.00		0.89		0.54	1.00	1.00	
Satd. Flow (perm)	589	1680			1731	1471		1505		929	1713	1456	
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)	338	321	65	0	191	358	38	113	0	603	184	275	
RTOR Reduction (vph)	0	7	0	0	0	300	0	0	0	0	0	128	
Lane Group Flow (vph)	338	379	0	0	191	58	0	151	0	603	184	147	
Confl. Peds. (#/hr)			2	2									
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	8%	0%	0%	0%	1%	1%	
Turn Type	pm+pt	NA			NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Actuated Green, G (s)	37.0	37.0			17.0	17.0		24.6		56.1	56.1	56.1	
Effective Green, g (s)	37.0	39.0			19.0	17.0		26.6		56.1	58.1	56.1	
Actuated g/C Ratio	0.35	0.37			0.18	0.16		0.25		0.53	0.55	0.53	
Clearance Time (s)	3.0	6.0			6.0	6.0		6.0		3.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	375	623			312	237		380		689	946	777	
v/s Ratio Prot	c0.15	0.23			0.11					c0.24	0.11		
v/s Ratio Perm	c0.17					0.04		0.10		c0.23		0.10	
v/c Ratio	0.90	0.61			0.61	0.24		0.40		0.88	0.19	0.19	
Uniform Delay, d1	28.9	26.8			39.7	38.4		32.6		18.9	11.8	12.7	
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00	
Incremental Delay, d2	23.9	1.7			3.5	0.5		3.1		12.0	0.5	0.5	
Delay (s)	52.8	28.5			43.2	39.0		35.7		30.8	12.2	13.2	
Level of Service	D	C			D	D		D		C	B	B	
Approach Delay (s)		39.9			40.4			35.7			23.1		
Approach LOS		D			D			D			C		
Intersection Summary													
HCM 2000 Control Delay			32.6									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.90										
Actuated Cycle Length (s)			105.1									Sum of lost time (s)	14.0
Intersection Capacity Utilization			81.0%									ICU Level of Service	D
Analysis Period (min)			15										
c	Critical Lane Group												

























HCM Signalized Intersection Capacity Analysis
 5: Highway 58 & Townline Tunnel Road

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

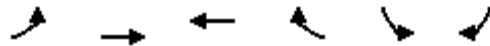
														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	39	58	17	353	37	385	0	572	232	531	645	16		
Future Volume (vph)	39	58	17	353	37	385	0	572	232	531	645	16		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5		
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	4.0	3.0	4.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.97	1.00			
Frbp, ped/bikes	1.00	0.99		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	1.00			
Frt	1.00	0.97		1.00	0.86			1.00	0.85	1.00	1.00			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (prot)	1552	1664		1505	1404			1731	1298	2980	1708			
Flt Permitted	0.50	1.00		0.55	1.00			1.00	1.00	0.95	1.00			
Satd. Flow (perm)	815	1664		865	1404			1731	1298	2980	1708			
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)	42	63	18	384	40	418	0	622	252	577	701	17		
RTOR Reduction (vph)	0	9	0	0	274	0	0	0	93	0	0	0		
Lane Group Flow (vph)	42	72	0	384	184	0	0	622	159	577	718	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	0%	0%	0%	3%	0%	7%	0%	0%	7%	1%	1%	0%		
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Prot	NA			
Protected Phases		4		3	8			2		1	6			
Permitted Phases	4			8			2		2					
Actuated Green, G (s)	15.4	15.4		41.0	41.0			42.6	42.6	26.2	71.8			
Effective Green, g (s)	18.4	18.4		41.0	44.0			46.3	46.3	26.2	75.5			
Actuated g/C Ratio	0.14	0.14		0.32	0.35			0.36	0.36	0.21	0.59			
Clearance Time (s)	7.0	7.0		3.0	7.0			7.7	7.7	3.0	7.7			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	117	240		391	484			628	471	612	1011			
v/s Ratio Prot		0.04		c0.17	0.13			c0.36		c0.19	0.42			
v/s Ratio Perm	0.05			c0.14					0.12					
v/c Ratio	0.36	0.30		0.98	0.38			0.99	0.34	0.94	0.71			
Uniform Delay, d1	49.2	48.8		40.8	31.5			40.4	29.5	49.9	18.3			
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00			
Incremental Delay, d2	1.9	0.7		40.5	0.5			33.7	1.9	23.1	4.2			
Delay (s)	51.1	49.5		81.3	32.0			74.0	31.4	73.0	22.5			
Level of Service	D	D		F	C			E	C	E	C			
Approach Delay (s)		50.1			54.5			61.7			45.0			
Approach LOS		D			D			E			D			
Intersection Summary														
HCM 2000 Control Delay			52.4									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.97											
Actuated Cycle Length (s)			127.5								14.0			
Intersection Capacity Utilization			99.8%										ICU Level of Service	F
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
 6: Canal Bank Street & Townline Tunnel Road

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	372	407	504	500	174	279	222	355	123	328	67
Future Volume (vph)	91	372	407	504	500	174	279	222	355	123	328	67
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	0.0	3.0	4.0	4.0	3.0	4.0	4.0	6.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	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	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1644	1559	1471	3189	1559	1442	1644	3224	1471	1596	3115	
Flt Permitted	0.46	1.00	1.00	0.95	1.00	1.00	0.31	1.00	1.00	0.60	1.00	
Satd. Flow (perm)	799	1559	1471	3189	1559	1442	531	3224	1471	1011	3115	
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)	99	404	442	548	543	189	303	241	386	134	357	73
RTOR Reduction (vph)	0	0	48	0	0	57	0	0	227	0	15	0
Lane Group Flow (vph)	99	404	394	548	543	132	303	241	159	134	415	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	11%	0%	0%	11%	2%	0%	2%	0%	3%	3%	0%
Turn Type	Perm	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4	5	3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	28.6	28.6	43.6	20.8	52.4	52.4	42.6	42.6	42.6	24.6	24.6	
Effective Green, g (s)	31.6	31.6	49.6	20.8	55.4	55.4	42.6	44.6	44.6	24.6	26.6	
Actuated g/C Ratio	0.29	0.29	0.46	0.19	0.51	0.51	0.39	0.41	0.41	0.23	0.25	
Clearance Time (s)	7.0	7.0	3.0	3.0	7.0	7.0	3.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	233	456	675	614	799	739	364	1331	607	230	767	
v/s Ratio Prot		c0.26	0.10	c0.17	0.35		c0.12	0.07			0.13	
v/s Ratio Perm	0.12		0.17			0.09	c0.21		0.11	0.13		
v/c Ratio	0.42	0.89	0.58	0.89	0.68	0.18	0.83	0.18	0.26	0.58	0.54	
Uniform Delay, d1	30.9	36.5	21.6	42.5	19.7	14.1	25.1	20.1	20.9	37.1	35.4	
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	18.3	1.3	15.2	2.3	0.1	14.9	0.3	1.1	10.4	2.7	
Delay (s)	32.1	54.8	22.9	57.8	22.0	14.2	40.0	20.4	21.9	47.5	38.1	
Level of Service	C	D	C	E	C	B	D	C	C	D	D	
Approach Delay (s)		37.5			36.2			27.4			40.3	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			34.9		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			108.0		Sum of lost time (s)				14.0			
Intersection Capacity Utilization			92.9%		ICU Level of Service				F			
Analysis Period (min)			15									

c Critical Lane Group



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	126	598	716	49	99	131
Future Volume (vph)	126	598	716	49	99	131
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1596	1697	1680	1274	1644	1471
Flt Permitted	0.22	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	369	1697	1680	1274	1644	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	650	778	53	108	142
RTOR Reduction (vph)	0	0	0	22	0	105
Lane Group Flow (vph)	137	650	778	31	108	37
Heavy Vehicles (%)	3%	2%	3%	9%	0%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	28.0	28.0	28.0	28.0	11.3	11.3
Effective Green, g (s)	30.0	30.0	30.0	30.0	13.3	13.3
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	992	982	745	426	381
v/s Ratio Prot		0.38	c0.46		c0.07	
v/s Ratio Perm	0.37			0.02		0.03
v/c Ratio	0.64	0.66	0.79	0.04	0.25	0.10
Uniform Delay, d1	7.0	7.2	8.2	4.5	15.1	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	1.6	4.4	0.0	1.4	0.5
Delay (s)	13.1	8.7	12.7	4.6	16.5	14.9
Level of Service	B	A	B	A	B	B
Approach Delay (s)		9.5	12.2		15.6	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	51.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group












HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	10	218	8	15	0	169	0	7	1	3	6
Future Volume (Veh/h)	2	10	218	8	15	0	169	0	7	1	3	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	11	237	9	16	0	184	0	8	1	3	7
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	16			248			176	168	130	176	286	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			248			176	168	130	176	286	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			76	100	99	100	100	99
cM capacity (veh/h)	1615			1330			769	723	926	780	622	1069
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	250	25	192	11								
Volume Left	2	9	184	1								
Volume Right	237	0	8	7								
cSH	1615	1330	775	869								
Volume to Capacity	0.00	0.01	0.25	0.01								
Queue Length 95th (m)	0.0	0.2	7.4	0.3								
Control Delay (s)	0.1	2.8	11.2	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.8	11.2	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.9									
Intersection Capacity Utilization			39.3%		ICU Level of Service				A			
Analysis Period (min)			15									












HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	8	11	731	12	19	980
Future Volume (Veh/h)	8	11	731	12	19	980
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)	9	12	795	13	21	1065
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			199			
pX, platoon unblocked						
vC, conflicting volume	1376	404			808	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1376	404			808	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			97	
cM capacity (veh/h)	135	602			826	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	21	530	278	376	710	
Volume Left	9	0	0	21	0	
Volume Right	12	0	13	0	0	
cSH	243	1700	1700	826	1700	
Volume to Capacity	0.09	0.31	0.16	0.03	0.42	
Queue Length 95th (m)	2.1	0.0	0.0	0.6	0.0	
Control Delay (s)	21.2	0.0	0.0	0.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.2	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			54.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	8	11	732	12	19	969
Future Volume (Veh/h)	8	11	732	12	19	969
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)	9	12	796	13	21	1053
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1371	404			809	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371	404			809	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			97	
cM capacity (veh/h)	136	601			825	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	21	531	278	372	702	
Volume Left	9	0	0	21	0	
Volume Right	12	0	13	0	0	
cSH	244	1700	1700	825	1700	
Volume to Capacity	0.09	0.31	0.16	0.03	0.41	
Queue Length 95th (m)	2.1	0.0	0.0	0.6	0.0	
Control Delay (s)	21.1	0.0	0.0	0.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.1	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			53.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	190	112	0	0	327
Future Volume (Veh/h)	558	190	112	0	0	327
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)	607	207	122	0	0	355
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	122				1543	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				1543	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	59				100	62
cM capacity (veh/h)	1478				75	935
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	607	207	122	355		
Volume Left	607	0	0	0		
Volume Right	0	0	0	355		
cSH	1478	1700	1700	935		
Volume to Capacity	0.41	0.12	0.07	0.38		
Queue Length 95th (m)	15.6	0.0	0.0	13.6		
Control Delay (s)	9.1	0.0	0.0	11.2		
Lane LOS	A			B		
Approach Delay (s)	6.8		0.0	11.2		
Approach LOS				B		
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			68.9%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access













<2037 FT w widening Sc1> PM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	186	0	0	0	0	109
Future Volume (Veh/h)	186	0	0	0	0	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)	202	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				404	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				404	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				100	89
cM capacity (veh/h)	1636				532	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	202	0	118			
Volume Left	202	0	0			
Volume Right	0	0	118			
cSH	1636	1700	1091			
Volume to Capacity	0.12	0.00	0.11			
Queue Length 95th (m)	3.2	0.0	2.8			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			25.2%		ICU Level of Service	A
Analysis Period (min)			15			

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	28	202	654	39	278	961
Future Volume (vph)	28	202	654	39	278	961
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3261		1644	3288
Flt Permitted	0.95	1.00	1.00		0.35	1.00
Satd. Flow (perm)	1644	1471	3261		611	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	220	711	42	302	1045
RTOR Reduction (vph)	0	181	4	0	0	0
Lane Group Flow (vph)	30	39	749	0	302	1045
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	10.5	10.5	48.6		48.6	48.6
Effective Green, g (s)	12.5	12.5	50.6		50.6	50.6
Actuated g/C Ratio	0.18	0.18	0.71		0.71	0.71
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	289	258	2320		434	2339
v/s Ratio Prot	0.02		0.23			0.32
v/s Ratio Perm		c0.03			c0.49	
v/c Ratio	0.10	0.15	0.32		0.70	0.45
Uniform Delay, d1	24.6	24.8	3.8		5.9	4.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.3	0.4		8.9	0.6
Delay (s)	24.8	25.1	4.2		14.8	5.0
Level of Service	C	C	A		B	A
Approach Delay (s)	25.0		4.2			7.2
Approach LOS	C		A			A

Intersection Summary				
HCM 2000 Control Delay		8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.59		
Actuated Cycle Length (s)		71.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization		56.0%	ICU Level of Service	B
Analysis Period (min)		15		
c Critical Lane Group				

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	244	207	486	256	234	755
Future Volume (vph)	244	207	486	256	234	755
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1471	3288	1471	1644	3288
Flt Permitted	0.95	1.00	1.00	1.00	0.45	1.00
Satd. Flow (perm)	1644	1471	3288	1471	775	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	225	528	278	254	821
RTOR Reduction (vph)	0	169	0	99	0	0
Lane Group Flow (vph)	265	56	528	179	254	821
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.6	16.6	46.1	46.1	46.1	46.1
Effective Green, g (s)	18.6	18.6	48.1	48.1	48.1	48.1
Actuated g/C Ratio	0.25	0.25	0.64	0.64	0.64	0.64
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	409	366	2117	947	499	2117
v/s Ratio Prot	c0.16		0.16			0.25
v/s Ratio Perm		0.04		0.12	c0.33	
v/c Ratio	0.65	0.15	0.25	0.19	0.51	0.39
Uniform Delay, d1	25.1	21.9	5.6	5.4	7.0	6.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.2	0.3	0.4	3.7	0.5
Delay (s)	28.6	22.1	5.9	5.8	10.7	6.8
Level of Service	C	C	A	A	B	A
Approach Delay (s)	25.6		5.9			7.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.8		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.55			
Actuated Cycle Length (s)			74.7		Sum of lost time (s)	8.0
Intersection Capacity Utilization			53.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

***C-14 2037 FUTURE
TOTAL SC2***

HCM Unsignalized Intersection Capacity Analysis
1: Nugent Road & Forks Road

<2037 FT Sc2> AM Peak Hour
07/08/2020





















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	232	62	3	92	176	55
Future Volume (Veh/h)	232	62	3	92	176	55
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)	252	67	3	100	191	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)						
pX, platoon unblocked						
vC, conflicting volume			319		392	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			319		392	286
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			100		67	92
cM capacity (veh/h)			1252		587	728
Direction, Lane #						
	EB 1	WB 1	NB 1			
Volume Total	319	103	251			
Volume Left	0	3	191			
Volume Right	67	0	60			
cSH	1700	1252	615			
Volume to Capacity	0.19	0.00	0.41			
Queue Length 95th (m)	0.0	0.1	15.1			
Control Delay (s)	0.0	0.2	14.8			
Lane LOS			A	B		
Approach Delay (s)	0.0	0.2	14.8			
Approach LOS			B			
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			38.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 2: Highway 58 & Forks Road Access

<2037 FT Sc2> AM Peak Hour

07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	67	0	0	264	0	883	78	0	853	244	
Future Volume (vph)	0	0	67	0	0	264	0	883	78	0	853	244	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Frt			0.86			0.86		1.00	0.85		1.00	0.85	
Flt Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1325			1412		1664	1325		1664	1325	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1325			1412		1664	1325		1664	1325	
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)	0	0	73	0	0	287	0	960	85	0	927	265	
RTOR Reduction (vph)	0	0	60	0	0	155	0	0	24	0	0	76	
Lane Group Flow (vph)	0	0	13	0	0	132	0	960	61	0	927	189	
Heavy Vehicles (%)	0%	0%	13%	0%	0%	6%	0%	4%	11%	0%	4%	11%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			10.0			10.0		48.0	48.0		48.0	48.0	
Effective Green, g (s)			12.0			12.0		50.0	50.0		50.0	50.0	
Actuated g/C Ratio			0.17			0.17		0.71	0.71		0.71	0.71	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			227			242		1188	946		1188	946	
v/s Ratio Prot								c0.58			0.56		
v/s Ratio Perm			0.01			c0.09			0.05			0.14	
v/c Ratio			0.06			0.55		0.81	0.06		0.78	0.20	
Uniform Delay, d1			24.3			26.5		6.8	3.0		6.5	3.3	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2			0.1			2.5		6.0	0.1		5.1	0.5	
Delay (s)			24.4			29.0		12.7	3.1		11.6	3.8	
Level of Service			C			C		B	A		B	A	
Approach Delay (s)		24.4			29.0			11.9			9.8		
Approach LOS		C			C			B			A		
Intersection Summary													
HCM 2000 Control Delay			13.2									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.78										
Actuated Cycle Length (s)			70.0									Sum of lost time (s)	10.0
Intersection Capacity Utilization			74.9%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 3: Highway 58 Access & Forks Road


















<2037 FT Sc2> AM Peak Hour
 07/08/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	88	214	66	21	74	6
Future Volume (Veh/h)	88	214	66	21	74	6
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)	96	233	72	23	80	7
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			329		380	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			329		380	212
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			94		86	99
cM capacity (veh/h)			1214		575	833
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	329	95	87			
Volume Left	0	72	80			
Volume Right	233	0	7			
cSH	1700	1214	589			
Volume to Capacity	0.19	0.06	0.15			
Queue Length 95th (m)	0.0	1.4	3.9			
Control Delay (s)	0.0	6.3	12.2			
Lane LOS			A	B		
Approach Delay (s)	0.0	6.3	12.2			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			39.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road























<2037 FT Sc2> AM Peak Hour
07/08/2020

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	2	0	1	0	0	768	1	228	2	257	110	2		
Future Volume (vph)	2	0	1	0	0	768	1	228	2	257	110	2		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0			
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00			
Frbp, ped/bikes		0.99			1.00			1.00		1.00	1.00			
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00			
Frt		0.95			0.86			1.00		1.00	1.00			
Flt Protected		0.97			1.00			1.00		0.95	1.00			
Satd. Flow (prot)		1190			1439			1711		1391	1645			
Flt Permitted		0.68			1.00			1.00		0.37	1.00			
Satd. Flow (perm)		840			1439			1710		548	1645			
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)	2	0	1	0	0	835	1	248	2	279	120	2		
RTOR Reduction (vph)	0	2	0	0	346	0	0	1	0	0	1	0		
Lane Group Flow (vph)	0	1	0	0	489	0	0	250	0	279	121	0		
Confl. Peds. (#/hr)			2	2					5	5				
Heavy Vehicles (%)	50%	0%	0%	0%	0%	4%	0%	1%	0%	18%	5%	0%		
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA			
Protected Phases		4			8			2		1	6			
Permitted Phases	4			8			2			6				
Actuated Green, G (s)		24.6			24.6			14.5		26.0	26.0			
Effective Green, g (s)		26.6			26.6			16.5		26.0	28.0			
Actuated g/C Ratio		0.42			0.42			0.26		0.42	0.45			
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)		356			611			450		342	735			
v/s Ratio Prot					c0.34					c0.11	0.07			
v/s Ratio Perm		0.00						0.15		c0.23				
v/c Ratio		0.00			0.80			0.56		0.82	0.16			
Uniform Delay, d1		10.4			15.7			19.9		15.0	10.3			
Progression Factor		1.00			1.00			1.00		1.00	1.00			
Incremental Delay, d2		0.0			10.6			1.5		13.9	0.1			
Delay (s)		10.4			26.3			21.4		28.8	10.4			
Level of Service		B			C			C		C	B			
Approach Delay (s)		10.4			26.3			21.4			23.2			
Approach LOS		B			C			C			C			
Intersection Summary														
HCM 2000 Control Delay			24.6									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.82											
Actuated Cycle Length (s)			62.6							11.0				
Intersection Capacity Utilization			91.1%										ICU Level of Service	F
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FT Sc2> AM Peak Hour

























07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	23	7	715	58	509	23	568	585	300	399	20
Future Volume (vph)	11	23	7	715	58	509	23	568	585	300	399	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0	
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	1.00	1.00	0.97	1.00	
Flt	1.00	0.96		1.00	0.87		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1424	1539		2787	1433		1492	1697	1274	2923	1670	
Flt Permitted	0.43	1.00		0.95	1.00		0.50	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	646	1539		2787	1433		785	1697	1274	2923	1670	
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	25	8	777	63	553	25	617	636	326	434	22
RTOR Reduction (vph)	0	7	0	0	186	0	0	0	205	0	1	0
Lane Group Flow (vph)	12	26	0	777	430	0	25	617	431	326	455	0
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA	
Protected Phases		4		3	8			2	3	1	6	
Permitted Phases	4						2		2			
Actuated Green, G (s)	11.4	11.4		32.5	47.9		39.9	39.9	72.4	12.2	56.1	
Effective Green, g (s)	14.4	14.4		32.5	50.9		43.6	43.6	79.8	12.2	59.8	
Actuated g/C Ratio	0.12	0.12		0.27	0.43		0.37	0.37	0.67	0.10	0.50	
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	78	186		763	614		288	623	856	300	841	
v/s Ratio Prot		0.02		c0.28	c0.30			c0.36	0.15	c0.11	0.27	
v/s Ratio Perm	0.02						0.03		0.18			
v/c Ratio	0.15	0.14		1.02	0.70		0.09	0.99	0.50	1.09	0.54	
Uniform Delay, d1	46.7	46.6		43.1	27.7		24.5	37.3	9.6	53.2	20.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.3		37.3	3.6		0.6	33.8	0.5	77.1	2.5	
Delay (s)	47.6	47.0		80.4	31.3		25.1	71.1	10.1	130.3	22.6	
Level of Service	D	D		F	C		C	E	B	F	C	
Approach Delay (s)		47.1			58.7			39.9			67.5	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			53.6				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			118.7			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			89.2%			ICU Level of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT Sc2> AM Peak Hour
07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	360	475	239	325	126	939	315	458	106	133	17
Future Volume (vph)	32	360	475	239	325	126	939	315	458	106	133	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1581	1648	1471	3097	1588	1471	3189	1713	1471	1644	1687	
Flt Permitted	0.55	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	910	1648	1471	3097	1588	1471	3189	1713	1471	961	1687	
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)	35	391	516	260	353	137	1021	342	498	115	145	18
RTOR Reduction (vph)	0	0	0	0	0	57	0	0	174	0	4	0
Lane Group Flow (vph)	35	391	516	260	353	80	1021	342	324	115	159	0
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		Free			8			2	6		
Actuated Green, G (s)	26.0	26.0	120.0	10.5	40.5	40.5	38.5	66.5	66.5	24.0	24.0	
Effective Green, g (s)	29.0	29.0	120.0	10.5	43.5	43.5	38.5	68.5	68.5	26.0	26.0	
Actuated g/C Ratio	0.24	0.24	1.00	0.09	0.36	0.36	0.32	0.57	0.57	0.22	0.22	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	219	398	1471	270	575	533	1023	977	839	208	365	
v/s Ratio Prot		c0.24		c0.08	0.22		c0.32	0.20			0.09	
v/s Ratio Perm	0.04		0.35			0.05			0.22	c0.12		
v/c Ratio	0.16	0.98	0.35	0.96	0.61	0.15	1.00	0.35	0.39	0.55	0.44	
Uniform Delay, d1	35.9	45.2	0.0	54.6	31.4	25.8	40.7	13.8	14.2	41.8	40.7	
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	0.3	40.2	0.7	44.3	1.9	0.1	27.4	1.0	1.3	10.2	3.8	
Delay (s)	36.2	85.5	0.7	98.9	33.3	25.9	68.2	14.8	15.5	52.0	44.4	
Level of Service	D	F	A	F	C	C	E	B	B	D	D	
Approach Delay (s)		37.2			54.7			44.3			47.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			44.8		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					16.0		
Intersection Capacity Utilization			86.4%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2037 FT Sc2> AM Peak Hour
07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷	↷	↶	↷
Traffic Volume (vph)	180	698	492	66	35	78
Future Volume (vph)	180	698	492	66	35	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1633	1664	1310	1468	1471
Flt Permitted	0.35	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	579	1633	1664	1310	1468	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	759	535	72	38	85
RTOR Reduction (vph)	0	0	0	34	0	57
Lane Group Flow (vph)	196	759	535	38	38	28
Heavy Vehicles (%)	5%	6%	4%	6%	12%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	28.6	28.6	28.6	28.6	17.1	17.1
Effective Green, g (s)	30.6	30.6	30.6	30.6	19.1	19.1
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.33	0.33
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	307	866	882	694	485	486
v/s Ratio Prot		c0.46	0.32		c0.03	
v/s Ratio Perm	0.34			0.03		0.02
v/c Ratio	0.64	0.88	0.61	0.06	0.08	0.06
Uniform Delay, d1	9.6	11.9	9.4	6.6	13.3	13.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	9.9	1.2	0.0	0.3	0.2
Delay (s)	13.9	21.8	10.6	6.6	13.6	13.4
Level of Service	B	C	B	A	B	B
Approach Delay (s)		20.2	10.1		13.4	
Approach LOS		C	B		B	













Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	57.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group










HCM Unsignalized Intersection Capacity Analysis
 8: Reaker Road & Netherby Road

<2037 FT Sc2> AM Peak Hour
 07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	7	112	3	4	0	242	0	6	0	1	7
Future Volume (Veh/h)	1	7	112	3	4	0	242	0	6	0	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	8	122	3	4	0	263	0	7	0	1	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	4			130			90	81	69	88	142	4
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			130			90	81	69	88	142	4
tC, single (s)	4.1			4.6			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			70	100	99	100	100	99
cM capacity (veh/h)	1631			1207			876	811	1000	894	751	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	131	7	270	9								
Volume Left	1	3	263	0								
Volume Right	122	0	7	8								
cSH	1631	1207	879	1034								
Volume to Capacity	0.00	0.00	0.31	0.01								
Queue Length 95th (m)	0.0	0.1	9.9	0.2								
Control Delay (s)	0.1	3.4	10.9	8.5								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	3.4	10.9	8.5								
Approach LOS			B	A								
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			36.3%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2037 FT Sc2> AM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	1007	4	5	352
Future Volume (Veh/h)	11	17	1007	4	5	352
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)	12	18	1095	4	5	383
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	199			389		
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	1490	1097			1099	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1489	1057			1059	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	93			99	
cM capacity (veh/h)	124	251			605	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	1099	388			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	178	1700	605			
Volume to Capacity	0.17	0.65	0.01			
Queue Length 95th (m)	4.5	0.0	0.2			
Control Delay (s)	29.2	0.0	0.3			
Lane LOS	D		A			
Approach Delay (s)	29.2	0.0	0.3			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			67.8%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FT Sc2> AM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	17	994	4	5	358
Future Volume (Veh/h)	11	17	994	4	5	358
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)	12	18	1080	4	5	389
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	101					
pX, platoon unblocked	0.89	0.89			0.89	
vC, conflicting volume	1481	1082			1084	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1479	1028			1030	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	93			99	
cM capacity (veh/h)	123	254			604	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	30	1084	394			
Volume Left	12	0	5			
Volume Right	18	4	0			
cSH	178	1700	604			
Volume to Capacity	0.17	0.64	0.01			
Queue Length 95th (m)	4.5	0.0	0.2			
Control Delay (s)	29.3	0.0	0.3			
Lane LOS	D		A			
Approach Delay (s)	29.3	0.0	0.3			
Approach LOS	D					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			67.1%	ICU Level of Service		C
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2037 FT Sc2> AM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	166	56	173	0	0	506
Future Volume (Veh/h)	166	56	173	0	0	506
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)	180	61	188	0	0	550
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	188				609	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				609	188
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				100	36
cM capacity (veh/h)	1398				402	859
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	180	61	188	550		
Volume Left	180	0	0	0		
Volume Right	0	0	0	550		
cSH	1398	1700	1700	859		
Volume to Capacity	0.13	0.04	0.11	0.64		
Queue Length 95th (m)	3.4	0.0	0.0	36.1		
Control Delay (s)	8.0	0.0	0.0	16.3		
Lane LOS	A			C		
Approach Delay (s)	5.9		0.0	16.3		
Approach LOS				C		
Intersection Summary						
Average Delay			10.6			
Intersection Capacity Utilization			63.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2037 FT Sc2> AM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	55	0	0	0	0	169
Future Volume (Veh/h)	55	0	0	0	0	169
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)	60	0	0	0	0	184
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	0				120	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				120	0
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				100	83
cM capacity (veh/h)	1636				848	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	60	0	184			
Volume Left	60	0	0			
Volume Right	0	0	184			
cSH	1636	1700	1091			
Volume to Capacity	0.04	0.00	0.17			
Queue Length 95th (m)	0.9	0.0	4.6			
Control Delay (s)	7.3	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			21.4%	ICU Level of Service		A
Analysis Period (min)			15			












HCM Signalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2037 FT Sc2> AM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	421	1291	7	238	609
Future Volume (vph)	5	421	1291	7	238	609
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3285		1644	3288
Flt Permitted	0.95	1.00	1.00		0.08	1.00
Satd. Flow (perm)	1644	1471	3285		143	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	458	1403	8	259	662
RTOR Reduction (vph)	0	230	0	0	0	0
Lane Group Flow (vph)	5	228	1411	0	259	662
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.8	17.8	45.4		61.3	61.3
Effective Green, g (s)	19.8	19.8	47.4		61.3	63.3
Actuated g/C Ratio	0.22	0.22	0.52		0.67	0.69
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	357	319	1709		308	2284
v/s Ratio Prot	0.00		0.43		c0.12	0.20
v/s Ratio Perm		c0.15			c0.45	
v/c Ratio	0.01	0.71	0.83		0.84	0.29
Uniform Delay, d1	28.0	33.0	18.4		24.8	5.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	7.4	4.7		18.3	0.3
Delay (s)	28.0	40.4	23.1		43.1	5.6
Level of Service	C	D	C		D	A
Approach Delay (s)	40.3		23.1			16.2
Approach LOS	D		C			B
Intersection Summary						
HCM 2000 Control Delay			23.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.81			
Actuated Cycle Length (s)			91.1		Sum of lost time (s)	11.0
Intersection Capacity Utilization			74.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						











HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2037 FT Sc2> AM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	285	1013	11	264	350
Future Volume (vph)	7	285	1013	11	264	350
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3283		1644	3288
Flt Permitted	0.95	1.00	1.00		0.18	1.00
Satd. Flow (perm)	1644	1471	3283		303	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	310	1101	12	287	380
RTOR Reduction (vph)	0	233	1	0	0	0
Lane Group Flow (vph)	8	77	1112	0	287	380
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	11.9	11.9	49.5		64.1	64.1
Effective Green, g (s)	13.9	13.9	51.5		64.1	66.1
Actuated g/C Ratio	0.16	0.16	0.59		0.73	0.75
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	259	232	1921		397	2469
v/s Ratio Prot	0.00		0.34		c0.10	0.12
v/s Ratio Perm		c0.05			c0.43	
v/c Ratio	0.03	0.33	0.58		0.72	0.15
Uniform Delay, d1	31.4	32.9	11.4		8.4	3.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.8	1.3		6.4	0.1
Delay (s)	31.4	33.8	12.7		14.8	3.2
Level of Service	C	C	B		B	A
Approach Delay (s)	33.7		12.7			8.2
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			14.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	11.0
Intersection Capacity Utilization			65.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 1: Nugent Road & Forks Road



















<2037 FT Sc2> PM Peak Hour
 07/08/2020

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	243	109	1	63	214	50
Future Volume (Veh/h)	243	109	1	63	214	50
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)	264	118	1	68	233	54
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			382		393	323
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			382		393	323
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		61	93
cM capacity (veh/h)			1188		601	723
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	382	69	287			
Volume Left	0	1	233			
Volume Right	118	0	54			
cSH	1700	1188	621			
Volume to Capacity	0.22	0.00	0.46			
Queue Length 95th (m)	0.0	0.0	18.5			
Control Delay (s)	0.0	0.1	15.7			
Lane LOS			A	C		
Approach Delay (s)	0.0	0.1	15.7			
Approach LOS			C			
Intersection Summary						
Average Delay			6.1			
Intersection Capacity Utilization			43.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
2: Highway 58 & Forks Road Access

<2037 FT Sc2> PM Peak Hour

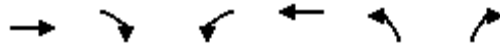
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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	0	99	0	0	291	0	984	55	0	1015	213	
Future Volume (vph)	0	0	99	0	0	291	0	984	55	0	1015	213	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Total Lost time (s)			4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Fr _t			0.86			0.86		1.00	0.85		1.00	0.85	
Fl _t Protected			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (prot)			1412			1468		1713	1247		1713	1428	
Fl _t Permitted			1.00			1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)			1412			1468		1713	1247		1713	1428	
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)	0	0	108	0	0	316	0	1070	60	0	1103	232	
RTOR Reduction (vph)	0	0	92	0	0	147	0	0	14	0	0	55	
Lane Group Flow (vph)	0	0	16	0	0	169	0	1070	46	0	1103	177	
Heavy Vehicles (%)	0%	0%	6%	0%	0%	2%	0%	1%	18%	0%	1%	3%	
Turn Type			Perm			Perm		NA	Perm		NA	Perm	
Protected Phases								2			6		
Permitted Phases			4			8			2			6	
Actuated Green, G (s)			11.2			11.2		66.5	66.5		66.5	66.5	
Effective Green, g (s)			13.2			13.2		68.5	68.5		68.5	68.5	
Actuated g/C Ratio			0.15			0.15		0.76	0.76		0.76	0.76	
Clearance Time (s)			6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)			3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)			207			216		1308	952		1308	1090	
v/s Ratio Prot								0.62			c0.64		
v/s Ratio Perm			0.01			c0.12			0.04			0.12	
v/c Ratio			0.08			0.78		0.82	0.05		0.84	0.16	
Uniform Delay, d ₁			33.0			36.9		6.7	2.6		7.0	2.9	
Progression Factor			1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d ₂			0.2			16.8		5.8	0.1		6.8	0.3	
Delay (s)			33.2			53.7		12.5	2.7		13.8	3.2	
Level of Service			C			D		B	A		B	A	
Approach Delay (s)		33.2			53.7			11.9			11.9		
Approach LOS		C			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			17.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			89.7									Sum of lost time (s)	10.0
Intersection Capacity Utilization			82.5%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
3: Highway 58 Access & Forks Road

<2037 FT Sc2> PM Peak Hour
07/08/2020




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (veh/h)	80	220	81	15	55	4
Future Volume (Veh/h)	80	220	81	15	55	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)	87	239	88	16	60	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			326		398	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			326		398	206
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		89	100
cM capacity (veh/h)			1245		562	839
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	326	104	64			
Volume Left	0	88	60			
Volume Right	239	0	4			
cSH	1700	1245	574			
Volume to Capacity	0.19	0.07	0.11			
Queue Length 95th (m)	0.0	1.7	2.8			
Control Delay (s)	0.0	7.0	12.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	7.0	12.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			38.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT Sc2> PM Peak Hour

07/08/2020

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	0	0	499	0	145	1	832	272	1
Future Volume (vph)	1	0	0	0	0	499	0	145	1	832	272	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		1.00			0.98			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		1.00			0.86			1.00		1.00	1.00	
Flt Protected		0.95			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1643			1356			1729		1644	1730	
Flt Permitted		0.33			1.00			1.00		0.55	1.00	
Satd. Flow (perm)		577			1356			1729		943	1730	
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)	1	0	0	0	0	542	0	158	1	904	296	1
RTOR Reduction (vph)	0	0	0	0	459	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	83	0	0	159	0	904	297	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.0			10.0			22.0		56.0	56.0	
Effective Green, g (s)		12.0			12.0			24.0		56.0	58.0	
Actuated g/C Ratio		0.15			0.15			0.31		0.72	0.74	
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		88			208			532		955	1286	
v/s Ratio Prot					c0.06			0.09		c0.38	0.17	
v/s Ratio Perm		0.00								c0.30		
v/c Ratio		0.01			0.40			0.30		0.95	0.23	
Uniform Delay, d1		28.0			29.8			20.6		7.5	3.1	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.3			1.4		17.5	0.4	
Delay (s)		28.0			31.0			22.0		24.9	3.5	
Level of Service		C			C			C		C	A	
Approach Delay (s)		28.0			31.0			22.0			19.6	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.1									C
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			78.0							11.0		
Intersection Capacity Utilization			102.1%									G
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FT Sc2> PM Peak Hour

























07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 						 		
Traffic Volume (vph)	32	56	16	669	28	374	2	504	781	566	692	14
Future Volume (vph)	32	56	16	669	28	374	2	504	781	566	692	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0	
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	1.00	1.00	0.97	1.00	
Fr _t	1.00	0.97		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1674		2923	1423		1552	1713	1335	2923	1706	
Fl _t Permitted	0.51	1.00		0.95	1.00		0.27	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	831	1674		2923	1423		434	1713	1335	2923	1706	
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)	35	61	17	727	30	407	2	548	849	615	752	15
RTOR Reduction (vph)	0	9	0	0	242	0	0	0	171	0	0	0
Lane Group Flow (vph)	35	69	0	727	195	0	2	548	678	615	767	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA	
Protected Phases		4		3	8			2	3	1	6	
Permitted Phases	4						2		2			
Actuated Green, G (s)	15.3	15.3		27.3	46.6		32.7	32.7	60.0	24.2	60.9	
Effective Green, g (s)	18.3	18.3		27.3	49.6		36.4	36.4	67.4	24.2	64.6	
Actuated g/C Ratio	0.15	0.15		0.22	0.41		0.30	0.30	0.55	0.20	0.53	
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	250		653	577		129	510	736	578	901	
v/s Ratio Prot		0.04		c0.25	c0.14			c0.32	0.23	c0.21	0.45	
v/s Ratio Perm	0.04						0.00		0.27			
v/c Ratio	0.28	0.28		1.11	0.34		0.02	1.07	0.92	1.06	0.85	
Uniform Delay, d ₁	46.1	46.1		47.5	25.0		30.3	42.9	25.0	49.0	24.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	1.3	0.6		70.6	0.4		0.2	61.3	16.9	55.6	9.9	
Delay (s)	47.4	46.7		118.0	25.3		30.5	104.2	41.9	104.6	34.6	
Level of Service	D	D		F	C		C	F	D	F	C	
Approach Delay (s)		46.9			83.2			66.3			65.8	
Approach LOS		D			F			E			E	
Intersection Summary												
HCM 2000 Control Delay			70.4				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			122.2			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			96.7%			ICU Level of Service			F			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT Sc2> PM Peak Hour
07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	50	360	984	490	393	162	672	190	322	111	320	55	
Future Volume (vph)	50	360	984	490	393	162	672	190	322	111	320	55	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1596	1648	1471	3189	1633	1456	3189	1731	1471	1644	1681	1681	
Flt Permitted	0.51	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.63	1.00	1.00	
Satd. Flow (perm)	863	1648	1471	3189	1633	1456	3189	1731	1471	1087	1681	1681	
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)	54	391	1070	533	427	176	730	207	350	121	348	60	
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	178	0	5	0	
Lane Group Flow (vph)	54	391	1070	533	427	115	730	207	172	121	403	0	
Confl. Peds. (#/hr)							2					2	
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%	
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	NA	
Protected Phases		4		3	8		5	2				6	
Permitted Phases	4		Free			8			2	6			
Actuated Green, G (s)	25.5	25.5	120.0	20.5	50.0	50.0	25.0	57.0	57.0	28.0	28.0	28.0	
Effective Green, g (s)	28.5	28.5	120.0	20.5	53.0	53.0	25.0	59.0	59.0	30.0	30.0	30.0	
Actuated g/C Ratio	0.24	0.24	1.00	0.17	0.44	0.44	0.21	0.49	0.49	0.25	0.25	0.25	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	204	391	1471	544	721	643	664	851	723	271	420	420	
v/s Ratio Prot		c0.24		c0.17	0.26		c0.23	0.12				c0.24	
v/s Ratio Perm	0.06		0.73			0.08			0.12	0.11			
v/c Ratio	0.26	1.00	0.73	0.98	0.59	0.18	1.10	0.24	0.24	0.45	0.96	0.96	
Uniform Delay, d1	37.2	45.8	0.0	49.5	25.3	20.3	47.5	17.6	17.6	38.0	44.4	44.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	45.5	3.2	33.0	1.3	0.1	65.3	0.7	0.8	5.2	34.7	34.7	
Delay (s)	37.9	91.3	3.2	82.5	26.6	20.4	112.8	18.3	18.3	43.2	79.1	79.1	
Level of Service	D	F	A	F	C	C	F	B	B	D	E	E	
Approach Delay (s)		27.2			51.9			71.9			70.9		
Approach LOS		C			D			E			E		
Intersection Summary													
HCM 2000 Control Delay			51.5		HCM 2000 Level of Service						D		
HCM 2000 Volume to Capacity ratio			1.01										
Actuated Cycle Length (s)			120.0		Sum of lost time (s)						16.0		
Intersection Capacity Utilization			95.2%		ICU Level of Service						F		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2037 FT Sc2> PM Peak Hour
07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷	↷	↶	↷
Traffic Volume (vph)	132	664	707	34	84	131
Future Volume (vph)	132	664	707	34	84	131
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1697	1664	1388	1612	1471
Flt Permitted	0.18	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	296	1697	1664	1388	1612	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	722	768	37	91	142
RTOR Reduction (vph)	0	0	0	17	0	96
Lane Group Flow (vph)	143	722	768	20	91	46
Heavy Vehicles (%)	5%	2%	4%	0%	2%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	28.4	28.4	28.4	28.4	16.6	16.6
Effective Green, g (s)	30.4	30.4	30.4	30.4	18.6	18.6
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.33	0.33
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	905	887	740	526	480
v/s Ratio Prot		0.43	0.46		c0.06	
v/s Ratio Perm	c0.48			0.01		0.03
v/c Ratio	0.91	0.80	0.87	0.03	0.17	0.10
Uniform Delay, d1	12.1	10.8	11.5	6.3	13.7	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	46.5	5.0	8.9	0.0	0.7	0.4
Delay (s)	58.5	15.8	20.4	6.3	14.4	13.8
Level of Service	E	B	C	A	B	B
Approach Delay (s)		22.8	19.7		14.0	
Approach LOS		C	B		B	

















Intersection Summary

HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group










HCM Unsignalized Intersection Capacity Analysis
8: Reaker Road & Netherby Road

<2037 FT Sc2> PM Peak Hour
07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	7	212	4	10	0	161	2	8	0	1	1
Future Volume (Veh/h)	3	7	212	4	10	0	161	2	8	0	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	8	230	4	11	0	175	2	9	0	1	1
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	11			238			150	148	123	158	263	11
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	11			238			150	148	123	158	263	11
tC, single (s)	4.4			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			78	100	99	100	100	100
cM capacity (veh/h)	1428			1341			807	743	933	800	642	1076
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	241	15	186	2								
Volume Left	3	4	175	0								
Volume Right	230	0	9	1								
cSH	1428	1341	811	804								
Volume to Capacity	0.00	0.00	0.23	0.00								
Queue Length 95th (m)	0.0	0.1	6.7	0.1								
Control Delay (s)	0.1	2.1	10.8	9.5								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.1	2.1	10.8	9.5								
Approach LOS			B	A								
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			38.6%		ICU Level of Service				A			
Analysis Period (min)			15									










HCM Unsignalized Intersection Capacity Analysis
 9: Kingsway & Huron Street

<2037 FT Sc2> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	632	12	19	1108
Future Volume (Veh/h)	8	11	632	12	19	1108
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)	9	12	687	13	21	1204
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	199					
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	1940	694			700	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1952	671			678	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	97			98	
cM capacity (veh/h)	68	447			899	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	700	1225			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	132	1700	899			
Volume to Capacity	0.16	0.41	0.02			
Queue Length 95th (m)	4.2	0.0	0.5			
Control Delay (s)	37.4	0.0	0.9			
Lane LOS	E		A			
Approach Delay (s)	37.4	0.0	0.9			
Approach LOS	E					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			89.8%	ICU Level of Service		E
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 10: Kingsway & Erie Street

<2037 FT Sc2> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	11	633	12	19	1097
Future Volume (Veh/h)	8	11	633	12	19	1097
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)	9	12	688	13	21	1192
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			104			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	1928	694			701	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1954	646			653	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	97			98	
cM capacity (veh/h)	66	448			890	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	21	701	1213			
Volume Left	9	0	21			
Volume Right	12	13	0			
cSH	128	1700	890			
Volume to Capacity	0.16	0.41	0.02			
Queue Length 95th (m)	4.3	0.0	0.6			
Control Delay (s)	38.6	0.0	0.9			
Lane LOS	E		A			
Approach Delay (s)	38.6	0.0	0.9			
Approach LOS	E					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			89.2%		ICU Level of Service	E
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Forks Road & West Access

<2037 FT Sc2> PM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	190	112	0	0	327
Future Volume (Veh/h)	558	190	112	0	0	327
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)	607	207	122	0	0	355
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	122				1543	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				1543	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	59				100	62
cM capacity (veh/h)	1478				75	935
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	607	207	122	355		
Volume Left	607	0	0	0		
Volume Right	0	0	0	355		
cSH	1478	1700	1700	935		
Volume to Capacity	0.41	0.12	0.07	0.38		
Queue Length 95th (m)	15.6	0.0	0.0	13.6		
Control Delay (s)	9.1	0.0	0.0	11.2		
Lane LOS	A			B		
Approach Delay (s)	6.8		0.0	11.2		
Approach LOS				B		
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			68.9%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Forks Road & East Access












<2037 FT Sc2> PM Peak Hour
 07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	186	0	0	0	0	109
Future Volume (Veh/h)	186	0	0	0	0	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)	202	0	0	0	0	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)						
pX, platoon unblocked						
vC, conflicting volume	0				404	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				404	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				100	89
cM capacity (veh/h)	1636				532	1091
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	202	0	118			
Volume Left	202	0	0			
Volume Right	0	0	118			
cSH	1636	1700	1091			
Volume to Capacity	0.12	0.00	0.11			
Queue Length 95th (m)	3.2	0.0	2.8			
Control Delay (s)	7.5	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			25.2%		ICU Level of Service	A
Analysis Period (min)			15			












HCM Signalized Intersection Capacity Analysis
 13: Canal Bank Street & North Access

<2037 FT Sc2> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	295	889	5	391	1403
Future Volume (vph)	6	295	889	5	391	1403
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3286		1644	3288
Flt Permitted	0.95	1.00	1.00		0.18	1.00
Satd. Flow (perm)	1644	1471	3286		315	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	321	966	5	425	1525
RTOR Reduction (vph)	0	274	1	0	0	0
Lane Group Flow (vph)	7	47	970	0	425	1525
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	11.2	11.2	41.7		66.1	66.1
Effective Green, g (s)	13.2	13.2	43.7		66.1	68.1
Actuated g/C Ratio	0.15	0.15	0.49		0.74	0.76
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	243	217	1608		551	2507
v/s Ratio Prot	0.00		0.30		c0.18	0.46
v/s Ratio Perm		c0.03			c0.39	
v/c Ratio	0.03	0.22	0.60		0.77	0.61
Uniform Delay, d1	32.6	33.5	16.5		14.4	4.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.5	1.7		6.6	1.1
Delay (s)	32.6	34.0	18.2		21.0	5.8
Level of Service	C	C	B		C	A
Approach Delay (s)	34.0		18.2			9.1
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			14.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			89.3		Sum of lost time (s)	11.0
Intersection Capacity Utilization			68.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						


























HCM Signalized Intersection Capacity Analysis
 14: South Access & Canal Bank Street

<2037 FT Sc2> PM Peak Hour
 07/08/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	87	293	601	42	369	1040
Future Volume (vph)	87	293	601	42	369	1040
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		3.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1644	1471	3256		1644	3288
Flt Permitted	0.95	1.00	1.00		0.32	1.00
Satd. Flow (perm)	1644	1471	3256		553	3288
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	318	653	46	401	1130
RTOR Reduction (vph)	0	268	4	0	0	0
Lane Group Flow (vph)	95	50	695	0	401	1130
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	11.6	11.6	47.1		63.0	63.0
Effective Green, g (s)	13.6	13.6	49.1		63.0	65.0
Actuated g/C Ratio	0.16	0.16	0.57		0.73	0.75
Clearance Time (s)	6.0	6.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	258	231	1846		564	2467
v/s Ratio Prot	c0.06		0.21		c0.11	0.34
v/s Ratio Perm		0.03			c0.41	
v/c Ratio	0.37	0.22	0.38		0.71	0.46
Uniform Delay, d1	32.7	31.8	10.3		5.3	4.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.9	0.5	0.6		4.2	0.6
Delay (s)	33.5	32.3	10.9		9.5	4.7
Level of Service	C	C	B		A	A
Approach Delay (s)	32.6		10.9			6.0
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			11.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			86.6		Sum of lost time (s)	11.0
Intersection Capacity Utilization			60.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

























<2037 FT w Recom Sc2> AM Peak Hour
07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations				 				 		 			
Traffic Volume (vph)	11	23	7	715	58	509	23	568	585	300	399	20	
Future Volume (vph)	11	23	7	715	58	509	23	568	585	300	399	20	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0		
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	0.95	1.00	0.97	1.00		
Fr _t	1.00	0.96		1.00	0.87		1.00	1.00	0.85	1.00	0.99		
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1424	1539		2787	1433		1492	3224	1274	2923	1670		
Fl _t Permitted	0.43	1.00		0.95	1.00		0.50	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	646	1539		2787	1433		785	3224	1274	2923	1670		
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	25	8	777	63	553	25	617	636	326	434	22	
RTOR Reduction (vph)	0	7	0	0	223	0	0	0	220	0	1	0	
Lane Group Flow (vph)	12	26	0	777	393	0	25	617	416	326	455	0	
Heavy Vehicles (%)	9%	11%	0%	8%	0%	5%	4%	2%	9%	3%	3%	0%	
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA		
Protected Phases		4		3	8			2	3	1	6		
Permitted Phases	4						2		2				
Actuated Green, G (s)	10.3	10.3		35.6	49.9		25.7	25.7	61.3	15.7	45.4		
Effective Green, g (s)	13.3	13.3		35.6	52.9		29.4	29.4	68.7	15.7	49.1		
Actuated g/C Ratio	0.12	0.12		0.32	0.48		0.27	0.27	0.62	0.14	0.45		
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	78	186		901	689		209	861	795	417	745		
v/s Ratio Prot		0.02		c0.28	c0.27			c0.19	0.19	c0.11	0.27		
v/s Ratio Perm	0.02						0.03		0.14				
v/c Ratio	0.15	0.14		0.86	0.57		0.12	0.72	0.52	0.78	0.61		
Uniform Delay, d ₁	43.3	43.2		34.9	20.4		30.5	36.5	11.5	45.5	23.2		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d ₂	0.9	0.3		8.5	1.1		1.2	5.1	0.6	9.2	3.7		
Delay (s)	44.2	43.6		43.4	21.6		31.7	41.6	12.1	54.7	26.9		
Level of Service	D	D		D	C		C	D	B	D	C		
Approach Delay (s)		43.8			33.8			26.8			38.5		
Approach LOS		D			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			32.4									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.78										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			88.2%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT w Recom Sc2> AM Peak Hour
07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	360	475	239	325	126	939	315	458	106	133	17
Future Volume (vph)	32	360	475	239	325	126	939	315	458	106	133	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1581	1648	1471	3097	1588	1471	3189	1713	1471	1644	1687	
Flt Permitted	0.55	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	915	1648	1471	3097	1588	1471	3189	1713	1471	961	1687	
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)	35	391	516	260	353	137	1021	342	498	115	145	18
RTOR Reduction (vph)	0	0	0	0	0	53	0	0	178	0	3	0
Lane Group Flow (vph)	35	391	516	260	353	84	1021	342	320	115	160	0
Heavy Vehicles (%)	4%	5%	0%	3%	9%	0%	0%	1%	0%	0%	0%	8%
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2				6
Permitted Phases	4		Free			8			2	6		
Actuated Green, G (s)	29.0	29.0	130.0	12.0	45.0	45.0	43.5	72.0	72.0	24.5	24.5	
Effective Green, g (s)	32.0	32.0	130.0	12.0	48.0	48.0	43.5	74.0	74.0	26.5	26.5	
Actuated g/C Ratio	0.25	0.25	1.00	0.09	0.37	0.37	0.33	0.57	0.57	0.20	0.20	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	225	405	1471	285	586	543	1067	975	837	195	343	
v/s Ratio Prot		c0.24		c0.08	0.22		c0.32	0.20			0.09	
v/s Ratio Perm	0.04		0.35			0.06			0.22	c0.12		
v/c Ratio	0.16	0.97	0.35	0.91	0.60	0.15	0.96	0.35	0.38	0.59	0.47	
Uniform Delay, d1	38.4	48.5	0.0	58.5	33.3	27.4	42.3	15.1	15.4	46.8	45.5	
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	0.3	35.4	0.7	31.3	1.8	0.1	17.9	1.0	1.3	12.4	4.5	
Delay (s)	38.7	83.9	0.7	89.8	35.0	27.6	60.2	16.1	16.7	59.3	50.0	
Level of Service	D	F	A	F	D	C	E	B	B	E	D	
Approach Delay (s)		36.6			52.7			40.5			53.8	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			42.9				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)		16.0			
Intersection Capacity Utilization			86.4%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2037 FT w Recom Sc2> AM Peak Hour
07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	698	492	66	35	78
Future Volume (vph)	180	698	492	66	35	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1633	1664	1310	1468	1471
Flt Permitted	0.36	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	601	1633	1664	1310	1468	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	759	535	72	38	85
RTOR Reduction (vph)	0	0	0	32	0	59
Lane Group Flow (vph)	196	759	535	40	38	26
Heavy Vehicles (%)	5%	6%	4%	6%	12%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	33.0	33.0	33.0	33.0	17.3	17.3
Effective Green, g (s)	35.0	35.0	35.0	35.0	19.3	19.3
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.31	0.31
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	337	917	934	735	454	455
v/s Ratio Prot		c0.46	0.32		c0.03	
v/s Ratio Perm	0.33			0.03		0.02
v/c Ratio	0.58	0.83	0.57	0.06	0.08	0.06
Uniform Delay, d1	8.9	11.2	8.8	6.2	15.2	15.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	6.2	0.9	0.0	0.4	0.2
Delay (s)	11.4	17.4	9.7	6.2	15.6	15.4
Level of Service	B	B	A	A	B	B
Approach Delay (s)		16.2	9.3		15.4	
Approach LOS		B	A		B	

Intersection Summary


















HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	62.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Kingsway & Forks Road

<2037 FT w Recom Sc2> PM Peak Hour

07/08/2020


























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	0	0	499	0	145	1	832	272	1
Future Volume (vph)	1	0	0	0	0	499	0	145	1	832	272	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)		4.0			4.0			4.0		3.0	4.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		1.00			0.98			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		1.00			0.86			1.00		1.00	1.00	
Flt Protected		0.95			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1643			1356			1729		1644	1730	
Flt Permitted		0.33			1.00			1.00		0.52	1.00	
Satd. Flow (perm)		576			1356			1729		902	1730	
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)	1	0	0	0	0	542	0	158	1	904	296	1
RTOR Reduction (vph)	0	0	0	0	468	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	74	0	0	159	0	904	297	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.0			10.0			22.2		66.0	66.0	
Effective Green, g (s)		12.0			12.0			24.2		66.0	68.0	
Actuated g/C Ratio		0.14			0.14			0.27		0.75	0.77	
Clearance Time (s)		6.0			6.0			6.0		3.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		78			184			475		1020	1336	
v/s Ratio Prot					c0.05			0.09		c0.41	0.17	
v/s Ratio Perm		0.00								c0.25		
v/c Ratio		0.01			0.40			0.33		0.89	0.22	
Uniform Delay, d1		32.9			34.7			25.5		6.9	2.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.4			1.9		9.4	0.4	
Delay (s)		32.9			36.2			27.4		16.3	3.1	
Level of Service		C			D			C		B	A	
Approach Delay (s)		32.9			36.2			27.4			13.0	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			20.8									C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			88.0							11.0		
Intersection Capacity Utilization			102.1%									G
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Highway 58 & Townline Tunnel Road

<2037 FT w Recom Sc2> PM Peak Hour

























07/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 				 		 		
Traffic Volume (vph)	32	56	16	669	28	374	2	504	781	566	692	14
Future Volume (vph)	32	56	16	669	28	374	2	504	781	566	692	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	0.3	4.0	4.0	
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	0.95	1.00	0.97	1.00	
Fr _t	1.00	0.97		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Fl _t Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1552	1674		2923	1423		1552	3256	1335	2923	1706	
Fl _t Permitted	0.51	1.00		0.95	1.00		0.23	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	831	1674		2923	1423		369	3256	1335	2923	1706	
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)	35	61	17	727	30	407	2	548	849	615	752	15
RTOR Reduction (vph)	0	9	0	0	225	0	0	0	172	0	1	0
Lane Group Flow (vph)	35	69	0	727	212	0	2	548	677	615	766	0
Heavy Vehicles (%)	0%	0%	0%	3%	0%	5%	0%	1%	4%	3%	1%	7%
Turn Type	Perm	NA		Prot	NA		Perm	NA	pm+ov	Prot	NA	
Protected Phases		4		3	8			2	3	1	6	
Permitted Phases	4						2		2			
Actuated Green, G (s)	15.3	15.3		32.3	51.6		24.5	24.5	56.8	27.3	55.8	
Effective Green, g (s)	18.3	18.3		32.3	54.6		28.2	28.2	64.2	27.3	59.5	
Actuated g/C Ratio	0.15	0.15		0.26	0.45		0.23	0.23	0.53	0.22	0.49	
Clearance Time (s)	7.0	7.0		4.0	7.0		7.7	7.7	4.0	4.0	7.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	250		773	636		85	752	701	653	831	
v/s Ratio Prot		0.04		0.25	c0.15			0.17	c0.28	0.21	c0.45	
v/s Ratio Perm	0.04						0.01		0.22			
v/c Ratio	0.28	0.28		0.94	0.33		0.02	0.73	0.97	0.94	0.92	
Uniform Delay, d ₁	46.1	46.0		44.0	21.9		36.3	43.4	27.9	46.6	29.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d ₂	1.3	0.6		19.3	0.3		0.5	6.1	25.5	21.9	17.2	
Delay (s)	47.3	46.6		63.3	22.2		36.8	49.5	53.4	68.6	46.4	
Level of Service	D	D		E	C		D	D	D	E	D	
Approach Delay (s)		46.9			47.9			51.8			56.3	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			52.1				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			122.1				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			96.7%				ICU Level of Service			F		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Canal Bank Street & Townline Tunnel Road

<2037 FT w Recom Sc2> PM Peak Hour
07/08/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	50	360	984	490	393	162	672	190	322	111	320	55	
Future Volume (vph)	50	360	984	490	393	162	672	190	322	111	320	55	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	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	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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1596	1648	1471	3189	1633	1456	3189	1731	1471	1644	1681	1681	
Flt Permitted	0.51	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.63	1.00	1.00	
Satd. Flow (perm)	863	1648	1471	3189	1633	1456	3189	1731	1471	1087	1681	1681	
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)	54	391	1070	533	427	176	730	207	350	121	348	60	
RTOR Reduction (vph)	0	0	0	0	0	53	0	0	174	0	5	0	
Lane Group Flow (vph)	54	391	1070	533	427	123	730	207	176	121	403	0	
Confl. Peds. (#/hr)							2					2	
Heavy Vehicles (%)	3%	5%	0%	0%	6%	1%	0%	0%	0%	0%	0%	3%	
Turn Type	Perm	NA	Free	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	NA	
Protected Phases		4		3	8		5	2				6	
Permitted Phases	4		Free			8			2	6			
Actuated Green, G (s)	30.5	30.5	140.0	24.0	58.5	58.5	32.5	68.5	68.5	32.0	32.0	32.0	
Effective Green, g (s)	33.5	33.5	140.0	24.0	61.5	61.5	32.5	70.5	70.5	34.0	34.0	34.0	
Actuated g/C Ratio	0.24	0.24	1.00	0.17	0.44	0.44	0.23	0.50	0.50	0.24	0.24	0.24	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	4.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	206	394	1471	546	717	639	740	871	740	263	408	408	
v/s Ratio Prot		c0.24		c0.17	0.26		c0.23	0.12				c0.24	
v/s Ratio Perm	0.06		0.73			0.08			0.12	0.11			
v/c Ratio	0.26	0.99	0.73	0.98	0.60	0.19	0.99	0.24	0.24	0.46	0.99	0.99	
Uniform Delay, d1	43.2	53.1	0.0	57.7	29.8	24.0	53.5	19.6	19.6	45.2	52.8	52.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	43.1	3.2	32.2	1.3	0.1	29.4	0.6	0.8	5.7	41.9	41.9	
Delay (s)	43.9	96.2	3.2	89.9	31.1	24.2	83.0	20.2	20.4	50.9	94.7	94.7	
Level of Service	D	F	A	F	C	C	F	C	C	D	F	F	
Approach Delay (s)		28.7			57.6			55.9			84.7		
Approach LOS		C			E			E			F		
Intersection Summary													
HCM 2000 Control Delay			50.5		HCM 2000 Level of Service						D		
HCM 2000 Volume to Capacity ratio			0.99										
Actuated Cycle Length (s)			140.0		Sum of lost time (s)						16.0		
Intersection Capacity Utilization			95.2%		ICU Level of Service						F		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Highway 58A & Reaker Road

<2037 FT w Recom Sc2> PM Peak Hour
07/08/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	132	664	707	34	84	131
Future Volume (vph)	132	664	707	34	84	131
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width	3.5	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1566	1697	1664	1388	1612	1471
Flt Permitted	0.19	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	311	1697	1664	1388	1612	1471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	722	768	37	91	142
RTOR Reduction (vph)	0	0	0	17	0	96
Lane Group Flow (vph)	143	722	768	20	91	46
Heavy Vehicles (%)	5%	2%	4%	0%	2%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	32.4	32.4	32.4	32.4	18.3	18.3
Effective Green, g (s)	34.4	34.4	34.4	34.4	20.3	20.3
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.32	0.32
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	170	931	912	761	521	476
v/s Ratio Prot		0.43	c0.46		c0.06	
v/s Ratio Perm	0.46			0.01		0.03
v/c Ratio	0.84	0.78	0.84	0.03	0.17	0.10
Uniform Delay, d1	11.9	11.1	11.9	6.5	15.2	14.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.5	4.1	7.1	0.0	0.7	0.4
Delay (s)	41.4	15.2	19.0	6.5	15.9	15.2
Level of Service	D	B	B	A	B	B
Approach Delay (s)		19.5	18.4		15.5	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX

D AWSC WARRANT ANALYSIS

***D-1 FUTURE
BACKGROUND***

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	278	4	11	0	17	5	130	0	20
9:00	0	0	0	0	120	4	5	0	7	6	105	0	10
10:00	0	0	0	0	120	4	5	0	7	6	105	0	10
11:00	0	0	0	0	120	4	5	0	7	6	105	0	10
14:00	0	0	0	0	120	4	5	0	7	6	105	0	10
15:00	0	0	0	0	120	4	5	0	7	6	105	0	10
16:00	0	0	0	0	120	4	5	0	7	6	105	0	10
17:00	0	0	0	0	202	12	8	0	11	19	288	0	20
Total	0	0	0	0	1,200	40	49	0	70	60	1,048	0	100

All way Stop Warrant (Major Roads)

Conditions	
1.	Vehicles > 500 on all intersection approaches
2.	Delay > 30 seconds and Minor Street > 200
3.	Volume Split 70/30 or less

Intersection:	Kingsway at Erie Street - 2037 FB Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	445	48	11%
9:00	247	22	9%
10:00	247	22	9%
11:00	247	22	9%
14:00	247	22	9%
15:00	247	22	9%
16:00	247	22	9%
17:00	540	39	7%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
8:00	0	0	0	0	291	4	11	0	0	17	5	124	0	20
9:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
10:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
11:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
14:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
15:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
16:00	0	0	0	0	123	4	5	0	0	7	6	106	0	10
17:00	0	0	0	0	201	12	8	0	0	11	19	299	0	20
Total	0	0	0	0	1,230	40	49	0	0	70	60	1,059	0	100

All way Stop Warrant (Major Roads)

Conditions	
1.	Vehicles > 500 on all intersection approaches
2.	Delay > 30 seconds and Minor Street > 200
3.	Volume Split 70/30 or less

Intersection:	Kingsway at Huron Street - 2037 FB Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	452	48	11%
9:00	251	22	9%
10:00	251	22	9%
11:00	251	22	9%
14:00	251	22	9%
15:00	251	22	9%
16:00	251	22	9%
17:00	550	39	7%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	301	4	11	0	17	5	125	0	20
9:00	0	0	0	0	121	4	5	0	7	6	116	0	10
10:00	0	0	0	0	121	4	5	0	7	6	116	0	10
11:00	0	0	0	0	121	4	5	0	7	6	116	0	10
14:00	0	0	0	0	121	4	5	0	7	6	116	0	10
15:00	0	0	0	0	121	4	5	0	7	6	116	0	10
16:00	0	0	0	0	121	4	5	0	7	6	116	0	10
17:00	0	0	0	0	183	12	8	0	11	19	338	0	20
Total	0	0	0	0	1,210	40	49	0	70	60	1,159	0	100

All way Stop Warrant (Major Roads)

Conditions	
1.	Vehicles > 500 on all intersection approaches
2.	Delay > 30 seconds and Minor Street > 200
3.	Volume Split 70/30 or less

Intersection:	Kingsway at Erie Street - 2037 FB Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	463	48	10%
9:00	259	22	8%
10:00	259	22	8%
11:00	259	22	8%
14:00	259	22	8%
15:00	259	22	8%
16:00	259	22	8%
17:00	571	39	7%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	314	4	11	0	17	5	119	0	20
9:00	0	0	0	0	124	4	5	0	7	6	117	0	10
10:00	0	0	0	0	124	4	5	0	7	6	117	0	10
11:00	0	0	0	0	124	4	5	0	7	6	117	0	10
14:00	0	0	0	0	124	4	5	0	7	6	117	0	10
15:00	0	0	0	0	124	4	5	0	7	6	117	0	10
16:00	0	0	0	0	124	4	5	0	7	6	117	0	10
17:00	0	0	0	0	182	12	8	0	11	19	349	0	20
Total	0	0	0	0	1,240	40	49	0	70	60	1,170	0	100

All way Stop Warrant (Major Roads)

Conditions	
1.	Vehicles > 500 on all intersection approaches
2.	Delay > 30 seconds and Minor Street > 200
3.	Volume Split 70/30 or less

Intersection:	Kingsway at Huron Street - 2037 FB Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	470	48	10%
9:00	263	22	8%
10:00	263	22	8%
11:00	263	22	8%
14:00	263	22	8%
15:00	263	22	8%
16:00	263	22	8%
17:00	581	39	7%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

D-2 2032 FUTURE TOTAL

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): East-West

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	180	76	44	0	16	372	214	0	0	0	0	0
9:00	0	108	43	38	0	10	151	97	0	0	0	0	0
10:00	0	108	43	38	0	10	151	97	0	0	0	0	0
11:00	0	108	43	38	0	10	151	97	0	0	0	0	0
14:00	0	108	43	38	0	10	151	97	0	0	0	0	0
15:00	0	108	43	38	0	10	151	97	0	0	0	0	0
16:00	0	108	43	38	0	10	151	97	0	0	0	0	0
17:00	0	250	94	107	0	21	232	171	0	0	0	0	0
Total	0	1,078	428	379	0	97	1,510	967	0	0	0	0	0

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Nugent Road at Forks Road - 2032 FT Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	902	60	7%
9:00	447	48	11%
10:00	447	48	11%
11:00	447	48	11%
14:00	447	48	11%
15:00	447	48	11%
16:00	447	48	11%
17:00	875	128	15%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

D-3 2037 FUTURE TOTAL

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	898	4	11	0	17	5	530	0	20
9:00	0	0	0	0	408	4	5	0	7	6	375	0	10
10:00	0	0	0	0	408	4	5	0	7	6	375	0	10
11:00	0	0	0	0	408	4	5	0	7	6	375	0	10
14:00	0	0	0	0	408	4	5	0	7	6	375	0	10
15:00	0	0	0	0	408	4	5	0	7	6	375	0	10
16:00	0	0	0	0	408	4	5	0	7	6	375	0	10
17:00	0	0	0	0	732	12	8	0	11	19	969	0	20
Total	0	0	0	0	4,078	40	49	0	70	60	3,749	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Kingsway at Erie Street - 2037 FT Scenario 1
Date Taken:	<u>N/A</u>

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,465	48	3%
9:00	805	22	3%
10:00	805	22	3%
11:00	805	22	3%
14:00	805	22	3%
15:00	805	22	3%
16:00	805	22	3%
17:00	1,751	39	2%
Met Conditions?	YES	NO	NO

All-way Stop Justified? **NO**

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
8:00	0	0	0	0	911	4	11	0	0	17	5	524	0	20
9:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
10:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
11:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
14:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
15:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
16:00	0	0	0	0	411	4	5	0	0	7	6	376	0	10
17:00	0	0	0	0	731	12	8	0	0	11	19	980	0	20
Total	0	0	0	0	4,108	40	49	0	0	70	60	3,760	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Kingsway at Huron Street - 2037 FT Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,472	48	3%
9:00	809	22	3%
10:00	809	22	3%
11:00	809	22	3%
14:00	809	22	3%
15:00	809	22	3%
16:00	809	22	3%
17:00	1,761	39	2%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
8:00	0	0	0	0	892	20	44	0	0	307	149	453	0	20
9:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
10:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
11:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
14:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
15:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
16:00	0	0	0	0	387	15	18	0	0	128	107	354	0	10
17:00	0	0	0	0	654	39	28	0	0	202	278	961	0	20
Total	0	0	0	0	3,868	149	180	0	0	1,277	1,069	3,538	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Canal Bank Street at North Access - 2037 FT Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,865	371	20%
9:00	1,009	156	15%
10:00	1,009	156	15%
11:00	1,009	156	15%
14:00	1,009	156	15%
15:00	1,009	156	15%
16:00	1,009	156	15%
17:00	2,162	250	12%
Met Conditions?	YES	YES	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	760	168	215	0	152	183	314	0	20
9:00	0	0	0	0	312	106	115	0	90	105	268	0	10
10:00	0	0	0	0	312	106	115	0	90	105	268	0	10
11:00	0	0	0	0	312	106	115	0	90	105	268	0	10
14:00	0	0	0	0	312	106	115	0	90	105	268	0	10
15:00	0	0	0	0	312	106	115	0	90	105	268	0	10
16:00	0	0	0	0	312	106	115	0	90	105	268	0	10
17:00	0	0	0	0	486	256	244	0	207	234	755	0	20
Total	0	0	0	0	3,118	1,060	1,149	0	899	1,047	2,677	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Canal Bank Street at South Access - 2037 FT Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,792	387	22%
9:00	996	215	22%
10:00	996	215	22%
11:00	996	215	22%
14:00	996	215	22%
15:00	996	215	22%
16:00	996	215	22%
17:00	2,182	471	22%
Met Conditions?	YES	YES	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): East-West

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	208	84	49	0	17	379	229	0	0	0	0	0
9:00	0	120	47	42	0	10	163	107	0	0	0	0	0
10:00	0	120	47	42	0	10	163	107	0	0	0	0	0
11:00	0	120	47	42	0	10	163	107	0	0	0	0	0
14:00	0	120	47	42	0	10	163	107	0	0	0	0	0
15:00	0	120	47	42	0	10	163	107	0	0	0	0	0
16:00	0	120	47	42	0	10	163	107	0	0	0	0	0
17:00	0	270	104	118	0	22	272	196	0	0	0	0	0
Total	0	1,198	470	419	0	99	1,629	1,067	0	0	0	0	0

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Nugent Road at Forks Road - 2037 FT Scenario 1 with Phase 1 Dain East Density
Date Taken:	<u>N/A</u>

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	966	66	7%
9:00	489	52	11%
10:00	489	52	11%
11:00	489	52	11%
14:00	489	52	11%
15:00	489	52	11%
16:00	489	52	11%
17:00	982	140	14%
Met Conditions?	YES	NO	NO

All-way Stop Justified? **NO**

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): East-West

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	210	84	49	0	17	399	234	0	0	0	0	0
9:00	0	122	47	42	0	10	171	109	0	0	0	0	0
10:00	0	122	47	42	0	10	171	109	0	0	0	0	0
11:00	0	122	47	42	0	10	171	109	0	0	0	0	0
14:00	0	122	47	42	0	10	171	109	0	0	0	0	0
15:00	0	122	47	42	0	10	171	109	0	0	0	0	0
16:00	0	122	47	42	0	10	171	109	0	0	0	0	0
17:00	0	277	104	118	0	22	285	199	0	0	0	0	0
Total	0	1,219	470	419	0	99	1,710	1,087	0	0	0	0	0

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Nugent Road at Forks Road - 2037 FT Scenario 1
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	993	66	7%
9:00	501	52	10%
10:00	501	52	10%
11:00	501	52	10%
14:00	501	52	10%
15:00	501	52	10%
16:00	501	52	10%
17:00	1,005	140	14%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	994	4	11	0	17	5	358	0	20
9:00	0	0	0	0	407	4	5	0	7	6	364	0	10
10:00	0	0	0	0	407	4	5	0	7	6	364	0	10
11:00	0	0	0	0	407	4	5	0	7	6	364	0	10
14:00	0	0	0	0	407	4	5	0	7	6	364	0	10
15:00	0	0	0	0	407	4	5	0	7	6	364	0	10
16:00	0	0	0	0	407	4	5	0	7	6	364	0	10
17:00	0	0	0	0	633	12	8	0	11	19	1097	0	20
Total	0	0	0	0	4,069	40	49	0	70	60	3,639	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Kingsway at Erie Street - 2037 FT Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,389	48	3%
9:00	793	22	3%
10:00	793	22	3%
11:00	793	22	3%
14:00	793	22	3%
15:00	793	22	3%
16:00	793	22	3%
17:00	1,780	39	2%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00	0	0	0	0	1007	4	11	0	17	5	352	0	20
9:00	0	0	0	0	410	4	5	0	7	6	365	0	10
10:00	0	0	0	0	410	4	5	0	7	6	365	0	10
11:00	0	0	0	0	410	4	5	0	7	6	365	0	10
14:00	0	0	0	0	410	4	5	0	7	6	365	0	10
15:00	0	0	0	0	410	4	5	0	7	6	365	0	10
16:00	0	0	0	0	410	4	5	0	7	6	365	0	10
17:00	0	0	0	0	632	12	8	0	11	19	1108	0	20
Total	0	0	0	0	4,099	40	49	0	70	60	3,650	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Kingsway at Huron Street - 2037 FT Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,396	48	3%
9:00	797	22	3%
10:00	797	22	3%
11:00	797	22	3%
14:00	797	22	3%
15:00	797	22	3%
16:00	797	22	3%
17:00	1,790	39	2%
Met Conditions?	YES	NO	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
8:00	0	0	0	0	1291	7	5	0	0	421	238	609	0	20
9:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
10:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
11:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
14:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
15:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
16:00	0	0	0	0	545	3	3	0	0	179	158	503	0	10
17:00	0	0	0	0	889	5	6	0	0	295	391	1403	0	20
Total	0	0	0	0	5,450	30	29	0	0	1,790	1,577	5,030	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Canal Bank Street at North Access - 2037 FT Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	2,571	446	17%
9:00	1,391	192	14%
10:00	1,391	192	14%
11:00	1,391	192	14%
14:00	1,391	192	14%
15:00	1,391	192	14%
16:00	1,391	192	14%
17:00	2,989	321	11%
Met Conditions?	YES	YES	NO

All-way Stop Justified? NO

**All-Way Stop Warrant
(Arterial and Major Roads)**

Major Road Direction ("East-West" or "North-South"): North-South

Hour Ending	Eastbound Approach			Northbound Approach			Westbound Approach			Southbound Approach			Pedestrians Crossing Main Road	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
8:00	0	0	0	0	1013	11	7	0	0	285	264	350	0	20
9:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
10:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
11:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
14:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
15:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
16:00	0	0	0	0	404	14	24	0	0	145	159	348	0	10
17:00	0	0	0	0	601	42	87	0	0	293	369	1040	0	20
Total	0	0	0	0	4,038	137	238	0	0	1,448	1,587	3,478	0	100

All way Stop Warrant (Major Roads)

Conditions
1. Vehicles > 500 on all intersection approaches
2. Delay > 30 seconds and Minor Street > 200
3. Volume Split 70/30 or less

Intersection:	Canal Bank Street at South Access - 2037 FT Scenario 2
Date Taken:	N/A

Hours Ending	Total Vehicles	Minor Street Volumes	Volume Split of Minor Street
8:00	1,930	312	16%
9:00	1,094	179	16%
10:00	1,094	179	16%
11:00	1,094	179	16%
14:00	1,094	179	16%
15:00	1,094	179	16%
16:00	1,094	179	16%
17:00	2,432	400	16%
Met Conditions?	YES	YES	NO

All-way Stop Justified? NO

APPENDIX

E STP WARRANTS



***E-1 2037 FUTURE
BACKGROUND***

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	May 26, 2020
Analysis Period	2037 FB Sc2	East-West Street	Highway 58A (Townline Tunnel Rd)
Flow Conditions	Free flow (rural) <input type="button" value="v"/>	North-South Street	Reaker Road
'T' Intersection	Yes <input type="button" value="v"/>	Major Street	East-West <input type="button" value="v"/>
Existing Intersection	Yes <input type="button" value="v"/>	Approach lanes per direction	1 <input type="button" value="v"/> Major Street
Additional Comments		Approach lanes per direction	1 <input type="button" value="v"/> Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road	
	Eastbound			Westbound				Total	Northbound			Southbound					
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT	Total			
AM Peak Hour	111	420	0	0	344	66	941	0	0	0	35	0	41	76	0	0	
PM Peak Hour	81	463	0	0	420	34	998	0	0	0	84	0	59	143	0	0	
Total	192	883	0	0	764	100	1939	0	0	0	119	0	100	219	0	0	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1017	1141	540
Vehicle volume, along minor street	76	143	55
Vehicle volume, along major street	941	998	485
Combined vehicle and pedestrian volume crossing from minor streets	35	84	30

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	35	84
b.	0	0
c.	0	0
1.	No	No
2.	No	No
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	May 26, 2020
Analysis Period	2037 FB Sc2	East-West Street	Highway 58A
Flow Conditions	Free flow (rural)	North-South Street	Reaker Road
'T' Intersection	Yes	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				540	75%	75%	No
B. Vehicle volume, along minor streets	120				55	30%	30%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				485	67%	67%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50				30	40%	40%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2037 FB Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

E-2 2027 FUTURE TOTAL

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc1	East-West Street	Forks Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Kingsway
'T' Intersection	No ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road
	Eastbound			Westbound			Total	Northbound			Southbound			Total		
	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT			
AM Peak Hour	57	80	19	0	244	464	864	59	148	0	144	56	67	474	0	0
PM Peak Hour	74	266	60	0	160	300	860	35	90	0	505	154	63	847	0	0
Total	131	346	79	0	404	764	1724	94	238	0	649	210	130	1321	0	0

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1338	1707	761
Vehicle volume, along minor street	474	847	330
Vehicle volume, along major street	864	860	431
Combined vehicle and pedestrian volume crossing from minor streets	351	694	261

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:	AM	PM
a. Left turns from both minor street approaches	203	540
b. The heaviest through volume from the minor street	148	154
c. 50% of the heavier left turn movement from the major street when both of the following are met:	0	0
1. the left turn volume > 120	No	No
2. the left turn volume + opposing volume > 720	No	No
d. Pedestrians crossing the major street	0	0
3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection		
4. For 'T' intersection, the threshold values to be increased by 50%		

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc1	East-West Street	Forks Road
Flow Conditions	Restricted flow (urban)	North-South Street	Kingsway
'T' Intersection	No	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			761	106%	106%	No
B. Vehicle volume, along minor streets		170			330	194%	194%	Yes

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			431	60%	60%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			261	348%	348%	Yes

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2027 FT Sc1**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc1	East-West Street	Highway 58A (Townline Tunnel Rd)
Flow Conditions	Free flow (rural) ▼	North-South Street	Reaker Road
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Eastbound			Westbound				Total	Northbound			Southbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	132	428	0	0	327	54	941	0	0	0	28	0	42	70	0	0		
PM Peak Hour	85	407	0	0	490	40	1022	0	0	0	82	0	88	170	0	0		
Total	217	835	0	0	817	94	1963	0	0	0	110	0	130	240	0	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1011	1192	551
Vehicle volume, along minor street	70	170	60
Vehicle volume, along major street	941	1022	491
Combined vehicle and pedestrian volume crossing from minor streets	28	82	28

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	28	82
b.	0	0
c.	0	0
	Yes	No
	No	No
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc1	East-West Street	Highway 58A
Flow Conditions	Free flow (rural)	North-South Street	Reaker Road
'T' Intersection	Yes	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				551	76%	76%	No
B. Vehicle volume, along minor streets	120				60	33%	33%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				491	68%	68%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50				28	37%	37%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2027 FT Sc1**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc2	East-West Street	Forks Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Kingsway
'T' Intersection	No ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road
	Eastbound			Westbound			Total	Northbound			Southbound			Total		
	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT			
AM Peak Hour	2	0	1	0	0	698	701	1	210	2	233	98	2	546	0	0
PM Peak Hour	1	0	0	0	0	454	455	0	131	1	753	257	1	1143	0	0
Total	3	0	1	0	0	1152	1156	1	341	3	986	355	3	1689	0	0

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1247	1598	711
Vehicle volume, along minor street	546	1143	422
Vehicle volume, along major street	701	455	289
Combined vehicle and pedestrian volume crossing from minor streets	444	1010	364

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:	AM	PM
a. Left turns from both minor street approaches	234	753
b. The heaviest through volume from the minor street	210	257
c. 50% of the heavier left turn movement from the major street when both of the following are met:	0	0
1. the left turn volume > 120	No	No
2. the left turn volume + opposing volume > 720	No	No
d. Pedestrians crossing the major street	0	0
3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection		
4. For 'T' intersection, the threshold values to be increased by 50%		

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc2	East-West Street	Forks Road
Flow Conditions	Restricted flow (urban)	North-South Street	Kingsway
'T' Intersection	No	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			711	99%	99%	No
B. Vehicle volume, along minor streets		170			422	248%	248%	Yes

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			289	40%	40%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			364	485%	485%	Yes

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2027 FT Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc2	East-West Street	Highway 58A (Townline Tunnel Rd)
Flow Conditions	Free flow (rural) ▼	North-South Street	Reaker Road
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road	
	Eastbound			Westbound				Total	Northbound			Southbound					
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT	Total			
AM Peak Hour	127	471	0	0	323	54	975	0	0	0	29	0	45	74	0	0	
PM Peak Hour	90	461	0	0	483	28	1062	0	0	0	69	0	87	156	0	0	
Total	217	932	0	0	806	82	2037	0	0	0	98	0	132	230	0	0	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1049	1218	567
Vehicle volume, along minor street	74	156	58
Vehicle volume, along major street	975	1062	509
Combined vehicle and pedestrian volume crossing from minor streets	29	69	25

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	29	69
b.	0	0
c.	0	0
	Yes	No
	No	No
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2027 FT Sc2	East-West Street	Highway 58A
Flow Conditions	Free flow (rural)	North-South Street	Reaker Road
'T' Intersection	Yes	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				567	79%	79%	No
B. Vehicle volume, along minor streets	120				58	32%	32%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				509	71%	71%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50				25	33%	33%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2027 FT Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

E-3 2032 FUTURE TOTAL

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	Nugent/Forks Road
Flow Conditions	Free flow (rural) ▼	North-South Street	Highway 58
		Major Street	North-South ▼
'T' Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Minor Street
Additional Comments			

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	722	233	0	425	51	1431	0	0	440	0	0	93	533	0	0		
PM Peak Hour	0	613	424	0	750	120	1907	0	0	315	0	0	94	409	0	0		
Total	0	1335	657	0	1175	171	3338	0	0	755	0	0	187	942	0	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1964	2316	1070
Vehicle volume, along minor street	533	409	236
Vehicle volume, along major street	1431	1907	835
Combined vehicle and pedestrian volume crossing from minor streets	0	0	0

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	0	0
b.	0	0
c.	0	0
1.	No	No
2.	Yes	No
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	Nugent/Forks Road
Flow Conditions	Free flow (rural)	North-South Street	Highway 58
'T' Intersection	No	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

Yes

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				1070	223%	223%	Yes
B. Vehicle volume, along minor streets	120				236	196%	196%	Yes

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				835	174%	174%	Yes
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50							No

CONCLUSION

The results of the calculations show that justifications are **met**.

Therefore traffic control signal is **justified at this intersection for the horizon year**

2032 FT Sc1

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	Highway 58A (Townline Tunnel Rd)
Flow Conditions	Free flow (rural) ▼	North-South Street	Reaker Road
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Eastbound			Westbound				Total	Northbound			Southbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	174	592	0	0	427	60	1253	0	0	0	30	0	62	92	0	0		
PM Peak Hour	109	516	0	0	647	44	1316	0	0	0	90	0	121	211	0	0		
Total	283	1108	0	0	1074	104	2569	0	0	0	120	0	183	303	0	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1345	1527	718
Vehicle volume, along minor street	92	211	76
Vehicle volume, along major street	1253	1316	642
Combined vehicle and pedestrian volume crossing from minor streets	30	90	30

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 - 1. the left turn volume > 120
 - 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	30	90
b.	0	0
c.	0	0
1.	Yes	No
2.	No	Yes
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	Highway 58A
Flow Conditions	Free flow (rural)	North-South Street	Reaker Road
'T' Intersection	Yes	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				718	100%	100%	No
B. Vehicle volume, along minor streets	120				76	42%	42%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				642	89%	89%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50				30	40%	40%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc1**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	North Access
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Canal Bank Street
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	853	16	114	369	0	1352	0	0	0	41	0	277	318	20	0		
PM Peak Hour	0	539	41	280	585	0	1445	0	0	0	25	0	169	194	20	0		
Total	0	1392	57	394	954	0	2797	0	0	0	66	0	446	512	40	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1670	1639	827
Vehicle volume, along minor street	318	194	128
Vehicle volume, along major street	1352	1445	699
Combined vehicle and pedestrian volume crossing from minor streets	61	185	62

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	41	25
b.	0	0
c.	0	140
1.	No	Yes
2.	Yes	Yes
d.	20	20

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	North Access
Flow Conditions	Restricted flow (urban)	North-South Street	Canal Bank Street
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	No	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			827	77%	77%	No
B. Vehicle volume, along minor streets		170			128	50%	50%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			699	65%	65%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			62	55%	55%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc1**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	South Access
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Canal Bank Street
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	756	103	99	311	0	1269	0	0	0	180	0	113	293	20	0		
PM Peak Hour	0	532	153	64	819	0	1568	0	0	0	98	0	48	146	20	0		
Total	0	1288	256	163	1130	0	2837	0	0	0	278	0	161	439	40	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1562	1714	819
Vehicle volume, along minor street	293	146	110
Vehicle volume, along major street	1269	1568	709
Combined vehicle and pedestrian volume crossing from minor streets	200	118	80

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 - 1. the left turn volume > 120
 - 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	180	98
b.	0	0
c.	0	0
1.	No	No
2.	Yes	No
d.	20	20

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc1	East-West Street	South Access
Flow Conditions	Restricted flow (urban)	North-South Street	Canal Bank Street
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	No	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			819	76%	76%	No
B. Vehicle volume, along minor streets		170			110	43%	43%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			709	66%	66%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			80	71%	71%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc1**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	Nugent/Forks Road
Flow Conditions	Free flow (rural) ▼	North-South Street	Highway 58
		Major Street	North-South ▼
'T' Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Minor Street
Additional Comments			

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	774	71	0	783	226	1854	0	0	61	0	0	230	291	0	0		
PM Peak Hour	0	896	49	0	894	184	2023	0	0	90	0	0	265	355	0	0		
Total	0	1670	120	0	1677	410	3877	0	0	151	0	0	495	646	0	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	2145	2378	1131
Vehicle volume, along minor street	291	355	162
Vehicle volume, along major street	1854	2023	969
Combined vehicle and pedestrian volume crossing from minor streets	0	0	0

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	0	0
b.	0	0
c.	0	0
1.	No	No
2.	Yes	Yes
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	Nugent/Forks Road
Flow Conditions	Free flow (rural)	North-South Street	Highway 58
'T' Intersection	No	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

Yes

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				1131	236%	236%	Yes
B. Vehicle volume, along minor streets	120				162	135%	135%	Yes

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				969	202%	202%	Yes
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50							No

CONCLUSION

The results of the calculations show that justifications are **met**.

Therefore traffic control signal is **justified at this intersection for the horizon year**

2032 FT Sc2

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	Highway 58A (Townline Tunnel Rd)
Flow Conditions	Free flow (rural) ▼	North-South Street	Reaker Road
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Eastbound			Westbound				Total	Northbound			Southbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	169	641	0	0	422	60	1292	0	0	0	32	0	66	98	0	0		
PM Peak Hour	114	576	0	0	639	30	1359	0	0	0	76	0	120	196	0	0		
Total	283	1217	0	0	1061	90	2651	0	0	0	108	0	186	294	0	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1390	1555	736
Vehicle volume, along minor street	98	196	74
Vehicle volume, along major street	1292	1359	663
Combined vehicle and pedestrian volume crossing from minor streets	32	76	27

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	32	76
b.	0	0
c.	0	0
1.	Yes	No
2.	No	Yes
d.	0	0

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	Highway 58A
Flow Conditions	Free flow (rural)	North-South Street	Reaker Road
'T' Intersection	Yes	Major Street	East-West
Existing Intersection	Yes	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches	480				736	102%	102%	No
B. Vehicle volume, along minor streets	120				74	41%	41%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			120% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street	480				663	92%	92%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets	50				27	36%	36%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	North Access
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Canal Bank Street
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	1235	4	169	499	0	1907	0	0	0	3	0	374	377	20	0		
PM Peak Hour	0	744	1	362	1286	0	2393	0	0	0	1	0	223	224	20	0		
Total	0	1979	5	531	1785	0	4300	0	0	0	4	0	597	601	40	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	2284	2617	1225
Vehicle volume, along minor street	377	224	150
Vehicle volume, along major street	1907	2393	1075
Combined vehicle and pedestrian volume crossing from minor streets	108	202	77

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	3	1
b.	0	0
c.	85	181
1.	Yes	Yes
2.	Yes	Yes
d.	20	20

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	North Access
Flow Conditions	Restricted flow (urban)	North-South Street	Canal Bank Street
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	No	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			1225	113%	113%	No
B. Vehicle volume, along minor streets		170			150	59%	59%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			1075	100%	100%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			77	69%	69%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	South Access
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Canal Bank Street
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	No ▼	Approach lanes per direction	1 ▼ Major Street
Additional Comments		Approach lanes per direction	1 ▼ Minor Street

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road		
	Northbound			Southbound				Total	Eastbound			Westbound					Total	
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT					
AM Peak Hour	0	1010	5	154	348	0	1517	0	0	0	5	0	229	234	20	0		
PM Peak Hour	0	630	1	174	1113	0	1918	0	0	0	1	0	115	116	20	0		
Total	0	1640	6	328	1461	0	3435	0	0	0	6	0	344	350	40	0		

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1751	2034	946
Vehicle volume, along minor street	234	116	88
Vehicle volume, along major street	1517	1918	859
Combined vehicle and pedestrian volume crossing from minor streets	102	108	53

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

	AM	PM
a.	5	1
b.	0	0
c.	77	87
1.	Yes	Yes
2.	Yes	Yes
d.	20	20

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

401 CANAL BANK STREET - DAIN CITY - TIS

Analyst	NK	Jurisdiction	City of Welland
Agency or Company	WSP Canada Inc.	Date	June 30, 2020
Analysis Period	2032 FT Sc2	East-West Street	South Access
Flow Conditions	Restricted flow (urban)	North-South Street	Canal Bank Street
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	No	Approach lanes per direction	1
		Approach lanes per direction	1
			Major Street
			Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches		720			946	88%	88%	No
B. Vehicle volume, along minor streets		170			88	34%	34%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street		720			859	80%	80%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets		75			53	47%	47%	No

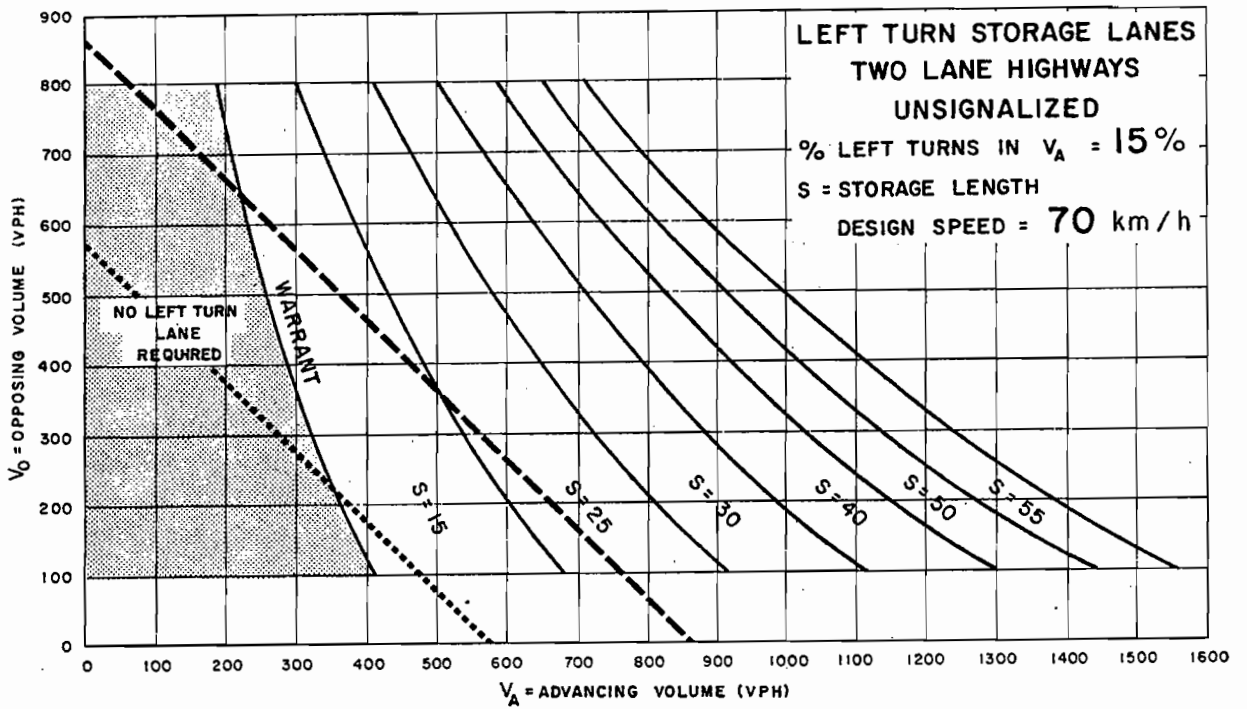
CONCLUSION

The results of the calculations show that justifications are **not met**.
Therefore traffic control signal is **not justified at this intersection for the horizon year 2032 FT Sc2**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

APPENDIX

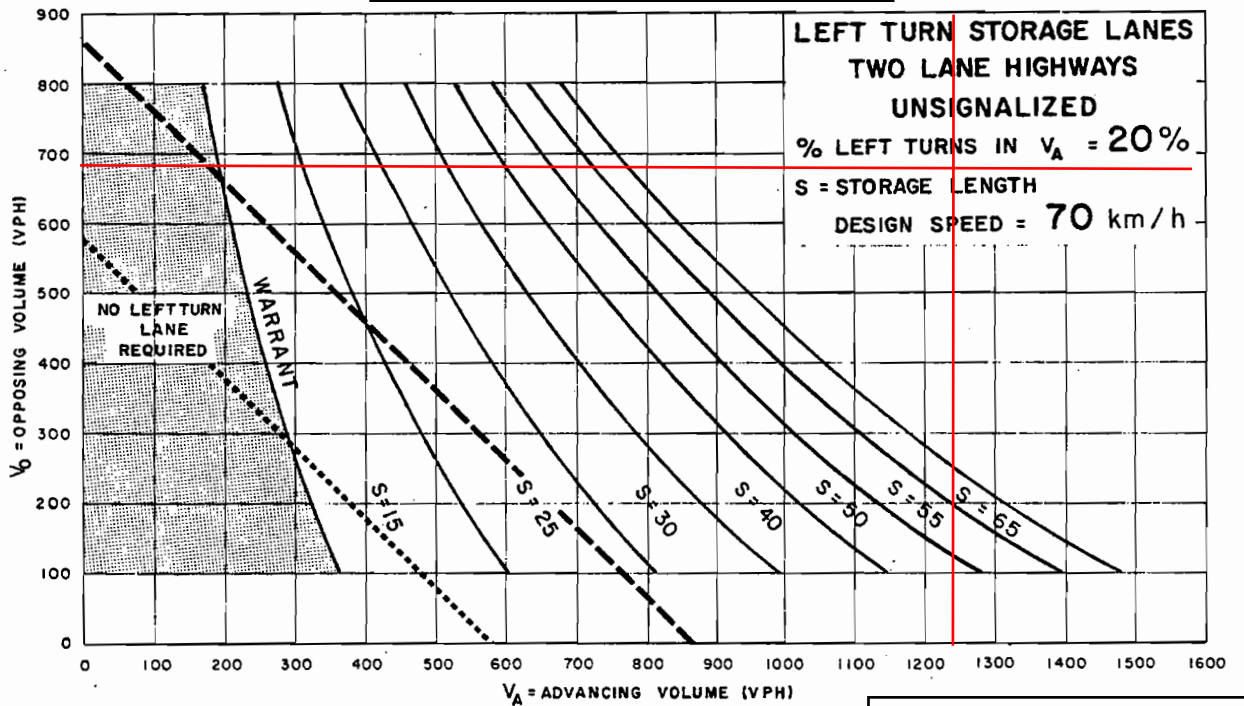
F TURNING LANE WARRANT ANALYSIS



----- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

2037 FT Sc1 - North Access - PM



PM Peak Hour
 $V_a = 1239$
 $V_L = 278$
 $\% = 22\%$
 $V_o = 693$

Figure EA-11

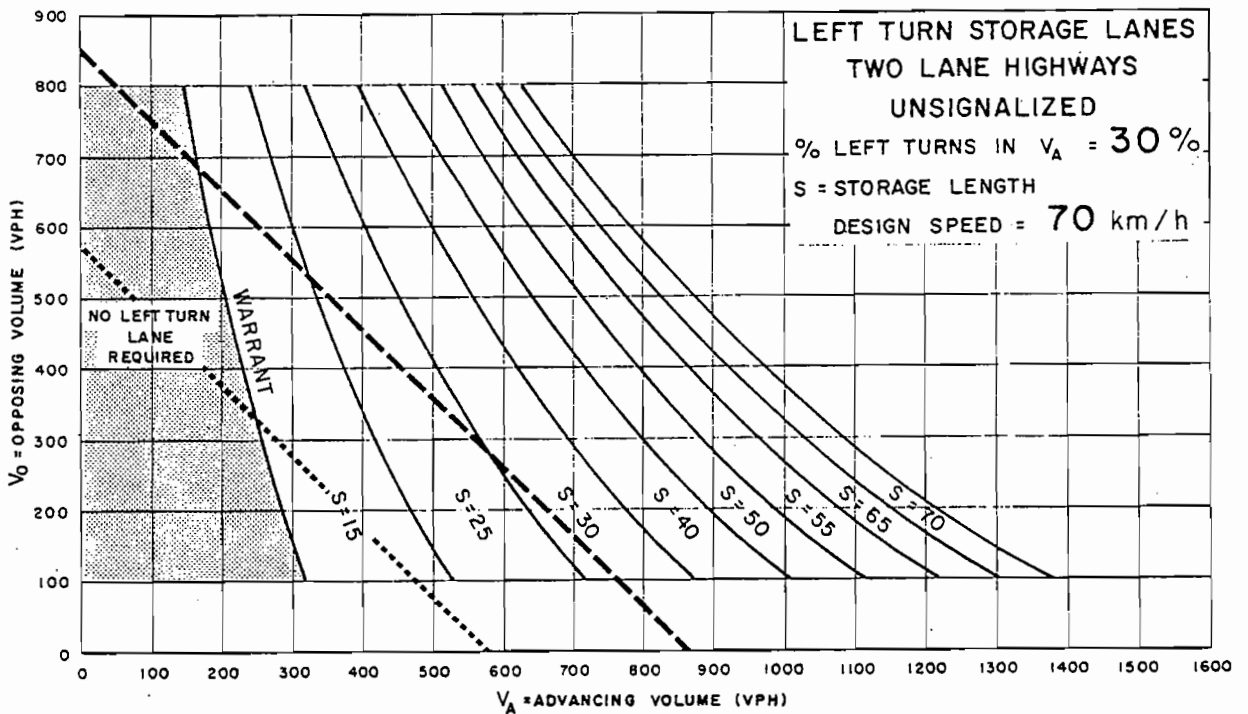
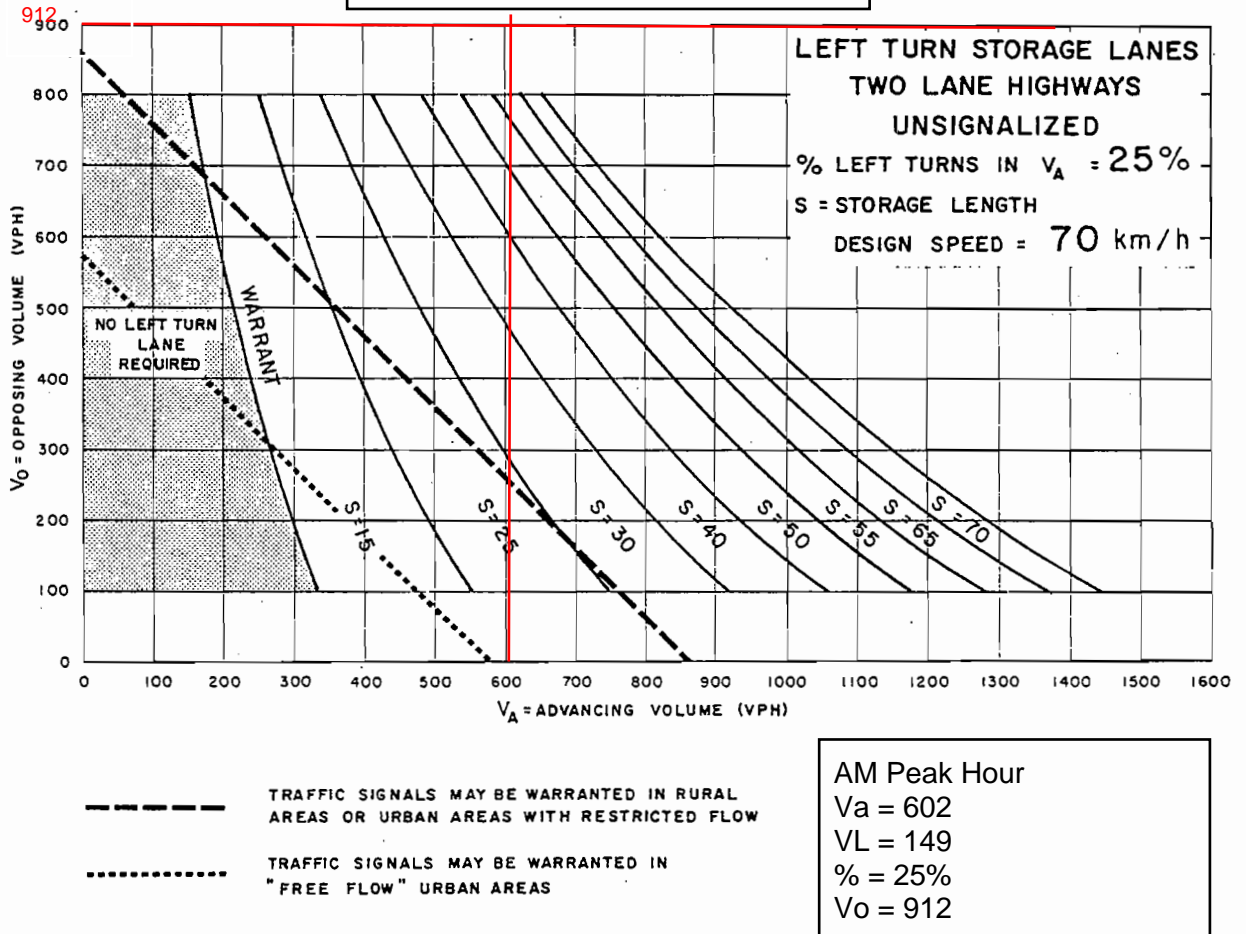
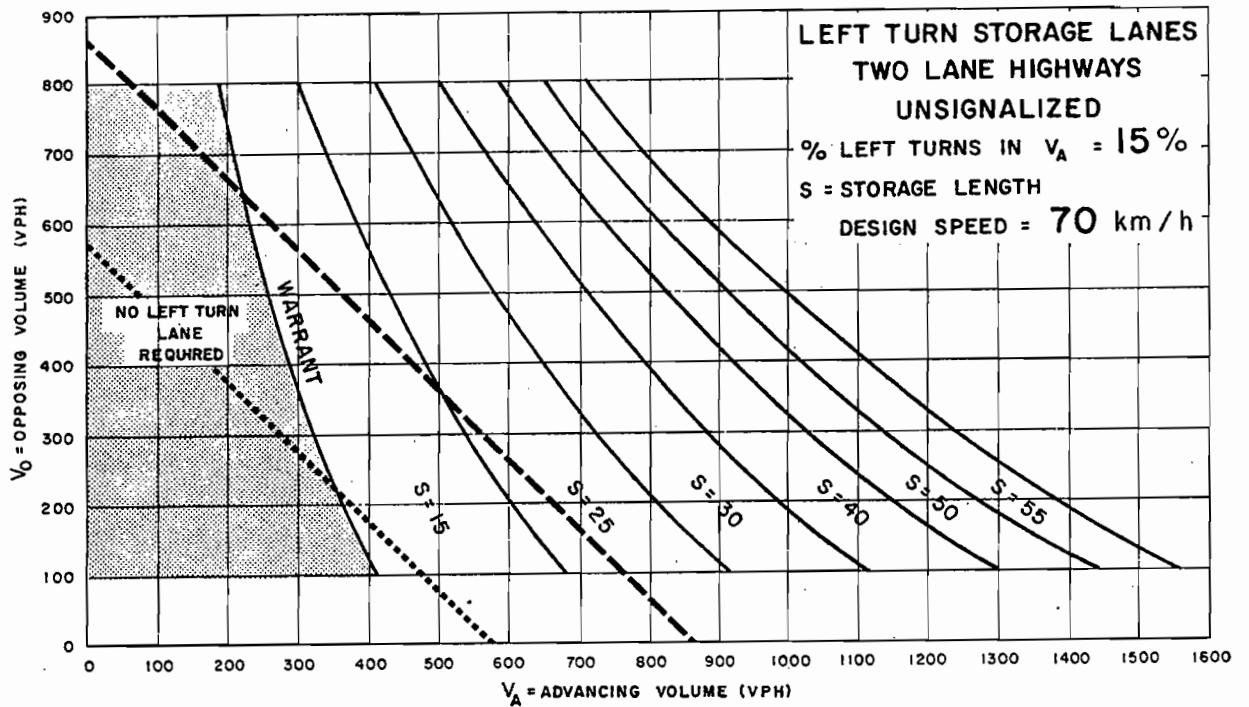


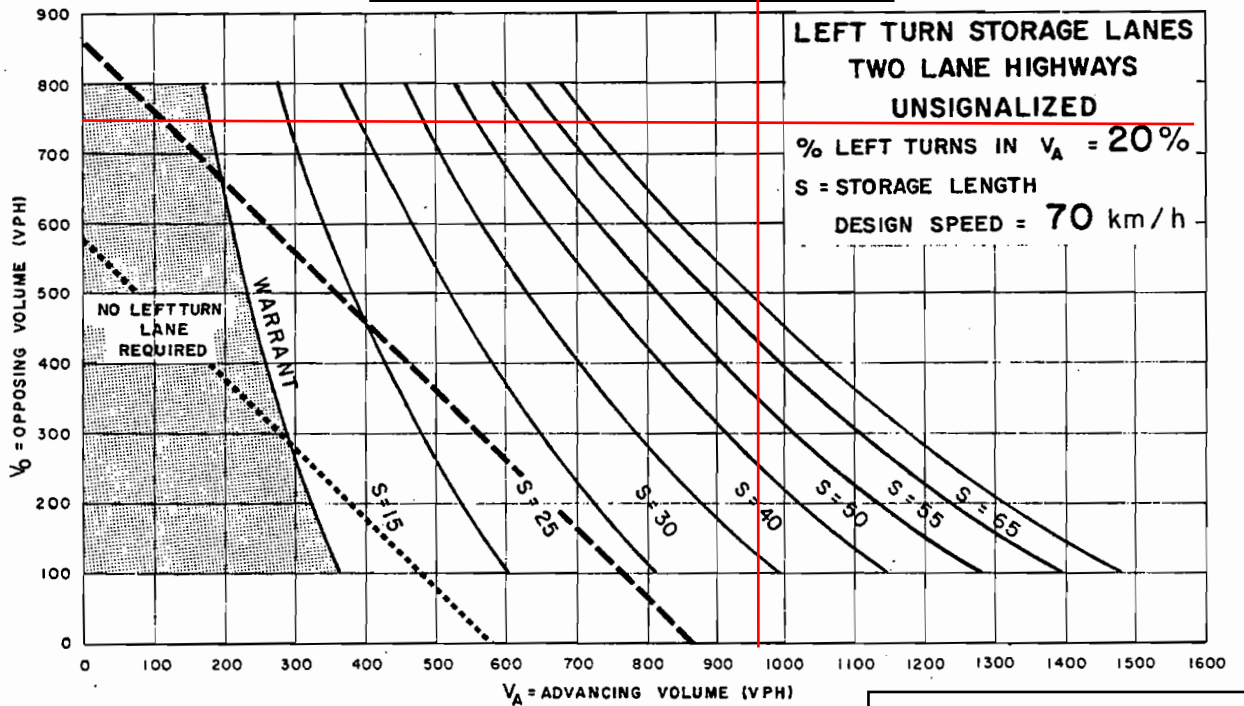
Figure EA-12



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

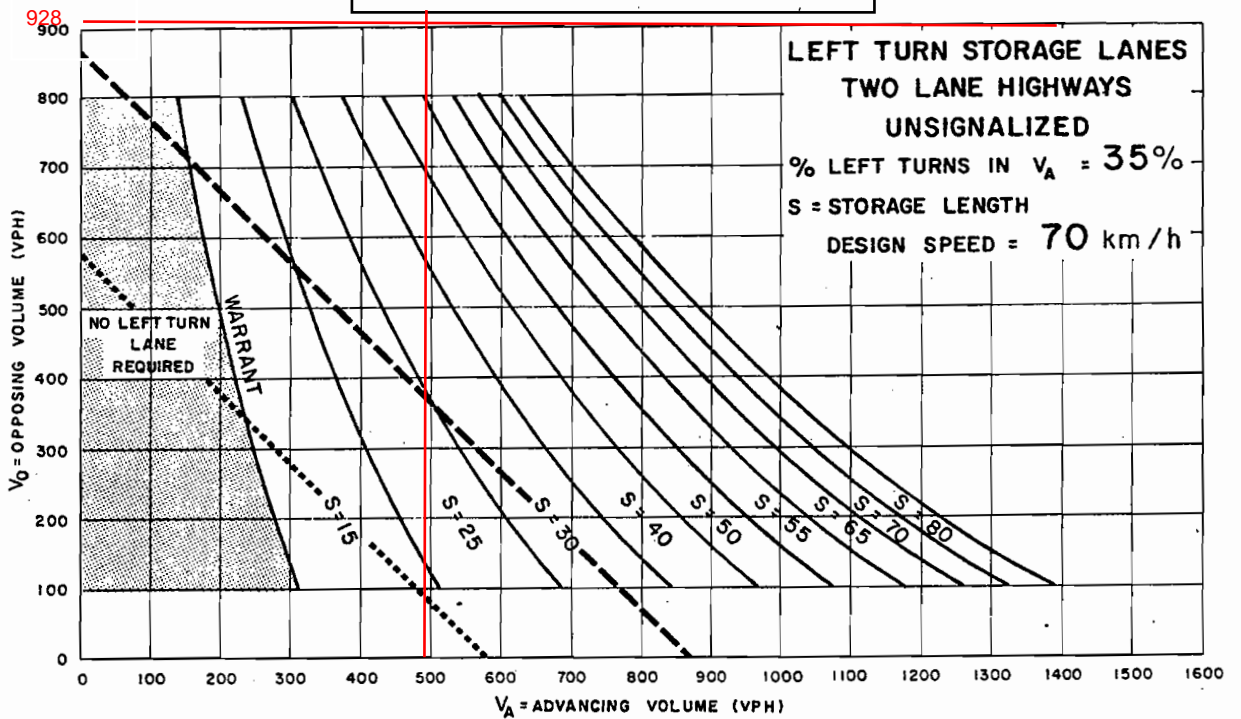
2037 FT Sc1 - South Access - PM



PM Peak Hour
 $V_a = 989$
 $V_L = 234$
 $\% = 23\%$
 $V_o = 742$

Figure EA-11

EA-12



- - - - - TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
 TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

AM Peak Hour
 $V_a = 497$
 $V_L = 183$
 $\% = 37\%$
 $V_o = 928$

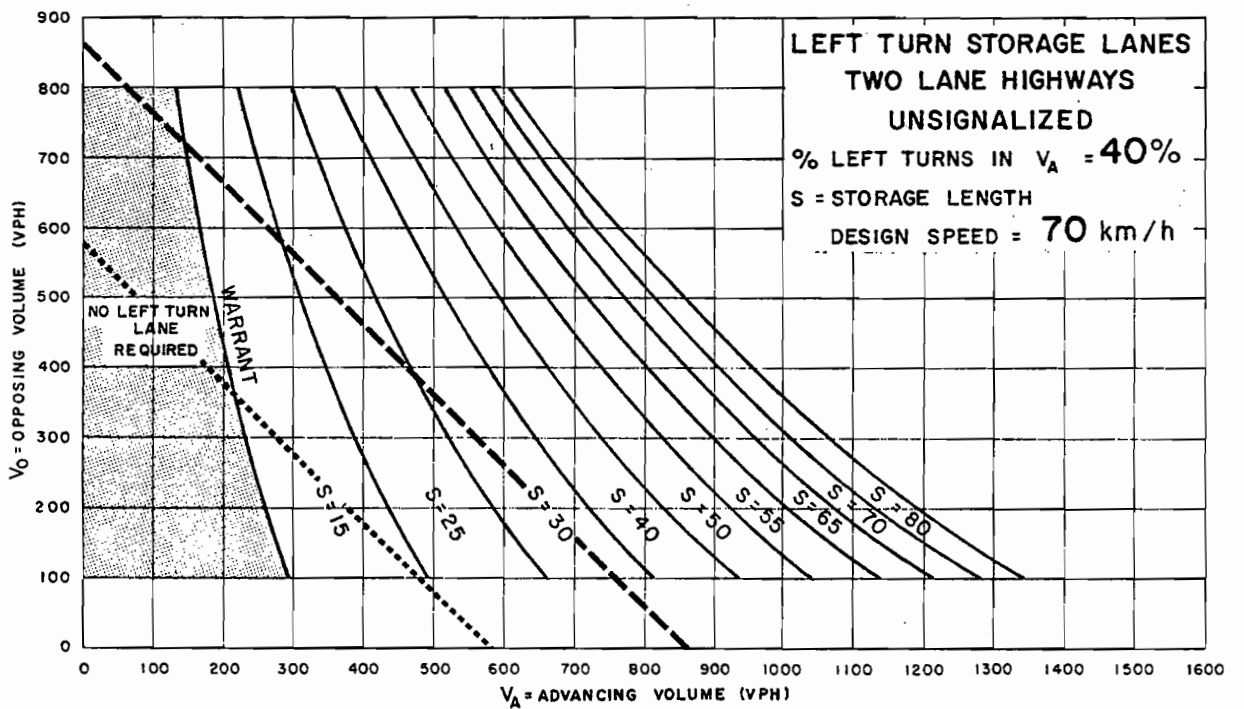
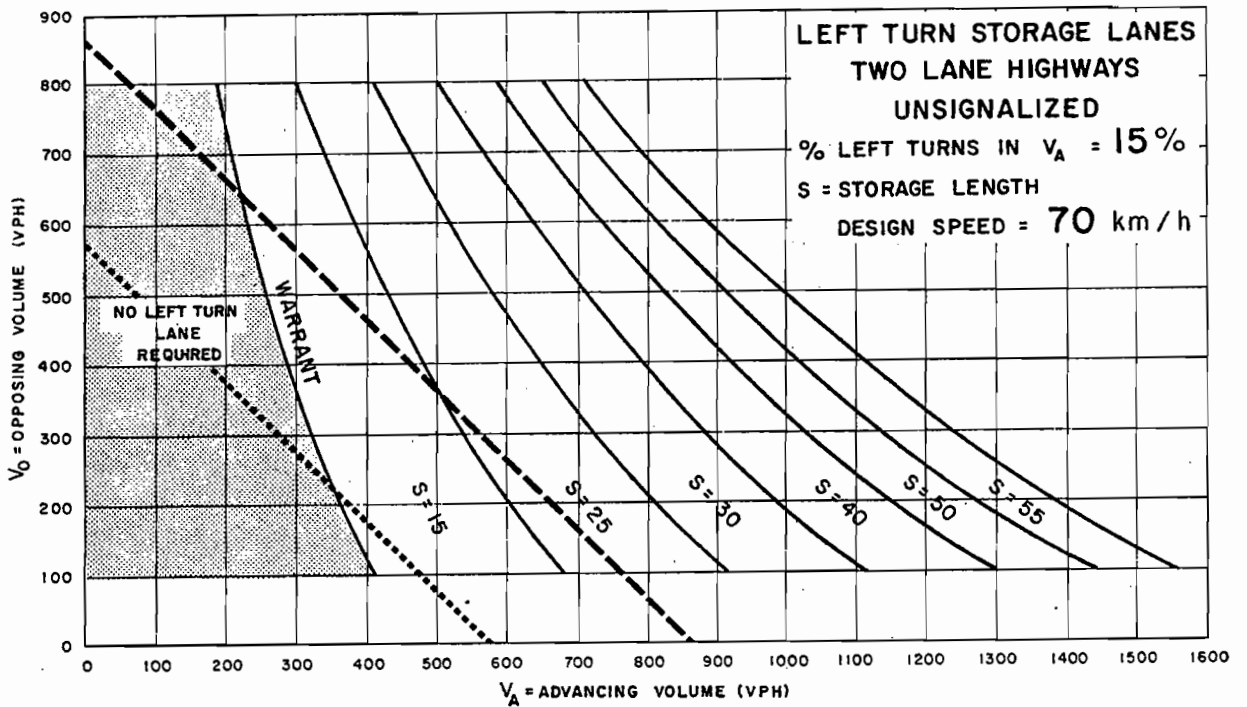


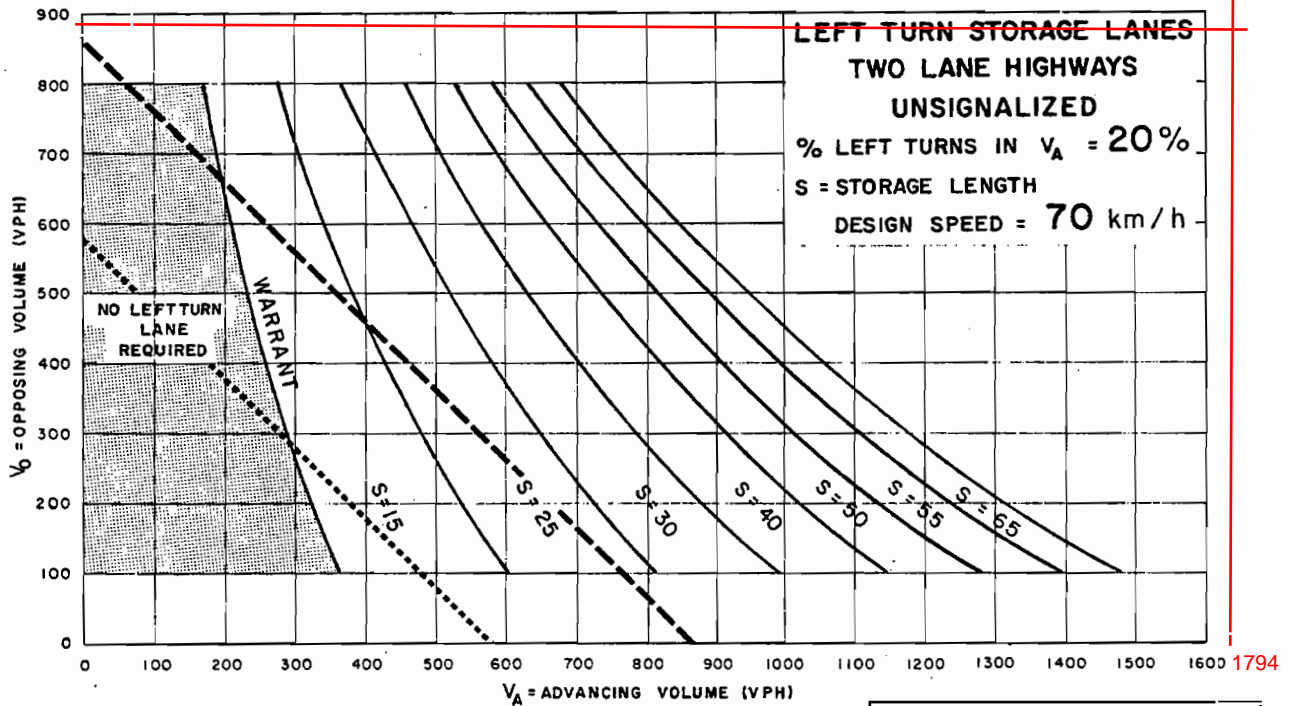
Figure EA-13



----- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

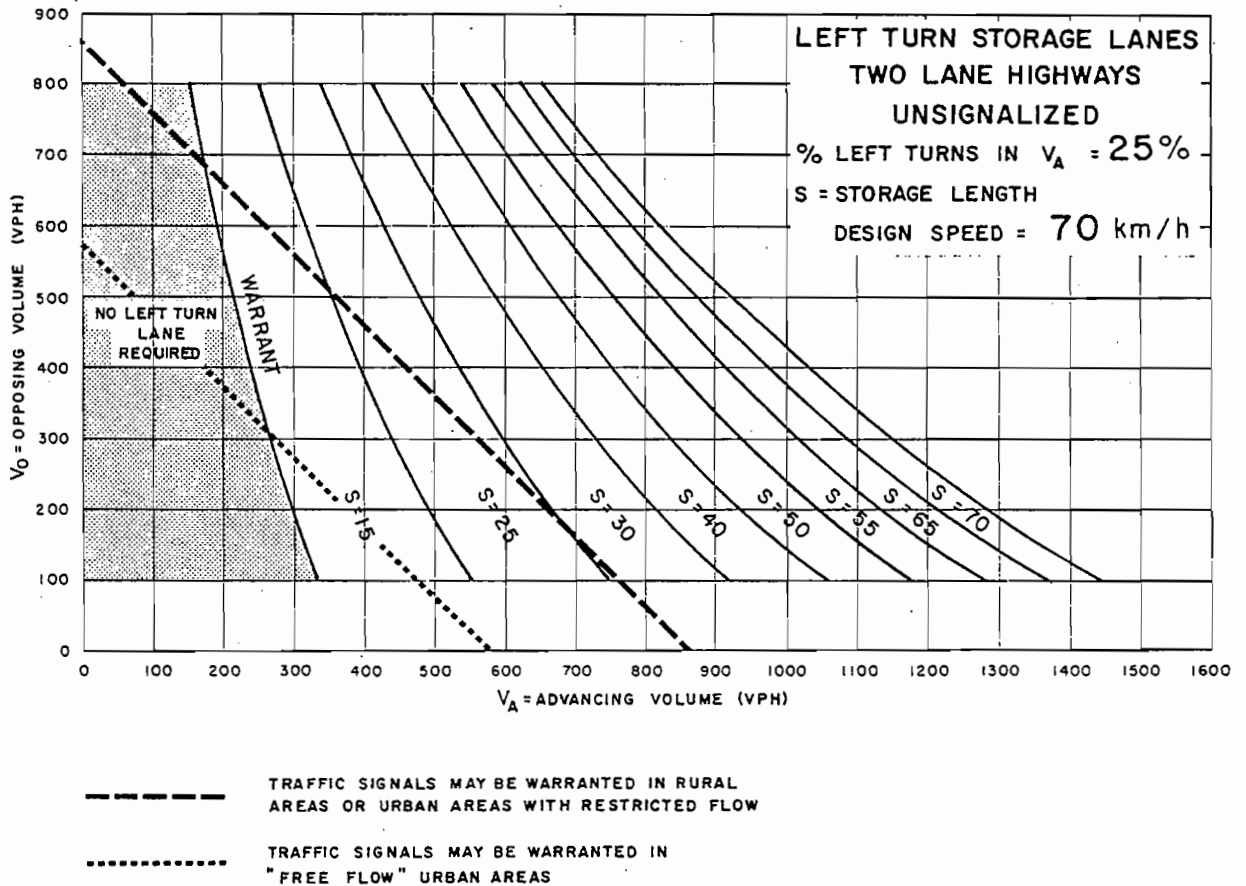
2037 FT Sc2 - North Access - PM



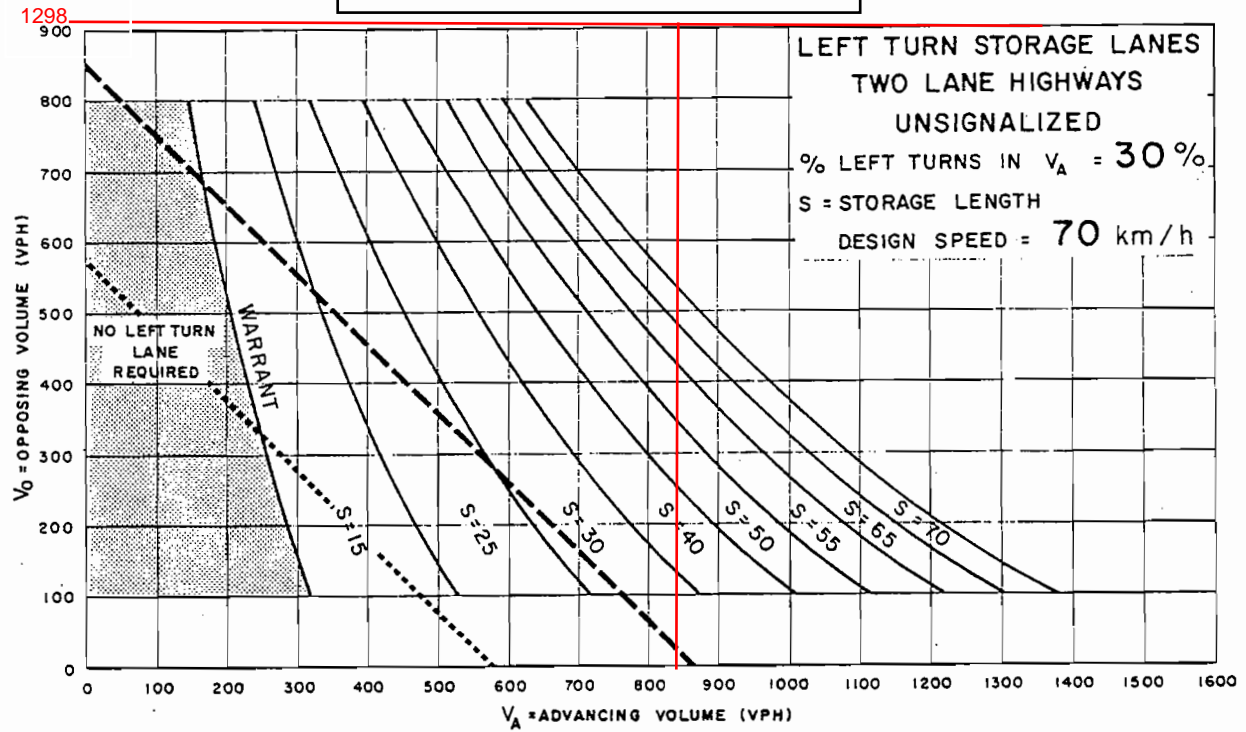
PM Peak Hour
 $V_a = 1794$
 $V_L = 391$
 $\% = 22\%$
 $V_o = 894$

Figure EA-11

EA-12



2037 FT Sc2 - North Access - AM



AM Peak Hour
 $V_a = 847$
 $V_L = 238$
 $\% = 28\%$
 $V_o = 1298$

Figure EA-12

EA-13

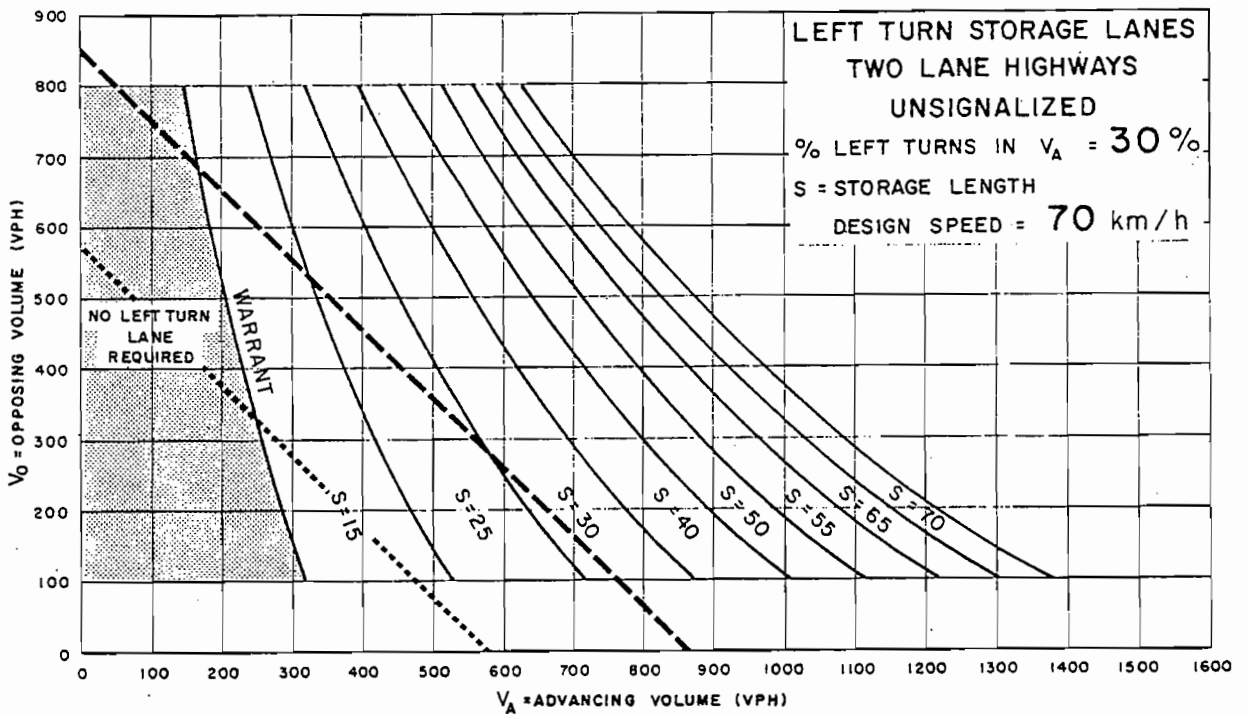
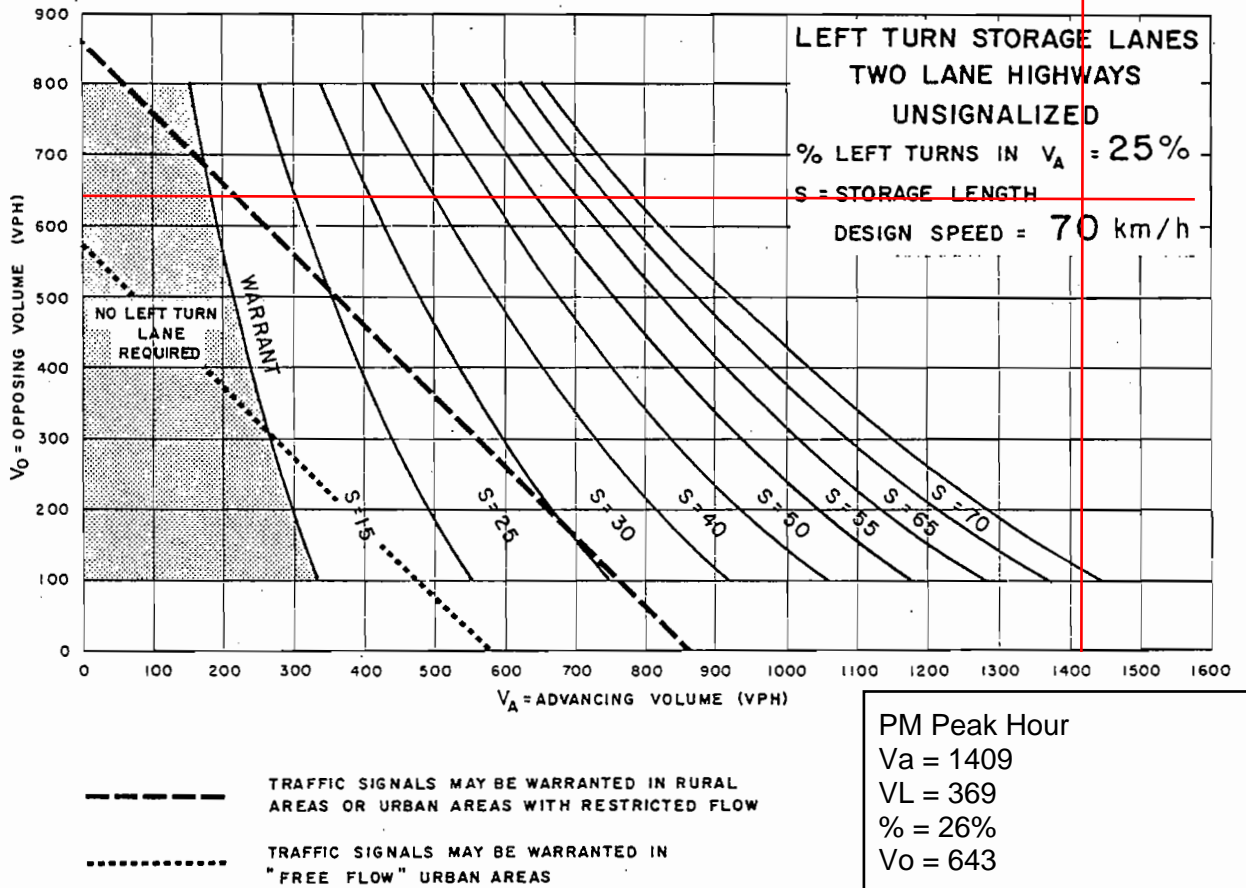
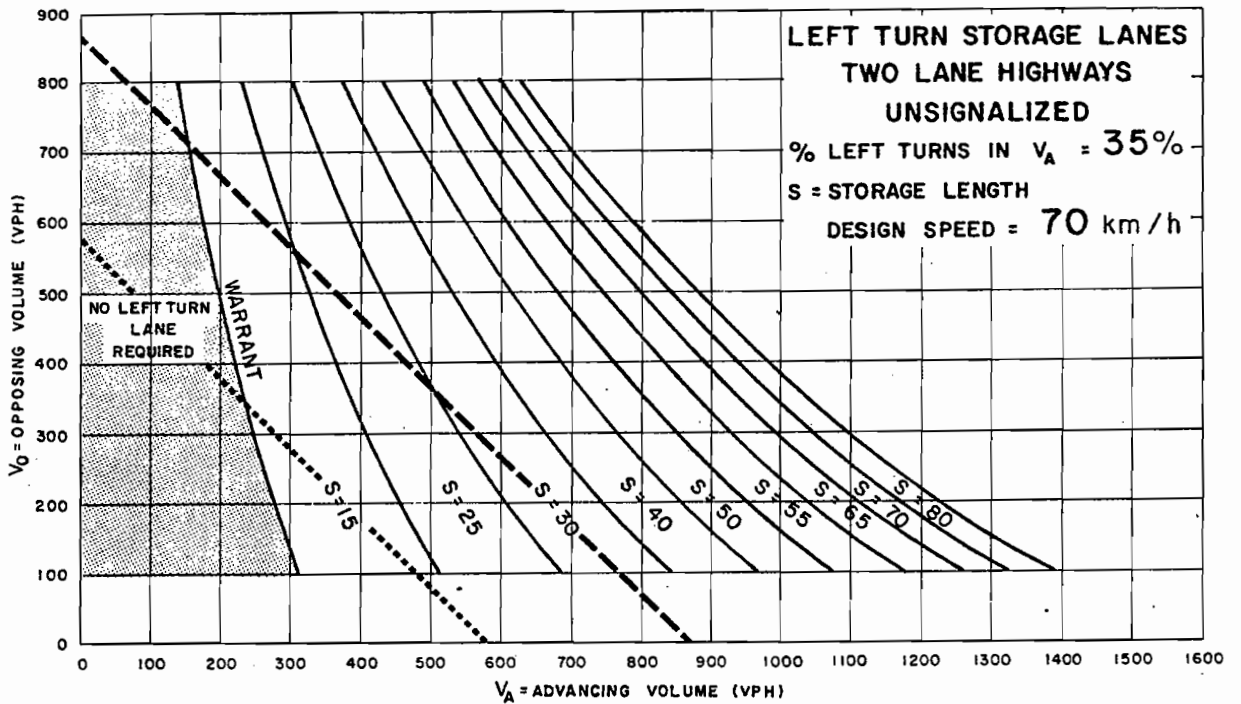


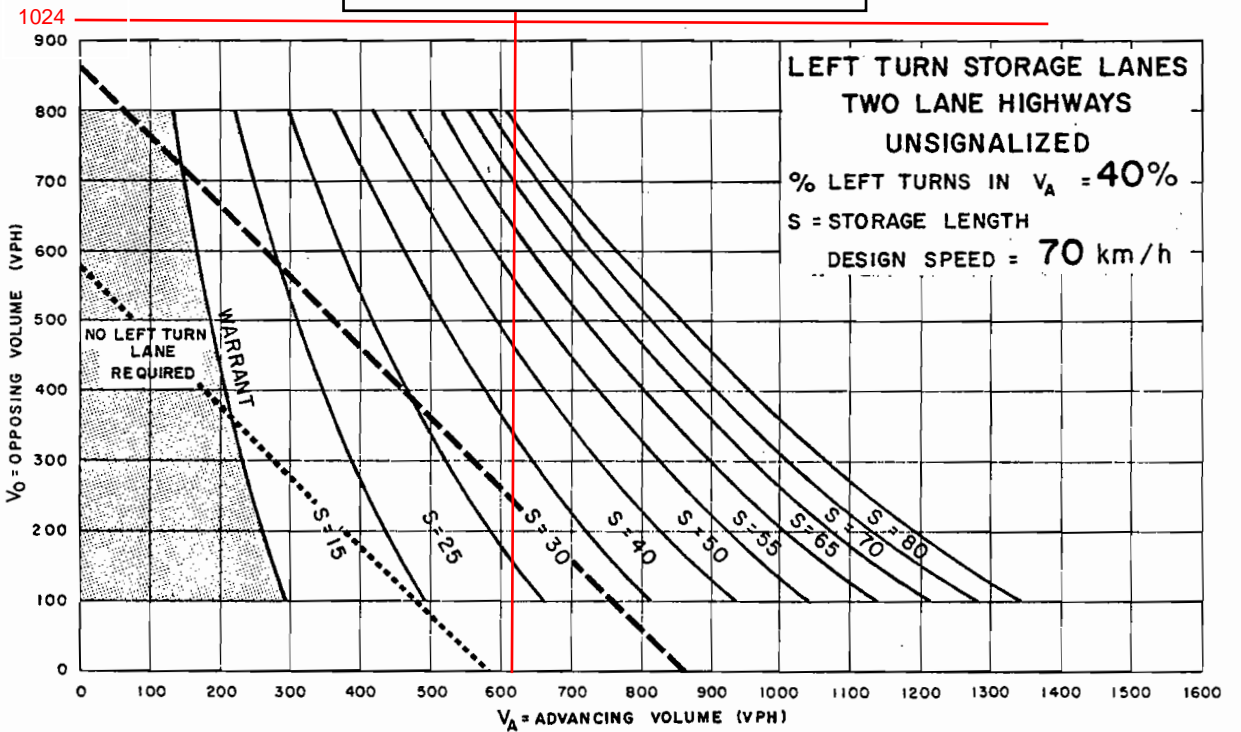
Figure EA-12



----- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

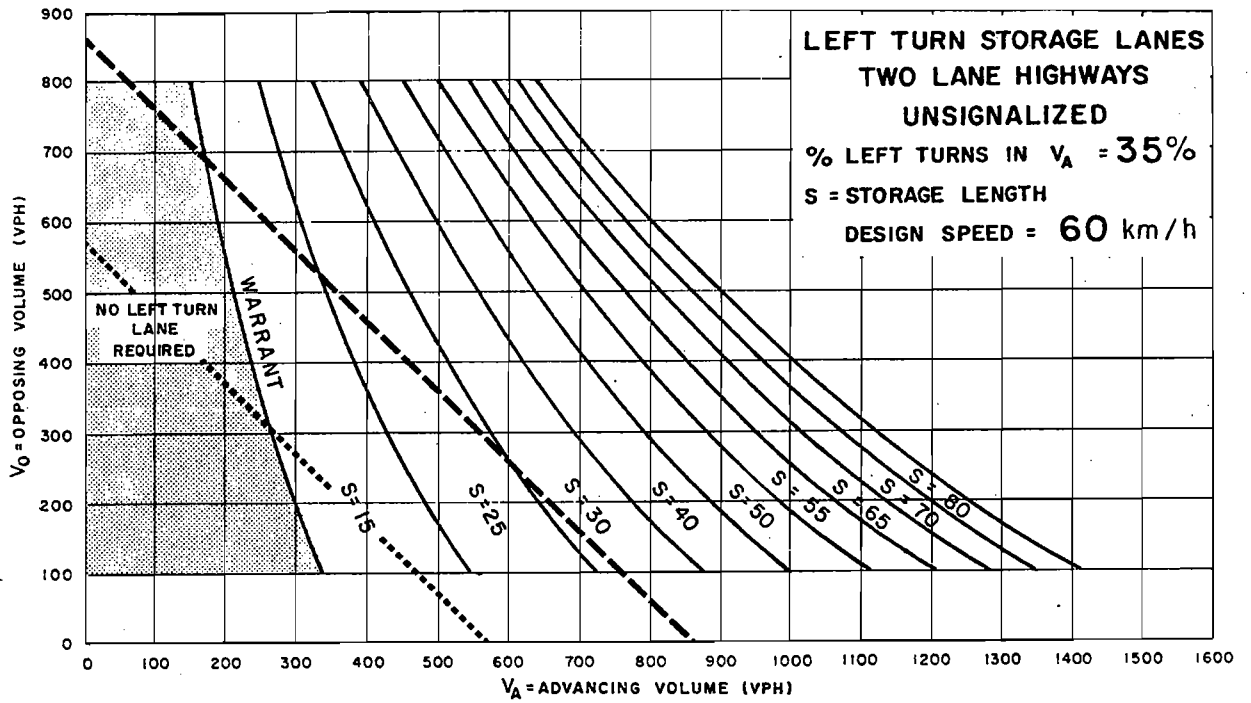
2037 FT Sc2 - South Access - AM



AM Peak Hour
 Va = 614
 VL = 264
 % = 43%
 Vo = 1024

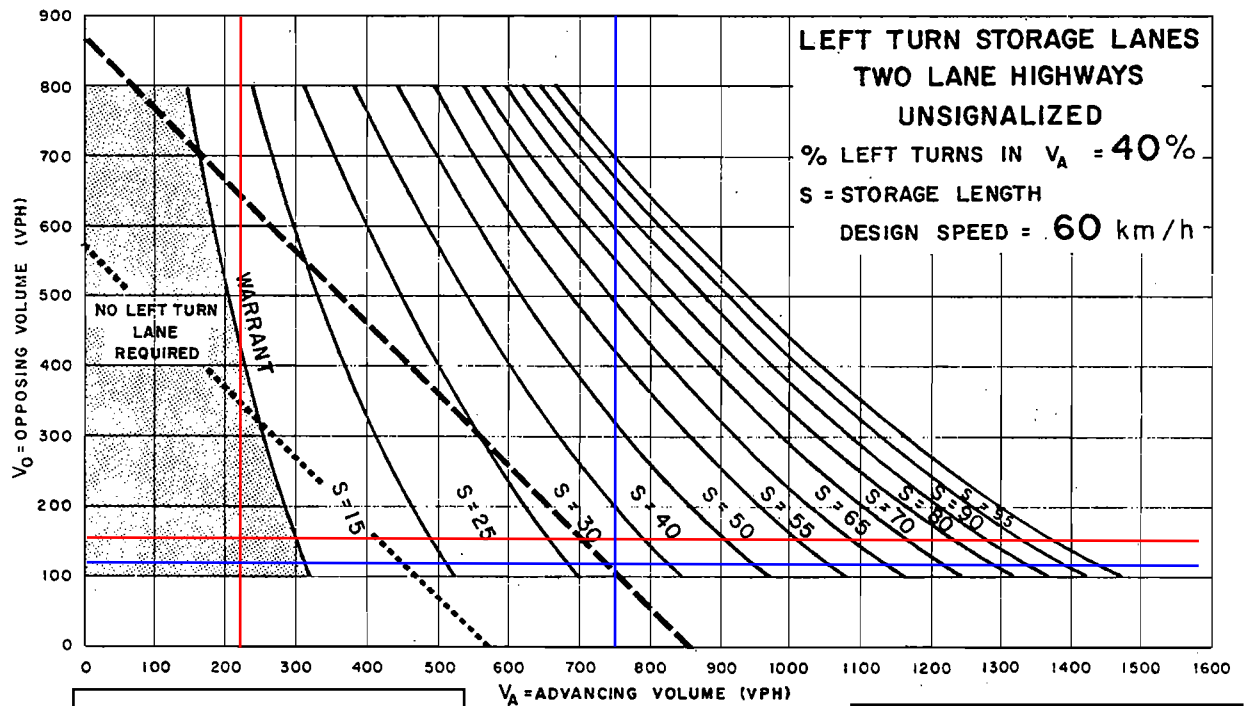
Figure EA-13

EA-14



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

2037 FT Sc1&2 - West Access - AM & PM



AM Peak Hour
 $V_a = 222$
 $V_L = 166$
 $\% = 75\%$
 $V_o = 173$

PM Peak Hour
 $V_a = 748$
 $V_L = 558$
 $\% = 75\%$
 $V_o = 112$

Figure EA-9

APPENDIX

G GRADE CROSSING WARRANT ANALYSIS

Horizon Year (Sc1)	Bi-Directional AM Peak Hour Volume	Bi-Directional PM Peak Hour Volume	Derived AADT Data	Number of Daily Train Crossings	AADT*# of Crossings	Is the 200,000 Threshold Met?	Is the Crossing Warranted?
2027 Future Total	950	1206	10780	12	129360	NO	NO
2032 Future Total (with Dain East Phase 1 Density)	1290	1523	14065	12	168780	NO	NO
2037 Future Total (with full Dain East Density)	1457	1741	15990	12	191880	NO	NO

