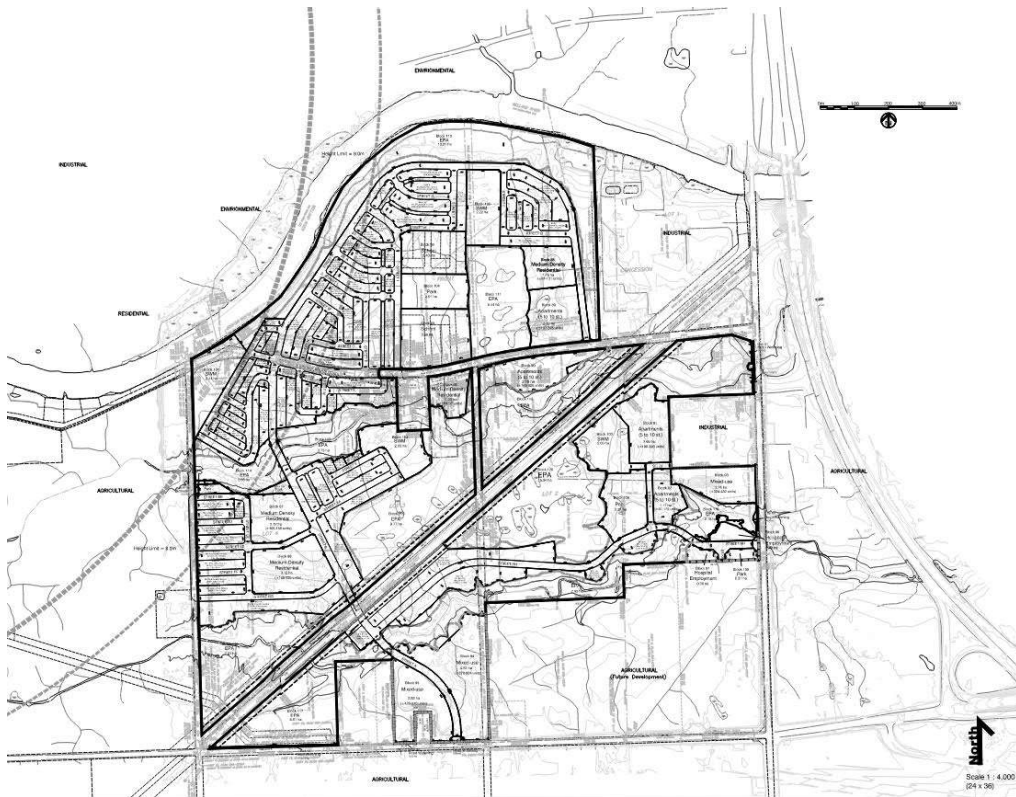


EMPIRE (GRAND NIAGARA) PROJECT GP INC.

TRANSPORTATION IMPACT STUDY

GRAND NIAGARA MIXED-USE DEVELOPMENT, CITY OF NIAGARA FALLS

FEBRUARY 3, 2023





TRANSPORTATION IMPACT STUDY

GRAND NIAGARA MIXED-USE DEVELOPMENT, CITY OF NIAGARA FALLS

EMPIRE (GRAND NIAGARA) PROJECT GP INC.

PROJECT NO.: 211-12072-00
DATE: FEBRUARY 3, 2022

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February 3, 2022

Jeffrey Swartz
Vice President,
Land Development
Empire (Grand Niagara) Project GP Inc.

Dear Mr. Swartz,

Subject: Transportation Impact Study
Grand Niagara, Proposed Mixed-use Development
City of Niagara Falls


WSP Canada Inc. (WSP) is pleased to present the findings of our Transportation Impact Study (TIS) for the proposed Grand Niagara mixed-use development in the city of Niagara Falls.

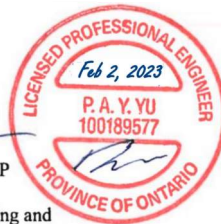
Based on the enclosed study findings, it is expected that the proposed development can be accommodated by the study area's transportation network.

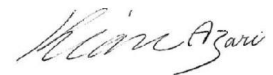
We thank you for the opportunity to undertake this study. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,

WSP Canada Inc.


Peter Yu, P.Eng., PMP
Project Manager,
Transportation Planning and
Science




Kian Azari, P.Eng.
Transportation Planner

WSP ref.: 211-12072-00



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EXECUTIVE SUMMARY

This Traffic Impact Study evaluates the impact of the proposed Grand Niagara development located in the City of Niagara Falls. The Grand Niagara development is a mixed-use community consisting of a maximum of 5,387 residential units (1,019 detached and semi-detached units, 529 townhouses and 3,839 medium density units) and a total of 8,750 sq.m. retail/office GFA. The subject site will be served by Grassy Brook Road, two new roads: Street A and Street HH connecting to Biggar Road and Montrose Road, and a private driveway onto Montrose Road. The development is expected to be 50% built by 2031 and fully constructed and occupied by 2036.

WSP had completed a Secondary Plan (SP) TIS dated June 2017, which includes the subject lands being submitted in this application. Since the SP, the Region has undertaken the Montrose Road and Lyons Creek Road / Biggar Road Municipal Class Environmental Assessment dated November 2021 (herein referred to as the Montrose/Lyons/Biggar EA) to identify the transportation infrastructure required in the study area to accommodate the anticipated growth from the SP. Both of these studies account for a set of land use and density for the subject site, which has since been updated based on the current context. The focus of this study is to evaluate the traffic influence with the proposed package of uses. It should be noted that the infrastructure recommendations from the Montrose/Lyons/Biggar EA have been carried forward in this study.

Based on the analysis contained in this report as per methodologies confirmed with the City, Region and MTO in the terms of reference, our conclusions are as follows:

- Under the existing conditions, all of the study intersections are operating at an acceptable LOS during the a.m. and p.m. peak hours.
- The full built-out of the Grand Niagara development based on the maximum buildable density is forecast to generate 1,964 trips during the weekday a.m. peak hour and 2,673 trips during the weekday p.m. peak hour. Under 50% buildout, the proposed development is expected to generate 982 auto trips during the a.m. peak hour and 1,337 auto trips during the p.m. peak hour.
- Under 2031, 2036 and 2041 future background conditions, all of the study signalized intersections operate at acceptable levels of service 'D' or better during the a.m. and p.m. peak hours. Provisions for traffic signal installations are recommended at the intersections of Lyons Creek Road and QEW northbound off-ramp and Montrose Road and Oakwood Drive under 2036 and 2041 future background traffic conditions.
- Based on the future total evaluations, all of the signalized study intersections are forecast to continue operating at an acceptable levels of service 'D' or better with all movements operating within capacity during the a.m. and p.m. peak hours.
- Under 2031 future total conditions, most of the unsignalized intersections in the study area are projected to be busier but still operational and it is recommended that the volumes be monitored and a series of traffic assessment and warrants be done at the time (i.e., 50% buildout) to determine whether intersection control improvements are required. Traffic signals are not likely yet triggered by 2031 except at Biggar Road and Street A since the traffic evaluation conducted is based on the maximum potential density and very conservative Synchro parameters that assume traffic patterns remain the same as existing conditions.

- Based on the maximum density scenario, by 2036 and 2041, it is anticipated that the 3 stop controlled study intersections along Montrose Road at Chippawa Creek Road, Grassy Brook Road and Reixinger Road/Street HH will need to be signalized. The findings are very similar to those presented in the Montrose/Biggar/Lyons EA by the Region in 2021.
- Overall, the findings indicate that the site-generated traffic from the Grand Niagara development can be accommodated by the future planned road network and all of the study intersections will operate adequately with the planned and recommended improvements. The study findings may be considered worst-case scenario since it is based on the maximum buildable density, and assumes that the existing traffic patterns (PHF, saturation flow rate, etc) continue to apply for the future horizons (including 18 years into the future) This is very conservative since as traffic volumes increase, the uniformity of traffic arrival pattern and flow rates tend to increase as well. Hence, the recommended updated traffic assessments and warrants at 50% build out is intended to confirm the required improvements.

1 INTRODUCTION

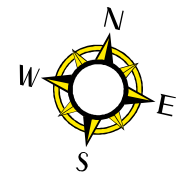
WSP Canada Inc. (WSP) was retained by Empire (Grand Niagara) Project GP Inc. to prepare a Transportation Impact Study (TIS) for the proposed Grand Niagara development located in the City of Niagara Falls. The Grand Niagara development is bound by the Welland River on the north, Biggar Road to the south, Montrose Road to the east and Crowland Avenue to the west. The study area is shown in Figure 1-1.

By way of background, WSP had completed a Secondary Plan (SP) TIS, which included the subject lands being submitted in this application, in June 2017. In addition, since the SP, the Region has undertaken the Montrose Road and Lyons Creek Road / Biggar Road Municipal Class Environmental Assessment dated November 2021 (herein referred to as the Montrose/Lyons/Biggar EA) to identify the transportation infrastructure required in the study area to accommodate the anticipated growth from the SP. Both of these background studies have been referenced and built upon in this TIS.

The Grand Niagara development is a mixed-use community that contains a mix of residential, commercial and office uses. The traffic assessment in this TIS conservatively accounts for the maximum density that can be achieved within the subject site, which totals 5,387 residential units (1,019 detached and semi-detached units, 529 townhouses and 3,839 medium density units) and a total of 8,750 sq.m. retail/office gross floor area (GFA) uses. Access to the Grand Niagara development is proposed via Grassy Brook Road, an east-west road (Street HH), a private driveway onto Montrose Road (serving mixed-use block 93) and a north-south road (Street A) onto Biggar Road. In addition, other internal roadways provide access to different blocks within the proposed development. The layout of the proposed development is shown in the Draft Plan of Subdivision in Figure 1-2 dated January 26, 2023.

A terms of reference (ToR) was confirmed with the City of Niagara Falls, Niagara Region and MTO transportation staff at the onset of the project and the correspondences are documented in Appendix A. The ToR comments received have been incorporated in this study.

The objective of this study is to evaluate the level of traffic impact the proposed development will have on the boundary transportation network and to identify improvements where necessary. Our study approach and findings are documented herein.



Legend

● Study Intersection

Figure 1-1
Site Location

2 EXISTING CONDITIONS

This section of our assessment describes the existing road network and traffic conditions within the study area.

2.1 ROADWAY NETWORK

The characteristics of the boundary roads in the vicinity of the site are summarized as follows:

- The Queen Elizabeth Way (QEW) is a north-south provincial highway that connects the Canada / United States border at Fort Erie with Toronto. The highway includes a two-lane cross-section and operates in both directions with a posted speed limit of 100 km/h.
- Lyons Creek Road (Regional Road 47) is an east-west arterial road with a two-lane cross-section and operates with a posted speed limit of 80 km/h. It provides a connection to the QEW and at the interchange with the QEW, Lyons Creek Road widens to a four-lane cross-section.
- Biggar Road is an east-west rural road with a two-lane cross-section and operates in both directions with a posted speed limit of 80 km/h. Biggar Road forms the southern boundary of the Grand Niagara development.
- Montrose Road (Regional Road 98) is a north-south arterial road with a two-lane cross-section. The posted speed limit along the roadway between Chippawa Creek Road and Reixinger Road is 70 km/hr and transitions to 80 km/hr south of Reixinger Road to Lyons Creek Road/Biggar Road. Montrose Road forms the eastern boundary of the development.
- Chippawa Creek Road (Regional Road 63) is an east-west arterial roadway with a two-lane cross-section and operates in both directions with a posted speed limit of 50 km/h.
- Grassy Brook Road is an east-west rural road with a two-lane cross-section and operates in both directions with a posted speed limit of 40 km/h. Grassy Brook Road will provide access through the northern portion of the Grand Niagara development.
- Oakwood Drive is a north-south rural road with a two-lane cross-section and operates in both directions with a posted speed limit of 40 km/h.
- Crowland Avenue is a north-south road with a two-lane cross-section and operates in both directions. Crowland Avenue forms the western boundary of the study area. At the time of the traffic count at the Crowland Avenue/Biggar Road intersection, this intersection was a 4-legged intersection. However, since then the north leg of Crowland Avenue at Biggar Road has been closed off and the intersection operates as a 'T' intersection. For the purpose of this assessment, the existing conditions evaluates the 4-legged arrangement, while the future conditions adopts the 3-legged 'T' intersection configuration. It should be noted that the traffic volumes to/from the north leg of Crowland at Biggar is minimal (1 to 2 trips during peak hour) and has minimal impact on the findings of the study. The assumed speed limit is 50 km/h.

Based on the terms of reference, the following study intersections have been evaluated in this TIS:

- Montrose Road & Biggar Road/Lyons Creek Road (signalized);
- Lyons Creek Road & QEW southbound off-ramp (unsignalized);
- Lyons Creek Road & QEW northbound off-ramp (unsignalized);
- Montrose Road & Chippawa Creek Road (unsignalized);
- Montrose Road & Oakwood Drive (unsignalized);
- Montrose Road & Grassy Brook Road (unsignalized);
- Montrose Road & Reixinger Road (unsignalized); and
- Biggar Road/Crowland Avenue (unsignalized).

The existing lane configurations and traffic controls at the study intersections are shown in Figure 2-1. It should be noted that Crowland Avenue, north of Biggar Road, was not closed at the time of collecting traffic counts in 2019. Therefore, Crowland Avenue and Biggar Road intersection is evaluated as a four-leg intersection under the existing conditions.

2.2 EXISTING TRANSIT SERVICES

The study area lies approximately 2.5 km south of Niagara Square, a shopping centre and transit hub. The study area is served by the following transit operators:

Niagara Region Transit: Two transit routes operate along Montrose Road and Biggar Road/Lyons Creek Road:

- Route 60/65: This route operates between Niagara College Welland and Niagara Falls along Montrose Road, a route which would likely have stops added to serve the proposed development. The route connects Wellington Terminal to Niagara Falls, stopping at Niagara Square to provide opportunities to transfer to Niagara Falls Transit routes; and
- Route 22: This route begins at Niagara Square and runs along Montrose Road to Lyons Creek Road to the Queen Elizabeth Way and terminates at the Leisureplex in Fort Erie.

The Niagara Region transit route map is shown in Figure 2-2.

Figure 2-2: Niagara Region Transit Routes



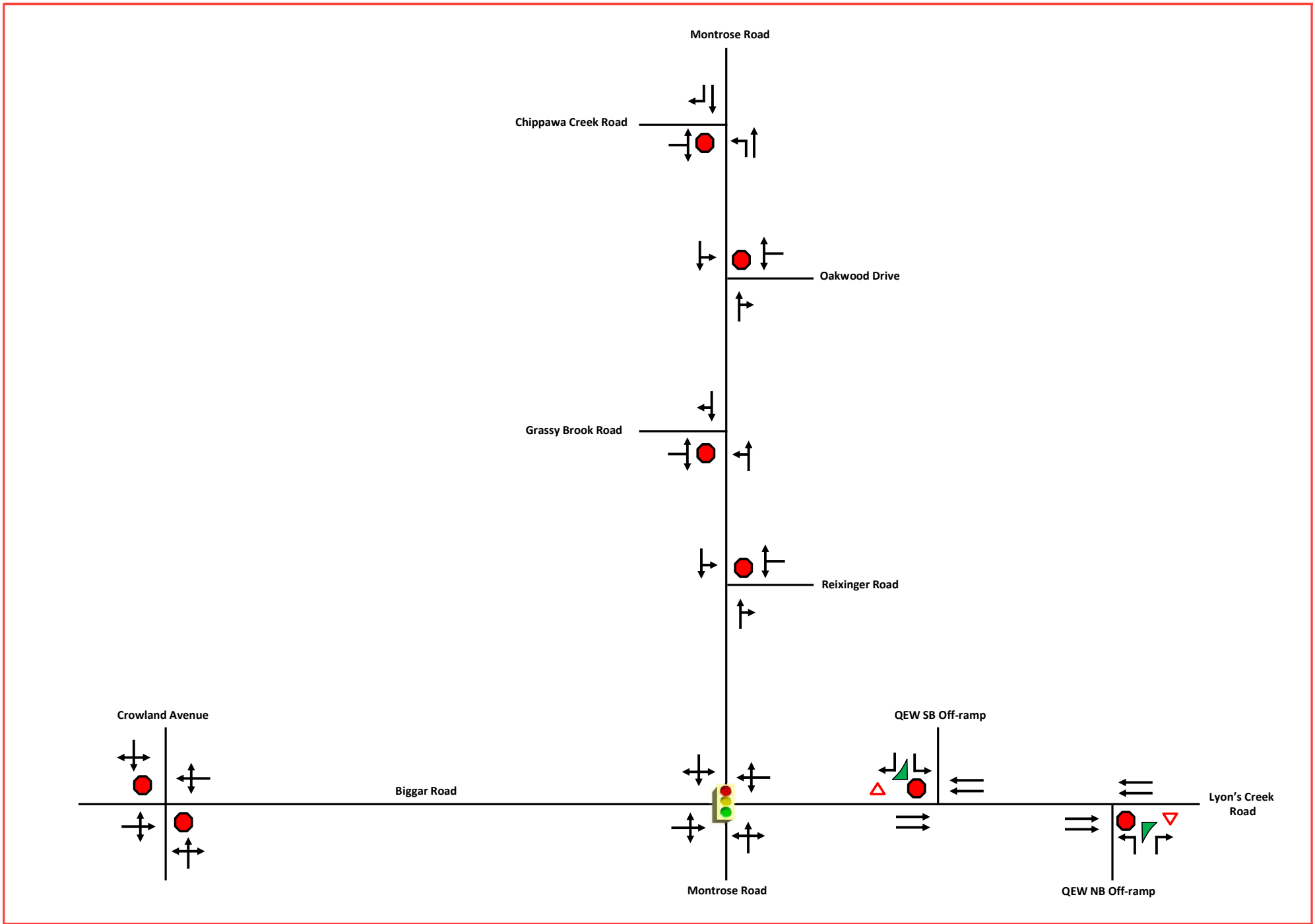


Figure 2-1
Existing Lane Configurations

City of Niagara Falls Transit: Niagara Falls Transit does not currently operate routes in the vicinity of the study area; however, the transit agency offers the TransCab service which shuttles passengers from areas in the proposed development vicinity to the regular Niagara Falls Transit system at zone-specific transfer hubs. TransCab zones are in effect Monday to Saturday, 6:00 a.m. to 6:30 p.m..

2.3 ACTIVE TRANSPORTATION NETWORK

No major multi-use trails or active transportation facilities currently exist in the study area. In addition, there are no existing cycling facilities immediately accessible to the subject site. However, on-road bike facilities are provided on both sides of Chippawa Creek and some parts of Lyons Creek Road. Figure 2-3 illustrates the existing active transportation facilities in the study area.

Figure 2-3: Existing Active Transportation Facilities



Source: Niagara Region Cycling Map

2.4 TRAFFIC DATA

Due to the COVID-19 pandemic and the various Public Health restrictions in place at the time of preparing this TIS, no new traffic counts were conducted as part of this study (as requested in the ToR discussion). This is because traffic volumes would not have represented typical traffic conditions. Instead, the most recent historical TMCs prior to the pandemic have been reviewed and acquired from traffic count consultants. Table 2.1 summarizes the list of turning movement counts (TMC) collected for this study, as well as the source and date of the counts.

Table 2.1: Traffic Data Information

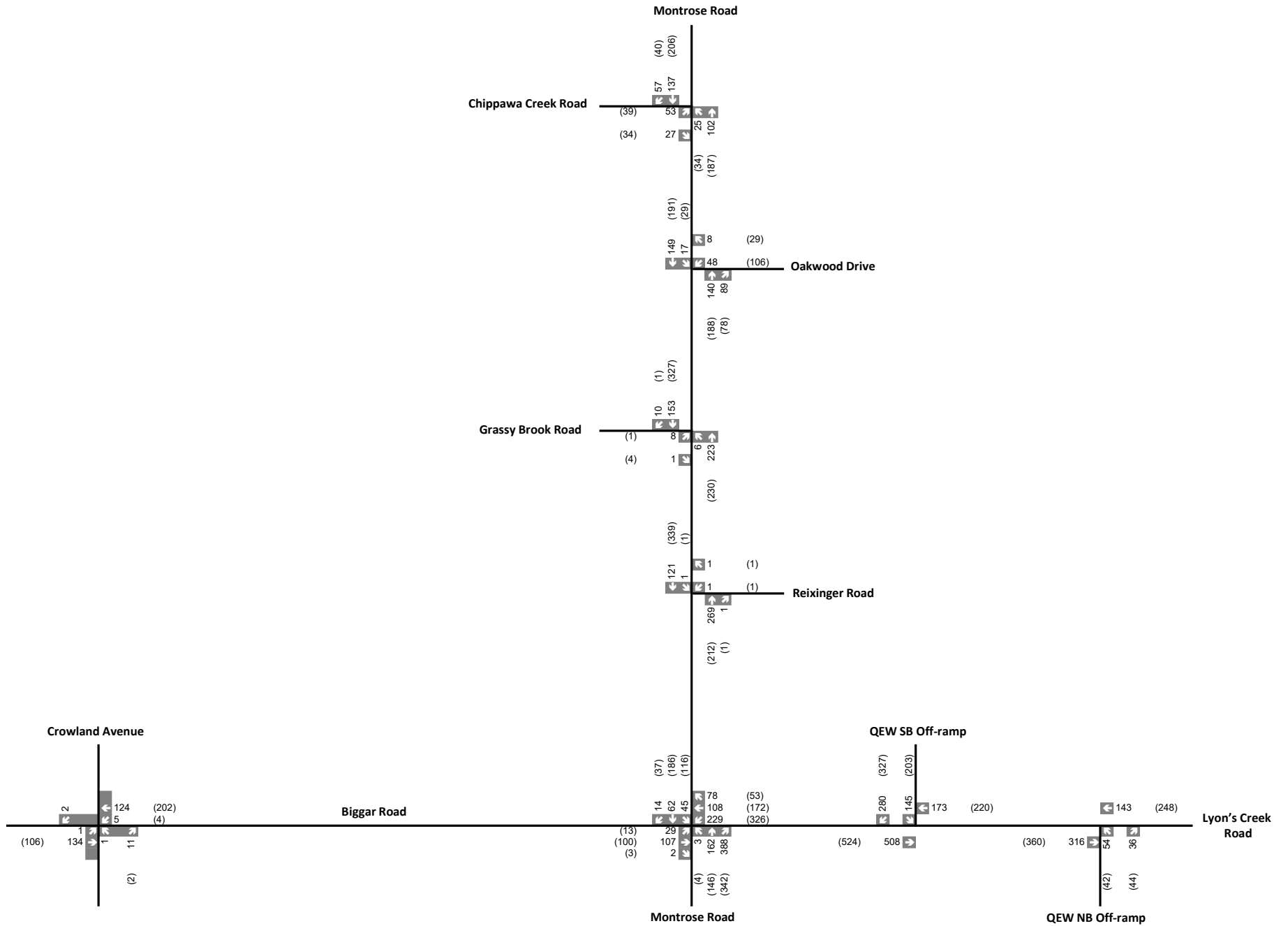
Intersection	Survey Date	Source
Montrose Road & Biggar Road/Lyons Creek Road	Wednesday, June 5, 2019	Spectrum count
Lyons Creek Road & QEW southbound off-ramp	Wednesday, June 5, 2019	Spectrum count
Lyons Creek Road & QEW northbound off-ramp	Wednesday, June 5, 2019	Spectrum count
Montrose Road & Chippawa Creek Road	Thursday, September 3, 2015	Extracted from Grand Niagara TIS by WSP, January 2017
Montrose Road & Oakwood Drive	Wednesday, June 5, 2019	Spectrum count
Montrose Road & Grassy Brook Road	Wednesday, June 5, 2019	Spectrum count
Montrose Road & Reixinger Road	Estimated based on ITE trip generation rates based on existing land use and the through volumes on Montrose Road balanced with adjacent intersections	
Biggar Road & Crowland Avenue	Wednesday, June 5, 2019	Spectrum count

Traffic volumes were balanced positively between 2015 and 2019 counts at the intersection of Montrose Road and Chippawa Creek Road when unjustified volume imbalance was greater than 10% (consistent with the Montrose/Lyons/Biggar EA existing conditions methodology).

To bridge the gap between 2019 volumes and 2022 existing conditions, a growth rate of 2% per year was applied to all the movements at the Regional and City intersections and 1% per year to the QEW southbound and northbound off-ramps. This is an extremely conservative assumption since there has been virtually no general traffic growth between 2020 and 2022 during the COVID-19 pandemic.

The 'Raw' peak hour volumes, and the adjustments made for growth and balancing at the study intersections are illustrated in Figures 2-4 and 2-5, respectively. Figure 2-6 illustrates the grown and balanced existing traffic volumes developed by aggregating Figure 2-5 with Figure 2-4.

The signal timing plans (STPs) for the signalized study intersection of Montrose Road and Biggar Road/Lyons Creek Road were obtained from Niagara Region. All of the TMCs and signal timing plans used are documented in Appendix B.

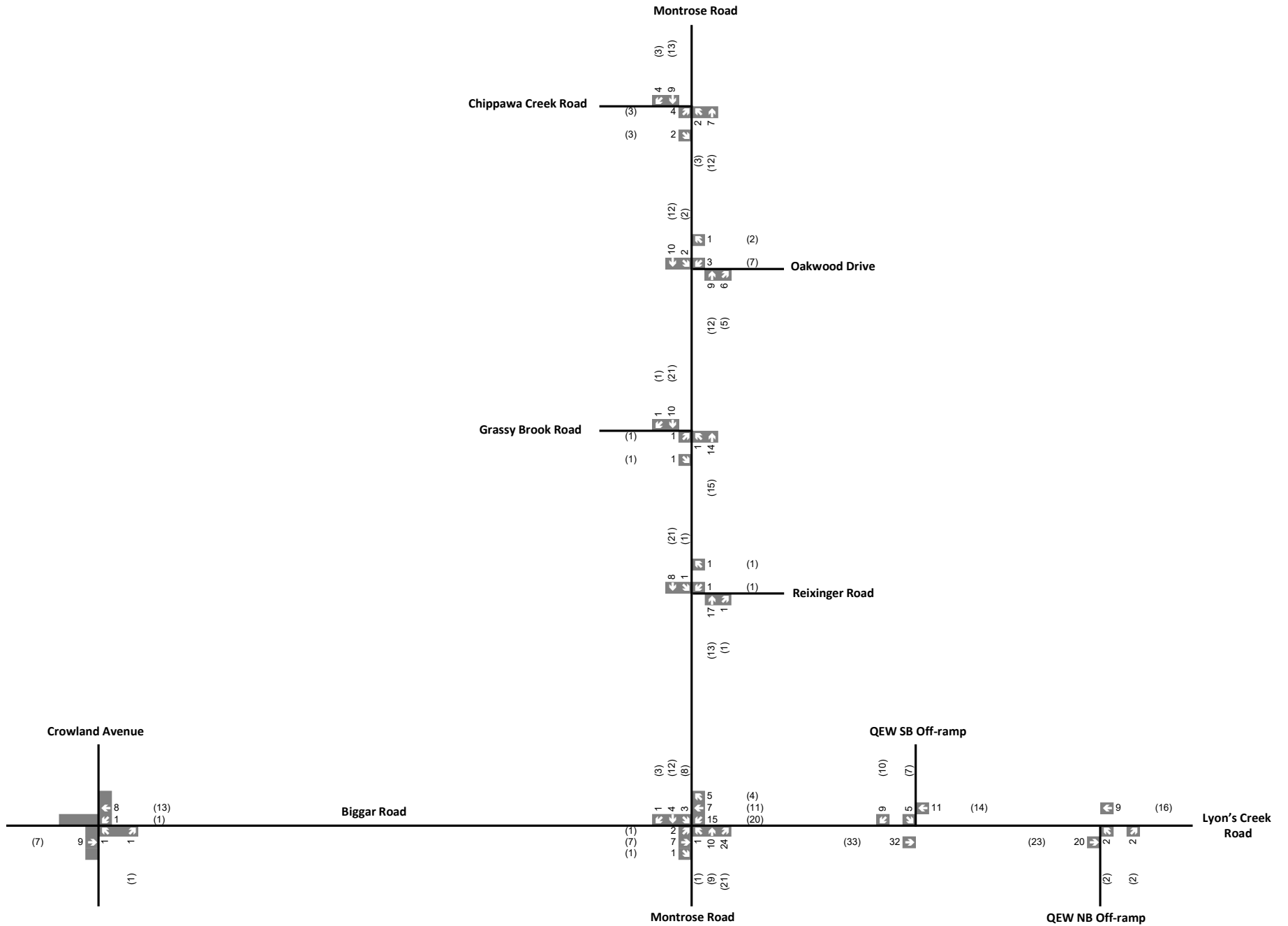


Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

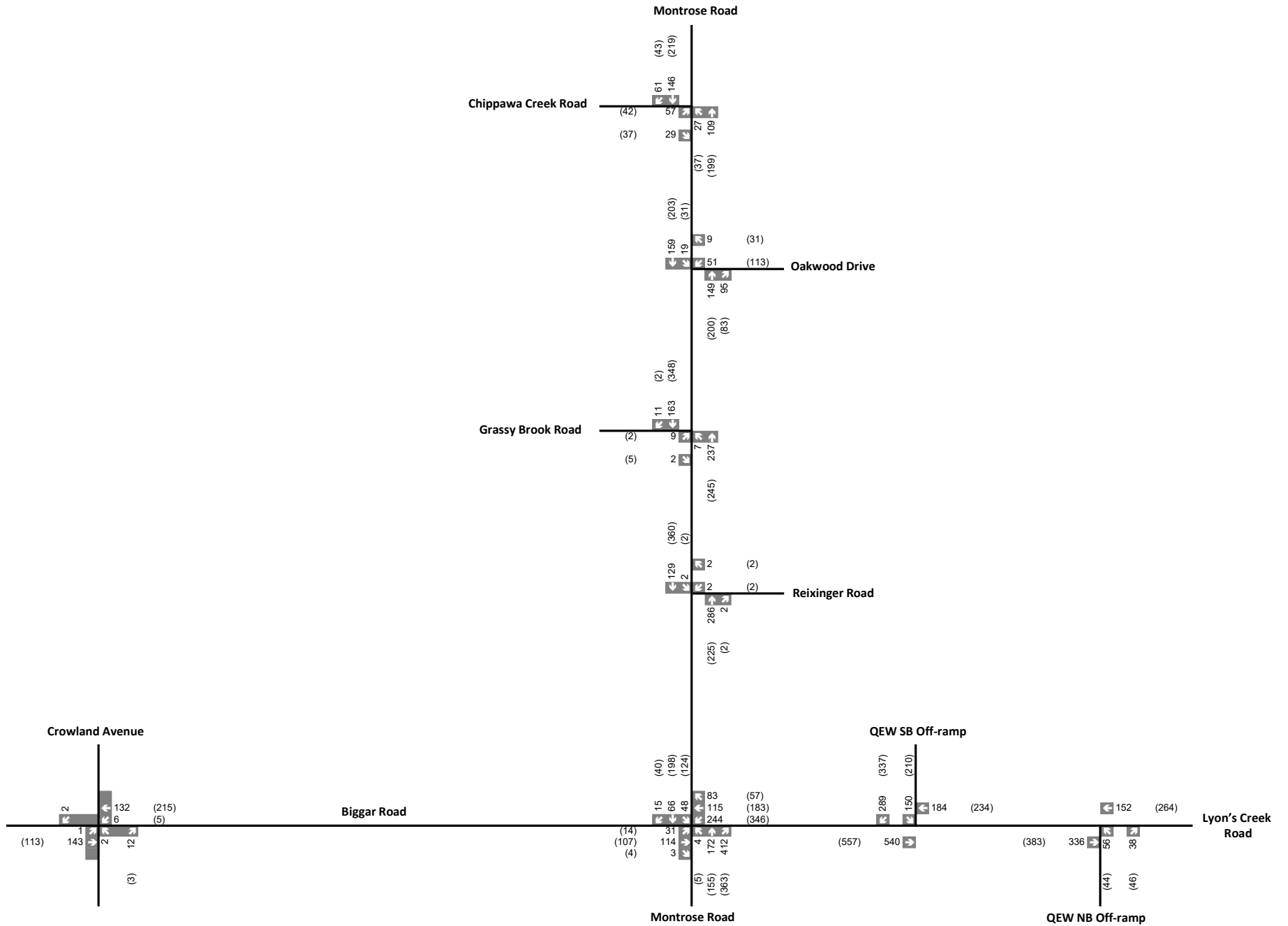
Figure 2-4

Raw Existing Traffic Volumes



Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-5
 Adjustment to Existing Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-6

Adjusted Existing Traffic Volumes

2.5 EXISTING TRAFFIC OPERATIONS

2.5.1 MODEL ASSUMPTIONS

The Synchro input parameters used in the analysis are in accordance with the Niagara Region Guidelines for Transportation Impact Studies, May 2012, and the Ministry of Transportation Ontario (MTO) Traffic Impact Study Guidelines, September 2014. The key Synchro input parameters are listed below:

- Existing lane configurations obtained from Google Maps' satellite and street views.
- Signal timing plans provided by the Niagara Region.
- Heavy vehicle percentages and conflicting pedestrian volumes as derived from the existing turning movement counts.
- Ideal saturation flow in vehicles per hour per lane (vphpl) was coded 1,750 for all the roads, which is lower than the Synchro default of 1,900.
- Lost time adjustment default of zero was applied at the signalized intersections during the weekday a.m. and p.m. peak hours.
- The observed intersection peak hour factors (PHF) were calculated based on the observed 15 minute peaking patterns from the TMCs. Table 2.2 lists the PHFs derived from the TMCs.

Table 2.2: Traffic Data Information

Intersection	Observed PHF	
	AM	PM
Montrose Road & Biggar Road/Lyons Creek Road	0.96	0.92
Lyons Creek Road & QEW southbound off-ramp	0.92	0.94
Lyons Creek Road & QEW northbound off-ramp	0.92	0.94
Montrose Road & Chippawa Creek Road	0.93	0.92
Montrose Road & Oakwood Drive	0.88	0.91
Montrose Road & Grassy Brook Road	0.94	0.88
Biggar Road & Crowland Avenue	0.91	0.90

Table 2-2 shows that the observed PHF ranges from 0.88 to 0.96 during the weekday peak periods. For the purpose of this assessment, a PHF of 0.92 was coded for all the intersection movements based on the Niagara Region TIS Guidelines. This is a conservative approach given the fact that the observed PHFs at many of the critical study intersections (i.e., Montrose Road & Biggar Road, as well as the QEW off ramps) are higher than 0.92.

These Synchro parameters are carried forward from the existing conditions to the future assessment to allow for "Apples to Apples" comparisons.

2.5.2 METHODOLOGY

To analyze existing traffic conditions in the study area, capacity analyses were undertaken using the Synchro 11 traffic analysis software. This software incorporates the methodology outlined in the Highway Capacity Manual (HCM), Transportation Research Board, 2000 and 2010. For the purpose of this study, all reported results are based on the Synchro 11 methodologies for the signalized intersections and HCM 2000 methodologies for the unsignalized intersections. This is consistent with the approach used in Grand Niagara SP TIS in 2017.

An intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity (v/c) and delays for individual movements at an intersection. Level of Service (LOS) denoted by letters 'A' through 'D', represent satisfactory traffic operations. LOS denoted by the letters 'E' and 'F' represents congested traffic operations. Appendix C provides the LOS definitions according to the HCM 2000 methodology. The following movements are critical movements as per the Niagara Region and MTO Guidelines:

Signalized intersections

- V/C ratios of 0.85 or greater for through or shared through/turning movements
- V/C ratios of 0.90 or greater for exclusive turning movements
- V/C ratios of 0.75 or greater for the MTO off-ramp movements
- projected 95th percentile queues for the critical movements exceed the available storage

Unsignalized intersections

- movements are expected to operate at LOS "D" or worse and/or where the estimated 95th percentile queue length for an individual movement exceeds the available queuing storage.

2.6 EXISTING TRANSPORTATION CONDITIONS

Traffic operations were analyzed at the study intersections based on the volumes presented in Figure 2-6 to determine the existing weekday a.m. and p.m. peak hour operations. The results of the intersection capacity analysis under existing conditions are summarized in Table 2.3. Detailed intersection capacity analysis sheets are provided in Appendix D. It should be noted that the signal timings of the existing signalized intersection were not optimized so that the most representative existing conditions are presented.

Table 2.3: Existing Intersection Operations

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (33)	WB-LTR (0.86) D NB-LTR (0.88) C	D (54)	WB-LTR (1.09) F SB-LTR (0.92) D
Lyons Creek Road & QEW southbound off-ramp	Unsignalized ²	C (16)	SB-L (0.34) C	C (20)	SB-L (0.5) C
Lyons Creek Road & QEW northbound off-ramp	Unsignalized	B (13)	NB-L (0.12) B	B (15)	NB-L (0.12) B
Montrose Road & Chippawa Creek Road	Unsignalized	B (11)	EB-LR (0.14) B	B (12)	EB-LR (0.15) B
Montrose Road & Oakwood Drive	Unsignalized	B (12)	WB-LR (0.11) B	B (15)	WB-LR (0.30) B
Montrose Road & Grassy Brook Road	Unsignalized	B (11)	EB-LR (0.02) B	B (12)	EB-LR (0.01) B
Montrose Road & Reixinger Road	Unsignalized	B (11)	WB-LR (0.01) B	B (11)	WB-LR (0.01) B
Biggar Road & Crowland Avenue	Unsignalized	A (9)	NB-TLR (0.02) A	A (9)	NB-TLR (0) A

¹ Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'D' or worse for an unsignalized intersection.

² The LOS at an unsignalized intersection is defined by the movement with the highest delay.

The results in Table 2.3 indicate that under existing conditions, the signalized study intersection of Montrose Road and Biggar Road/Lyons Creek Road operates at an acceptable LOS 'C' and 'D' during the weekday a.m. and p.m. peak hours, respectively. However, the westbound movement at this intersection is forecast to be over capacity during the p.m. peak hour. This is theoretically impossible under existing conditions since all of the traffic volumes were counted to have driven through the intersection and likely a result of the conservative growth applied as well as the use of very conservative Synchro parameters (lower saturation flow rate and lower PHF). Notwithstanding, this intersection is slated to be improved in the future and the focus will be on the incremental change in overall delay and critical movement v/c ratios.

Under the existing conditions, all of the unsignalized intersections operate adequately at LOS 'C' or better during the weekday a.m. and p.m. peak hours.

3 FUTURE BACKGROUND TRAFFIC CONDITIONS

3.1 HORIZON YEAR

The Grand Niagara development is anticipated to be developed in various phases with full build-out by the year 2036. It is expected that the approximately 50% of the proposed development will be built and occupied by the year 2031. Therefore, the horizon years of 2031 and 2036 were evaluated for future traffic assessments. In addition, as per the Niagara Region Guidelines for TIS, a five-year post-buildout horizon (2041) has also been evaluated in the study. The horizon year of 2041 is a reasonable ultimate horizon to evaluate in this study since it matches the ultimate horizon year assessed in the Montrose/Lyons/Biggar EA completed by the Region in 2021. As a result, the following three horizon years have been evaluated in this TIS:

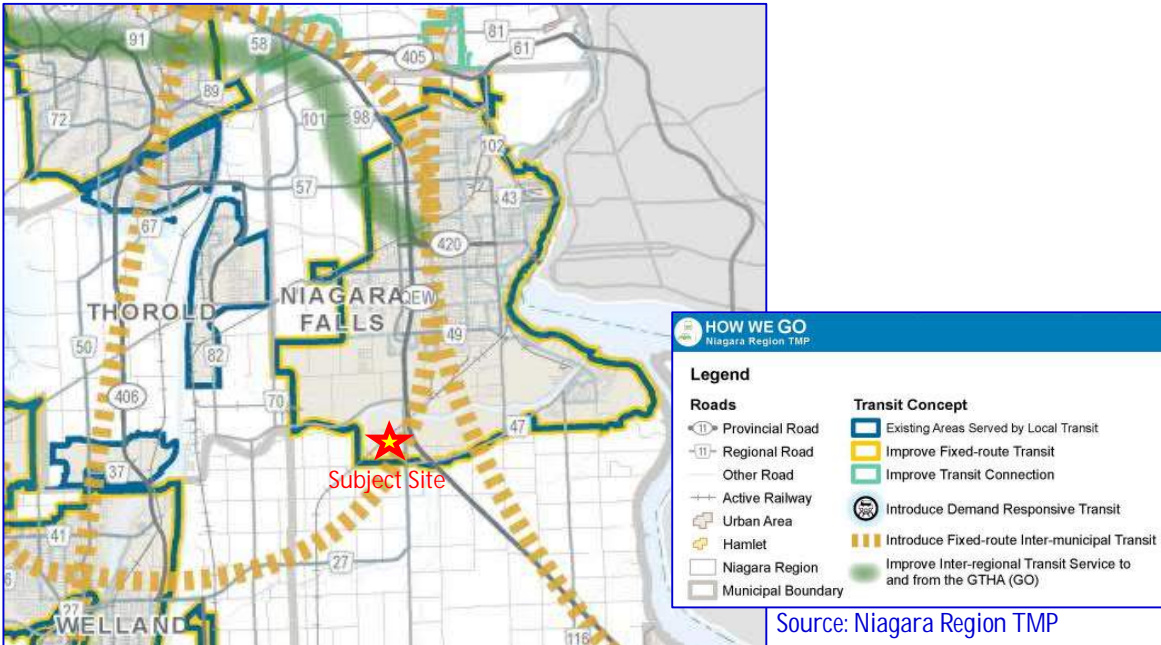
- 2031: 50% built-out of the development;
- 2036: full built-out of the development; and
- 2041: five-year post buildout horizon.

3.2 PLANNED TRANSIT IMPROVEMENTS

The planned transit improvements within the study area are discussed in the Niagara Region Transportation Master Plan (TMP), dated 2017. Niagara Region recommends a transit strategy that aims to increase fixed-route transit services and better connect all its local municipalities for inter-municipal travel (Figure 3-1). In addition, future opportunities for higher-order transit (such as GO transit) will also be required once urban densities and local transit services reach levels that justify further improvements. The plan will be to develop north-south and east-west inter-city express transit routes on highway and rail corridor infrastructure.

With the intensification planned as per the Grand Niagara SP, it is recommended that future transit routes will serve the subject study area.

Figure 3-1: Conceptual Transit Network

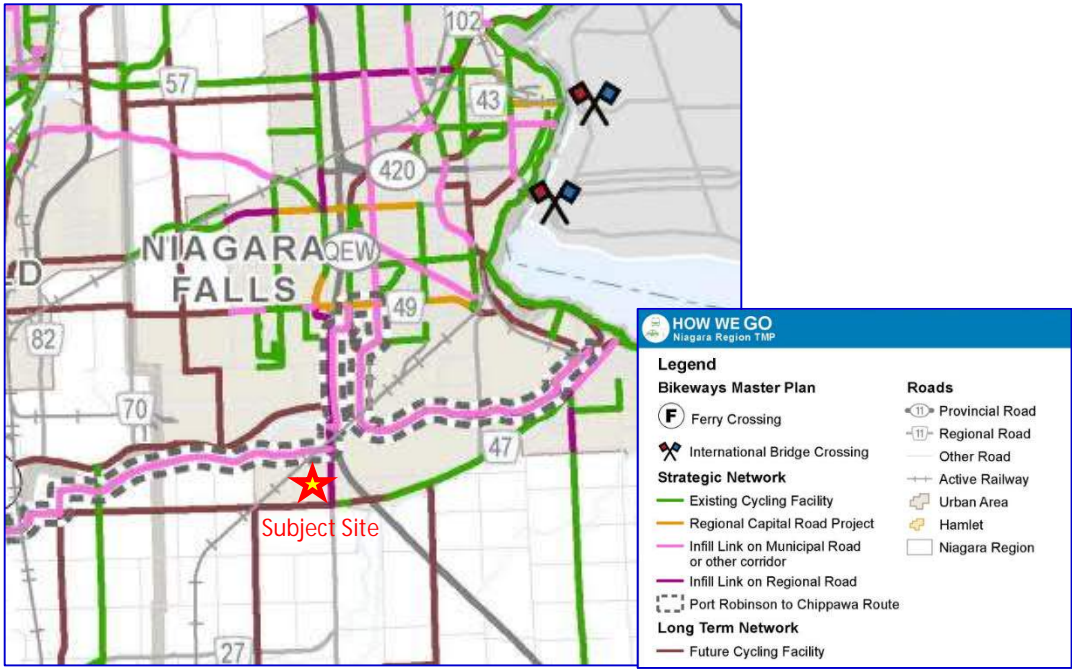


Source: Niagara Region TMP

3.3 PLANNED ACTIVE TRANSPORTATION IMPROVEMENT

A Strategic Cycling Network was developed to provide a high-quality and connected network in the Niagara areas in the shorter term. Figure 3-2 shows the future cycling network as per the Niagara Region 2017 TMP. It is envisioned that the Grand Niagara development will eventually connect with the future active transportation facilities in the vicinity of the site.

Figure 3-2: Strategic Cycling Network



Source: Niagara Region TMP

3.4 BACKGROUND ROAD NETWORK

As noted earlier, the Region of Niagara completed the Montrose Road and Lyons Creek Road / Biggar Road Municipal Class Environmental Assessment dated November 2021 (herein referred to as the Montrose/Lyons/Biggar EA) to examine rehabilitation and improvement needs as a result of planned growth in the study area. The future recommended road network established in the Montrose/Lyons/Biggar EA forms the baseline condition for this study. The relevant excerpts of the road network plan presented in the EA are provided in Appendix E and based on the recommendations, the following improvements have been assumed in the future background road network:

- widening along Montrose Road in the study area to two lanes in each direction with auxiliary left-turn lanes at the intersections.
- widening of Biggar Road in the study area from west of Montrose Road to the Hospital West Access to two lanes in each direction with auxiliary left-turn lanes at the intersections.
- widening of Lyons Creek Road from Montrose Road easterly to Willodell Road to two lanes per direction.
- dual southbound and dual westbound left-turn lanes at the Montrose Road and Biggar Road/Lyons Creek Road intersection.

- as part of the Montrose/Lyons/Biggar EA and the TIS completed for the South Niagara Hospital (located at the northwest corner of Montrose Road and Biggar Road/Lyons Creek Road), the following three intersections are recommended to be signalized:
 - QEW southbound off-ramp & Lyons Creek Road;
 - Montrose Road & Hospital South Access; and
 - Biggar Road & Hospital East Access
- WSP was informed by the City that the northern site driveway of the Niagara South Hospital development is no longer proposed directly onto Montrose Road, but will instead connect onto the future east-west collector road (aligned with an existing Reixinger Road) known as Street HH. Street HH will be a major access serving the Grand Niagara development.

The future background lane configurations with the above-noted planned improvements are based on the Montrose/Lyons/Biggar EA as documented in Appendix E and shown in Figure 3-3.

3.5 GENERAL TRAFFIC GROWTH

As confirmed with the Niagara Region transportation staff, a compound growth rate of 2% per year was applied to all of the existing movements at the Regional intersections up to the full buildout horizon of 2036. The Region requested that beyond 2036, an annual compound growth rate of 1% be applied for the 2041 assessment. These growth rates have been applied to all the movements at the City and Region intersections during both the a.m. and p.m. peak hours. It should be noted that in the 2021 EA completed by the Region, a 1% per year compound general growth rate was applied from existing to 2041. Therefore, the future assessments presented in this study may be considered conservative.

Based on confirmation with MTO staff, an annual compound growth rate of 1% was applied to the highway related turning movements at the QEW off ramps from the base year (2022) to the ultimate horizon year (2041). In addition, the eastbound and westbound through movements at the QEW off ramps along Lyons Creek Road were grown based on the Regional growth rates of 1% to 2% depending on the horizon.

The resulting net growth volumes for the horizon years of 2031, 2036 and 2041 are shown in Figures 3-4, 3-5, and 3-6, respectively.

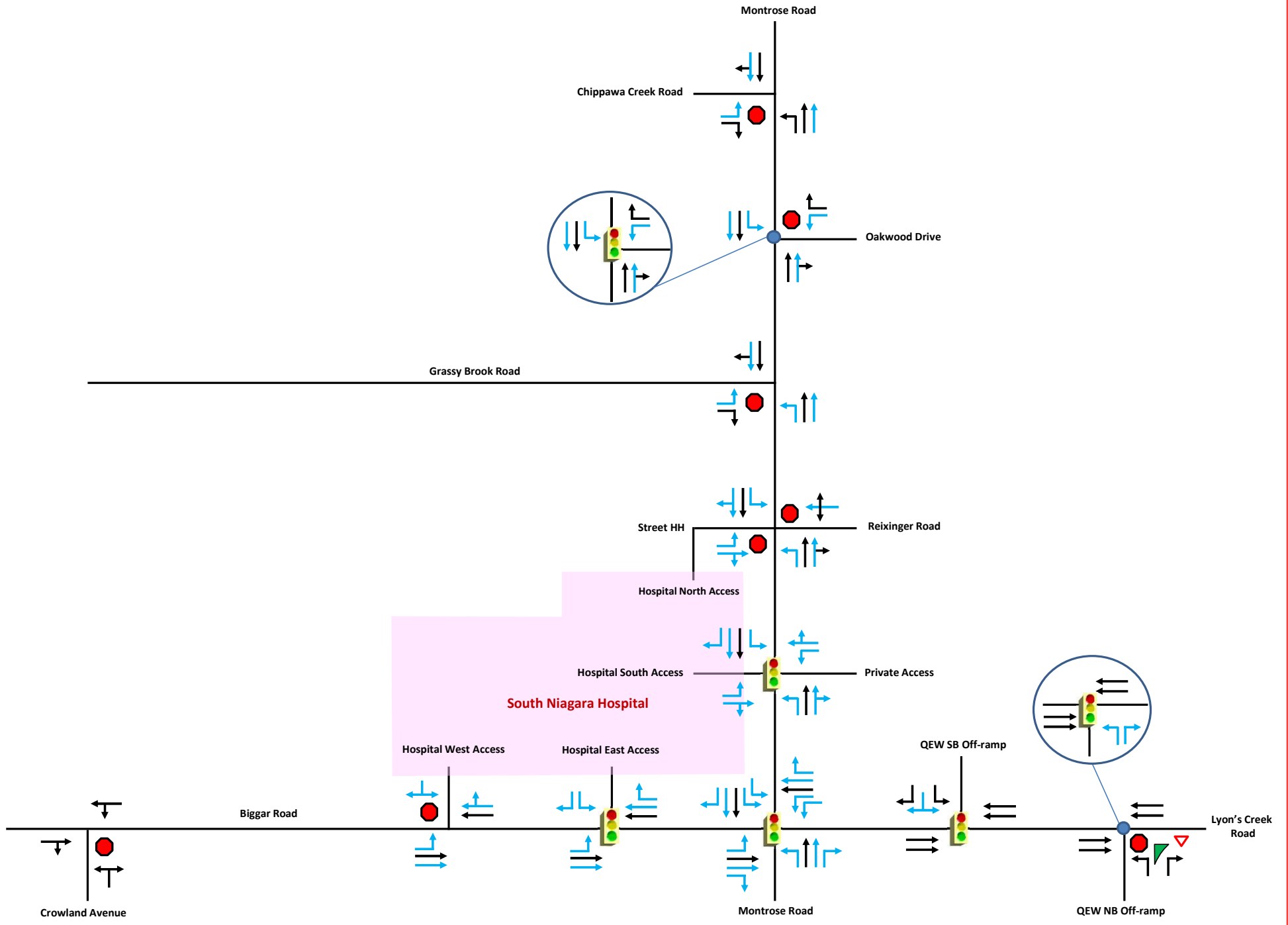
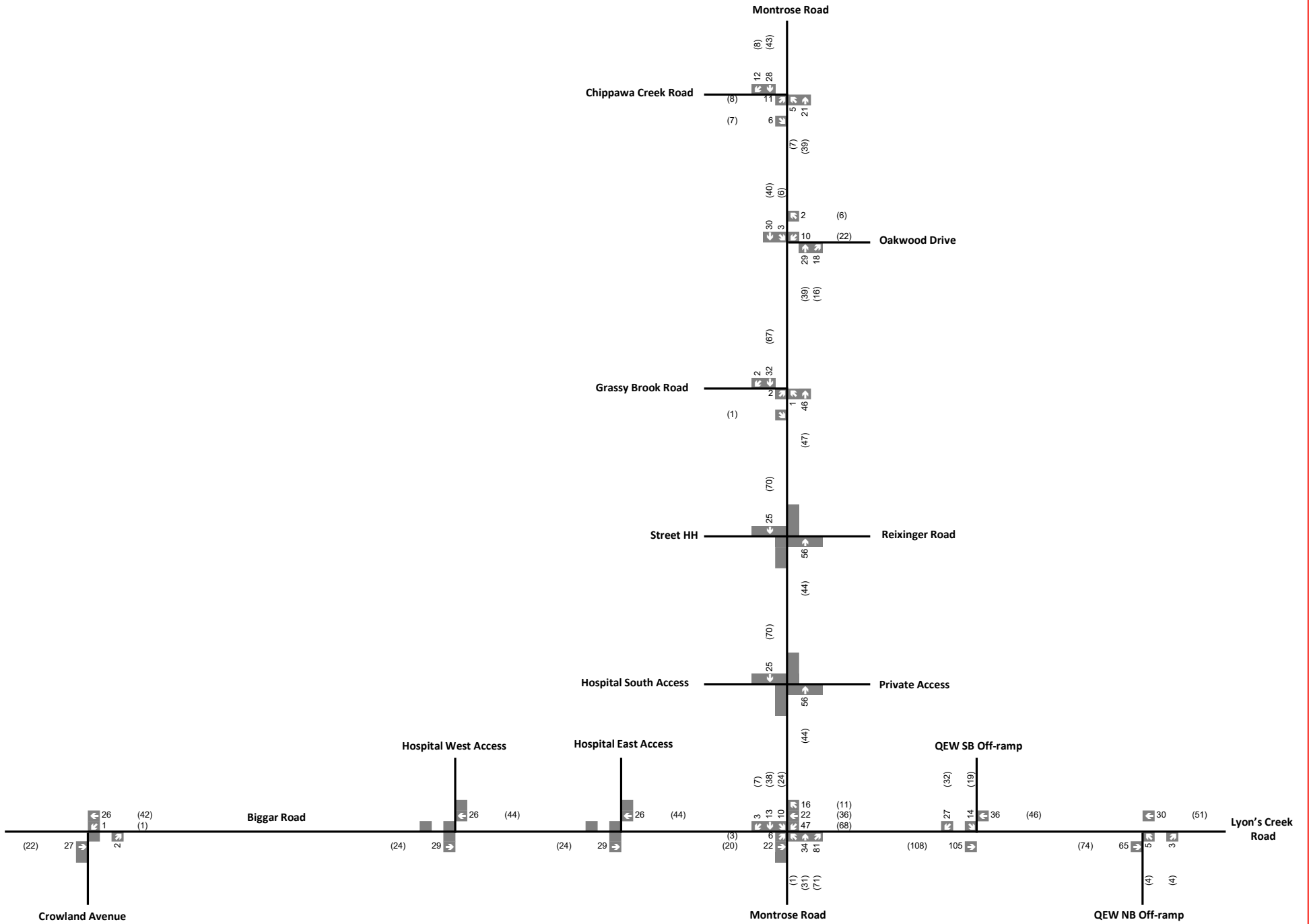
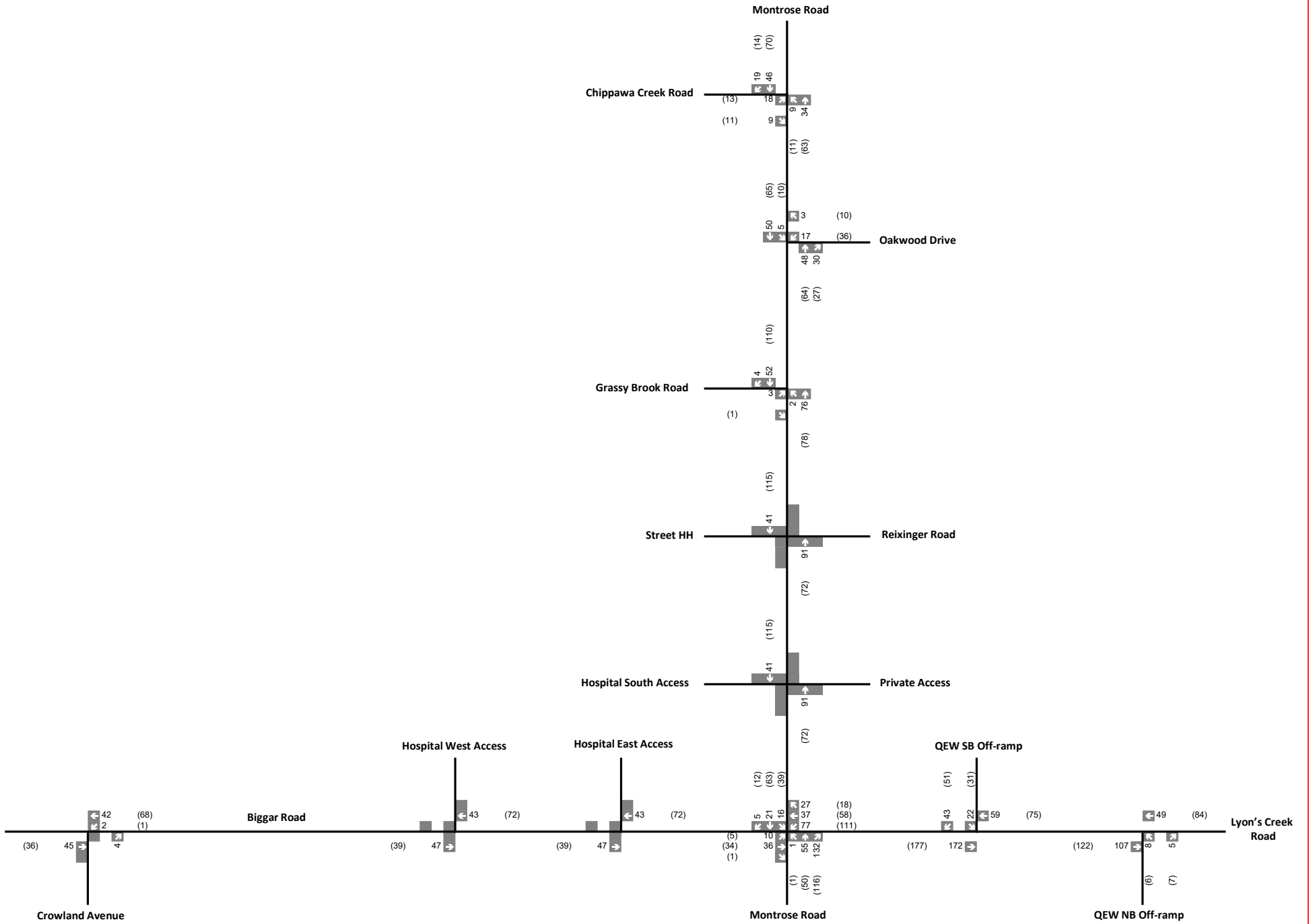


Figure 3-3
Future Background
Lane Configurations



Legend
 xx A.M. Peak Hour Traffic Volumes
 ((xx)) P.M. Peak Hour Traffic Volumes

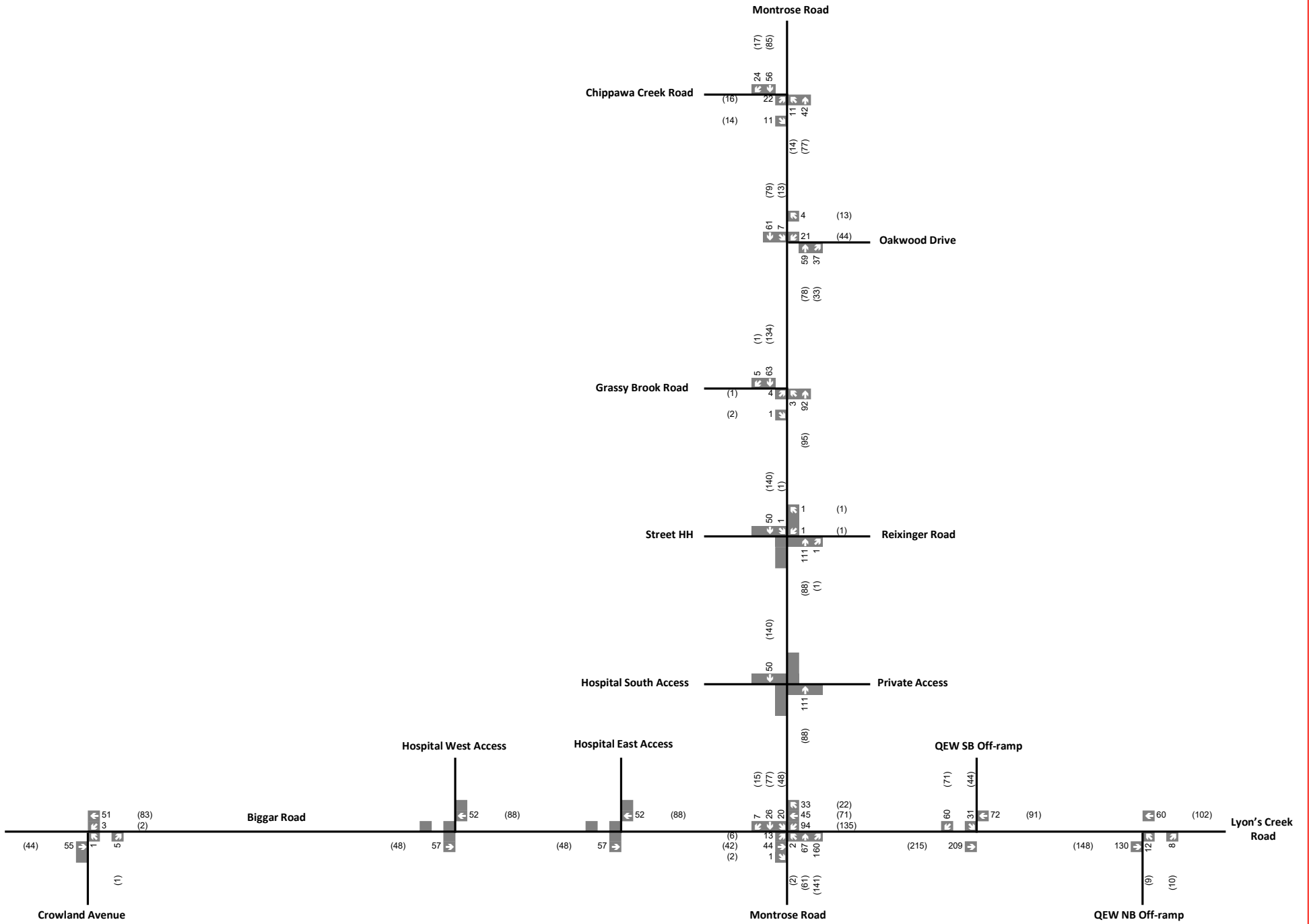
Figure 3-4
 Net General Growth
 Traffic Volumes (2022-2031)



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 3-5
 Net General Growth
 Traffic Volumes (2022-2036)



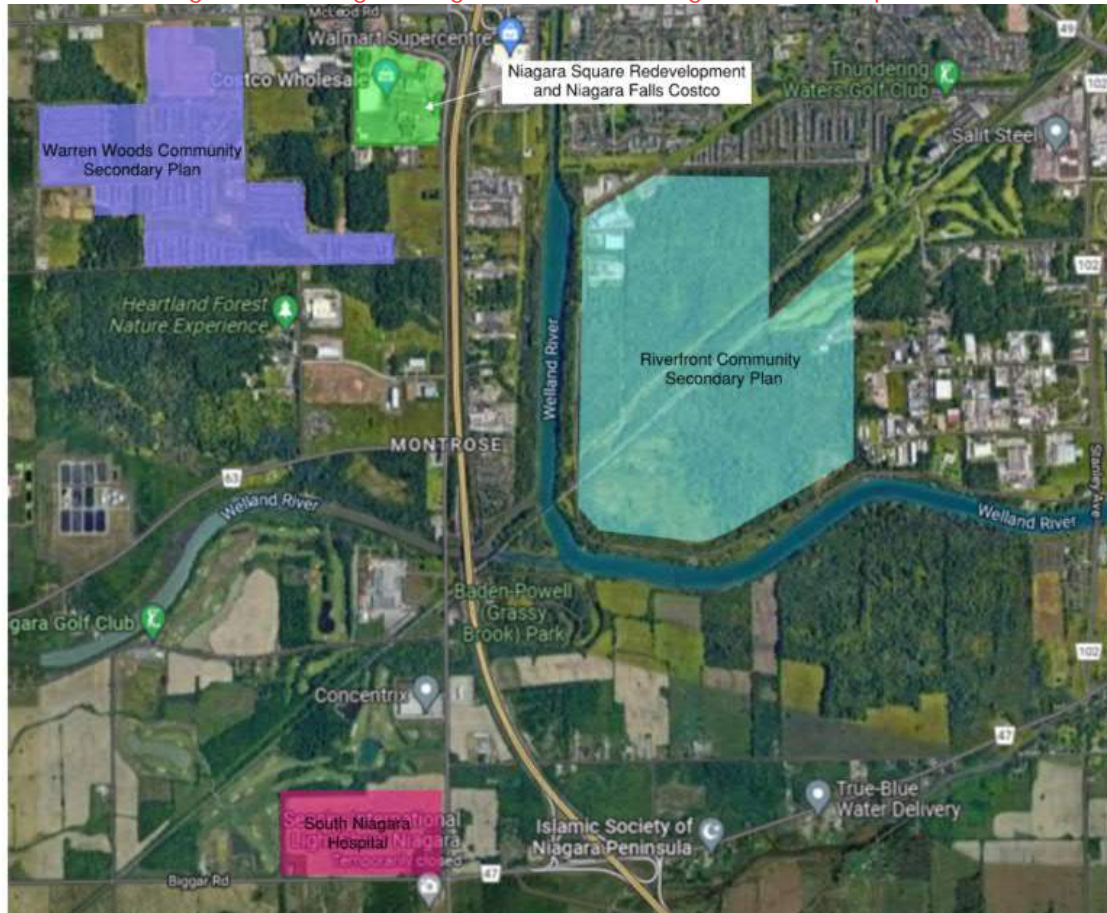
Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 3-6
 Net General Growth
 Traffic Volumes (2022-2041)

3.6 BACKGROUND DEVELOPMENT

In addition to the general growth applied to the boundary road network, background developments in the vicinity of the Grand Niagara development were also included. There are four background developments in this study area that would be expected to contribute vehicular traffic to the study road network. Figure 3-7 illustrates the location of the background developments.

Figure 3-7: Niagara Region Planned Background Development



The following four background developments in the vicinity of the subject site were incorporated as part of the future background conditions:

- Riverfront Community Secondary Plan: 879 residential units, TIS by Paradigm Transportation Solutions Limited in 2017, site traffic trips figure extracted from Montrose/Biggar/Lyons Creek EA.
- Warren Woods Community Secondary Plan: 1,245 residential units, TIS completed by Paradigm Transportation Solutions Limited in August 2014, site traffic trips extracted from the Montrose/Biggar/Lyons Creek EA. WSP understands that this background development has almost been fully built out. However, for the conservative nature of this development, this background development traffic source has been included even though some of the traffic may already be accounted for in the traffic data collected.

- Niagara Square Redevelopment and Niagara Falls Costco: TIS completed in August 2019, site traffic trips extracted from the Montrose/Biggar/Lyons Creek EA.
- South Niagara Hospital: 469 beds, TIS completed by BA Group in December 2020, Site Figure extracted from the respective study (Figure VIII).

It should be noted that the site traffic volumes for the Niagara Square redevelopment are not available for the weekday a.m. peak hour in the respective TIS. As a result, the a.m. peak hour trips were accounted for from first principles using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. Detailed distribution and assignment of background development traffic volumes are provided in Appendix F.

For the purpose of the future assessment, it has been conservatively assumed that all the background developments will be completed and built by the 2031 horizon. The combined background development peak hour traffic volumes are shown in Figure 3-8.

3.7 FUTURE BACKGROUND VOLUMES

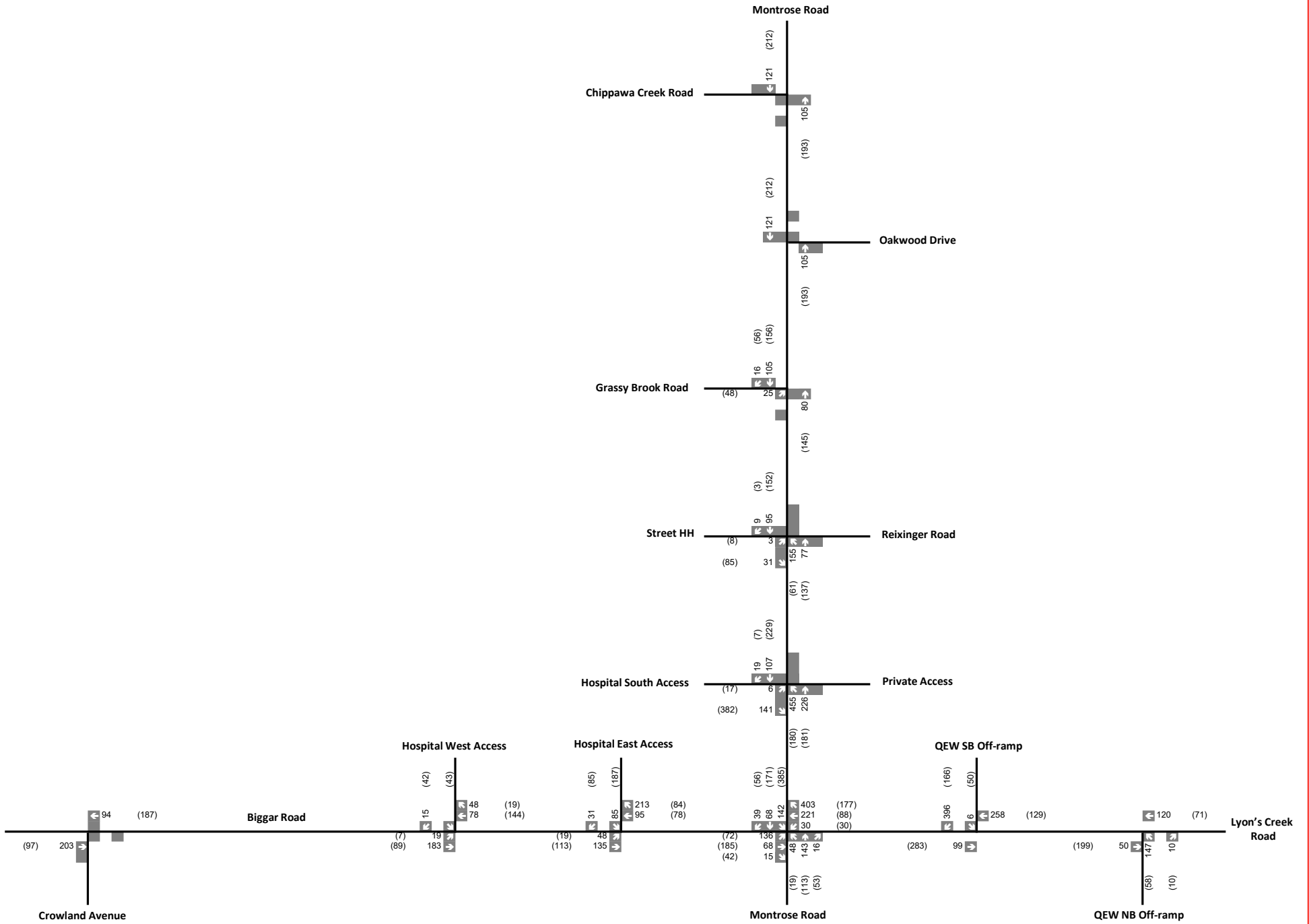
The projected 2031, 2036 and 2041 future background traffic volumes were developed by superimposing the general growth (Figures 3-4, 3-5 and 3-6), the background development traffic (Figure 3-8) onto the existing traffic volumes in Figure 2-6. The resulting 2031, 2036 and 2041 future background peak hour volumes are presented in Figures 3-9, 3-10 and 3-11, respectively.

3.8 FUTURE BACKGROUND OPERATIONS

As part of the future background assessment, the signal timing plans for the new signalized intersections are based on those evaluated in the Montrose/Biggar/Lyons Creek EA completed by the Region in 2021 and the details are presented in Appendix E. In addition, the cycle length at the intersection of Montrose Road and Biggar Road/Lyons Creek Road was increased from 97.6 seconds to 120 and 145 seconds during the a.m. and p.m. peak hours, respectively to be generally consistent with the Montrose/Biggar/Lyons Creek EA recommendation. The signal timing splits at this intersection has been optimized relative to the EA to better allocate the green time to accommodate the future background traffic volumes.

For the future evaluations at the intersection of Montrose Road and Biggar Road, the heavy vehicle percentages have been updated since traffic growth related to background developments and the subject Grand Niagara development will have minimal levels of heavy vehicle percentage (Synchro default of 2%) versus the existing heavy vehicle trend. The heavy vehicle percentage calculation during the weekday a.m. and p.m. peak hours are provided in Appendix B. The heavy vehicle % at the remaining intersections have been maintained as per existing, which is conservative. The remaining Synchro parameters used for the existing conditions assessment (PHF, saturation flow rate, etc) have been maintained for the future assessment, which is very conservative since as traffic volumes increase, the uniformity of traffic arrival pattern and flow rates tend to increase as well. Therefore, the future assessments presented in this TIS may be considered conservative.

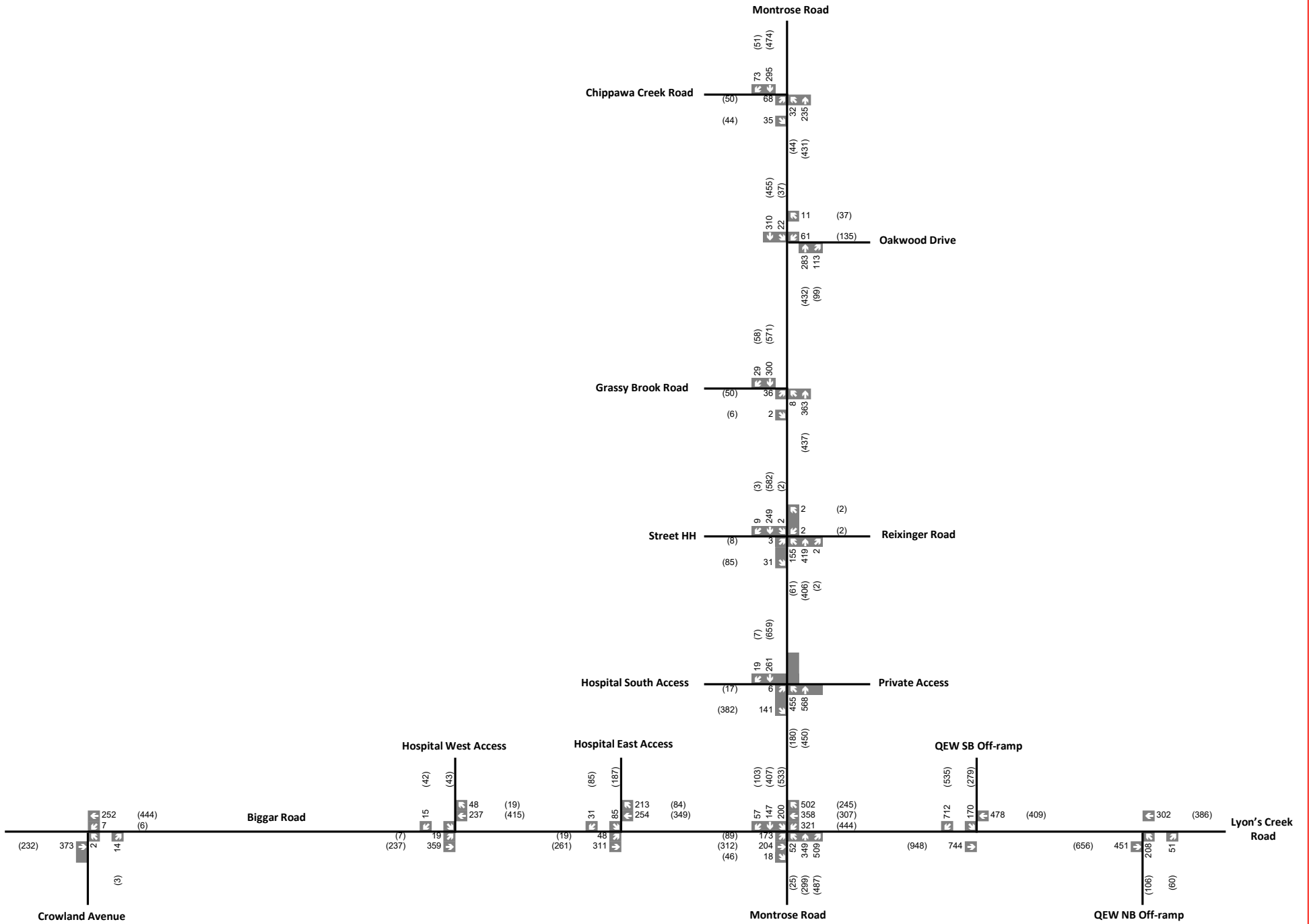
The resulting levels of service for the 2031, 2036 and 2041 future background conditions are outlined in Table 3.1 with further Synchro worksheet details provided in Appendix G.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

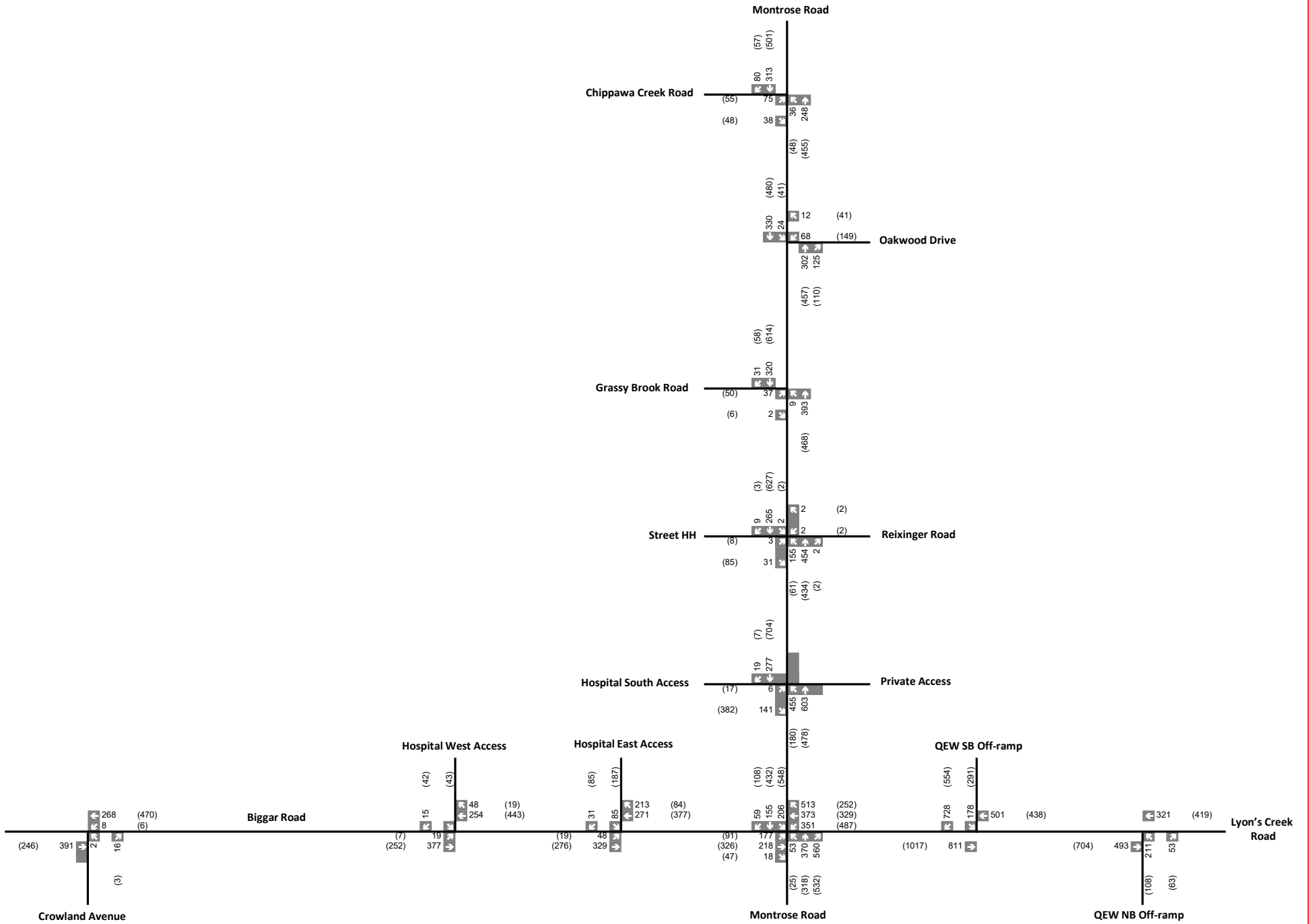
Figure 3-8 Background Development Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

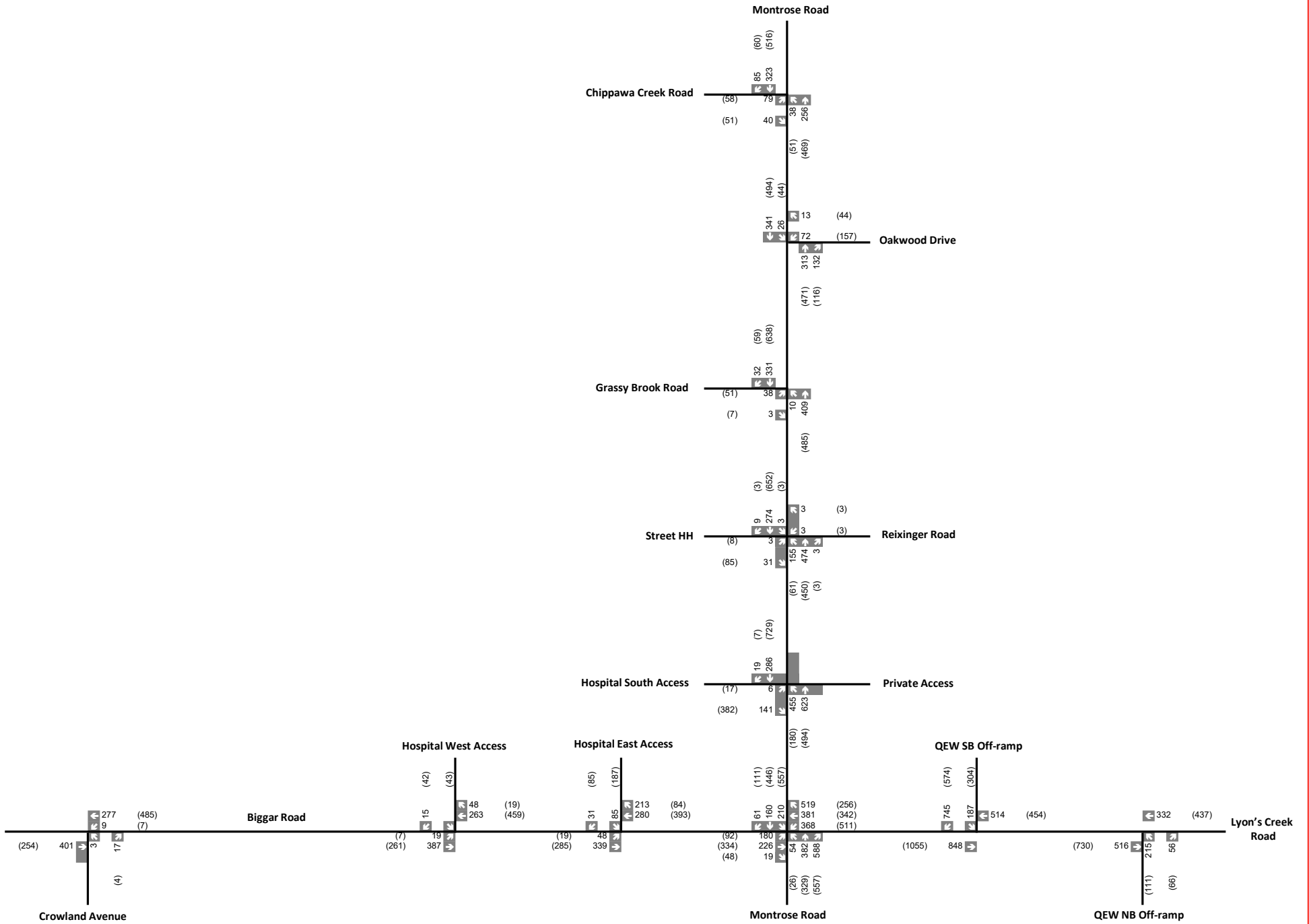
Figure 3-9
 Future Background
 Traffic Volumes (2031)



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 3-10
 Future Background Traffic Volumes (2036)



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 3-11 Future Background Traffic Volumes (2041)

Table 3.1: 2031, 2036 and 2041 Future Background Intersection Operations

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2031 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (25)	-	D (36)	-
Lyons Creek Road & QEW southbound off-ramp	Signalized	A (9)	-	B (10)	-
Montrose Road & Hospital South Access	Signalized	B (14)	-	B (14)	-
Biggar Road & Hospital East Access	Signalized	A (9)	-	B (11)	-
Lyons Creek Road & QEW northbound off-ramp	Unsignalized ²	D (27)	NB-L (0.59) D	D (34)	NB-L (0.49) D
Montrose Road & Chippawa Creek Road	Unsignalized	C (16)	EB-L (0.19) C	C (21)	EB-L (0.20) C
Montrose Road & Oakwood Drive	Unsignalized	C (15)	WB-L (0.16) C	D (30)	WB-L (0.51) D
Montrose Road & Grassy Brook Road	Unsignalized	B (14)	EB-L (0.09) B	C (21)	EB-L (0.19) C
Montrose Road & Reixinger Road/ Street HH	Unsignalized	C (20)	EB-L (0.01) C	C (23)	EB-L (0.04) C
Biggar Road & Crowland Avenue	Unsignalized	B (11)	NB-TLR (0.03) B	A (10)	NB-TLR (0.0) A
Biggar Road & Hospital West Access	Unsignalized	A (9)	SB-LR (0.02) A	B (13)	SB-LR (0.17) B
2036 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (25)	-	D (37)	WB-L (0.85) E
Lyons Creek Road & QEW southbound off-ramp	Signalized	A (10)	-	B (11)	-
Montrose Road & Hospital South Access	Signalized	B (14)	-	B (15)	-
Biggar Road & Hospital East Access	Signalized	A (9)	-	B (11)	-
Lyons Creek Road & QEW northbound off-ramp	Unsignalized ²	D (33)	NB-L (0.65) D	E (42)	NB-L (0.56) E
Montrose Road & Chippawa Creek Road	Unsignalized	C (18)	EB-L (0.22) C	C (24)	EB-L (0.24) C
Montrose Road & Oakwood Drive	Unsignalized	C (17)	WB-L (0.19) C	E (38)	WB-L (0.61) E
Montrose Road & Grassy Brook Road	Unsignalized	B (15)	EB-L (0.10) B	C (22)	EB-L (0.21) C
Montrose Road & Reixinger Road/ Street HH	Unsignalized	C (20)	EB-L (0.01) C	D (25)	EB-L (0.05) D
Biggar Road & Crowland Avenue	Unsignalized	B (12)	NB-TLR (0.03) B	A (10)	NB-TLR (0) A
Biggar Road & Hospital West Access	Unsignalized	A (9)	SB-LR (0.02) A	B (13)	SB-LR (0.18) B

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2041 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (25)	-	D (37)	WB-L (0.87) E
Lyons Creek Road & QEW southbound off-ramp	Signalized	A (10)	-	B (11)	-
Montrose Road & Hospital South Access	Signalized	B (14)	-	B (15)	-
Biggar Road & Hospital East Access	Signalized	A (9)	-	B (11)	-
Lyons Creek Road & QEW northbound off-ramp	Unsignalized ²	E (38)	NB-L (0.70) E	E (48)	NB-L (0.61) E
Montrose Road & Chippawa Creek Road	Unsignalized	C (18)	EB-L (0.24) C	D (25)	EB-L (0.26) D
Montrose Road & Oakwood Drive	Unsignalized	C (17)	WB-L (0.21) C	E (45)	WB-L (0.68) E
Montrose Road & Grassy Brook Road	Unsignalized	B (15)	EB-L (0.10) B	C (24)	EB-L (0.22) C
Montrose Road & Reixinger Road/ Street HH	Unsignalized	C (21)	EB-L (0.01) C	D (27)	EB-L (0.05) D
Biggar Road & Crowland Avenue	Unsignalized	B (12)	NB-TLR (0.04) B	A (10)	NB-TLR (0.01) A
Biggar Road & Hospital West Access	Unsignalized	A (9)	SB-LR (0.02) A	B (13)	SB-LR (0.18) B

¹ Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'D' or worse for an unsignalized intersection.

² The LOS at an unsignalized intersection is defined by the movement with the highest delay.

With the application of general traffic growth and the inclusion of the four background developments, all of the study signalized intersections operate at acceptable levels of service 'D' or better under 2031, 2036 and 2041 future background conditions. In addition, all of the movements at the study intersections are forecast to operate within capacity during the a.m. and p.m. peak hours.

Under the 2036 and 2041 future background conditions, the unsignalized intersection of Lyons Creek Road & QEW northbound off-ramp operates with a busier northbound left-turn movement during the weekday a.m. and p.m. peak hours at LOS 'E'. In addition, the westbound left-turn movement at the intersection of Montrose Road and Oakwood Drive is projected to operate at LOS 'E' during the p.m. peak hour. However, these busier movements are both operating at well within capacity.

WSP completed a signal warrant analysis based on the forecast 2041 future background traffic volumes to determine if signals are warranted at the intersections of Lyons Creek Road and QEW northbound off-ramp and Montrose Road and Oakwood Drive. The traffic control signal justification was completed as per the criteria defined in the Ontario Traffic Manual Book 12 (March 2012) Justification 7. The signal warrant results can be found in Appendix H and the results show that signals are not warranted for these two intersections. However, due to the longer delays associated with these movements, it is recommended to have provisions for traffic signal installations under 2036 and 2041 future background traffic conditions. This is similar to the recommendations from the Montrose/Biggar/Lyons Creek EA, where provisional signals are recommended. Therefore, a sensitivity analysis has been conducted with a traffic signal at the intersections of Lyons Creek Road and QEW northbound off-ramp and Montrose Road and Oakwood Drive. The results are presented in Table 3.2.

Table 3.2: Future Background Intersection Operations with Improvements

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2036 horizon					
Lyons Creek Road & QEW northbound off-ramp	Signalized ¹	B (14)	-	B (12)	-
Montrose Road & Oakwood Drive	Signalized	A (9)	-	B (11)	-
2041 horizon					
Lyons Creek Road & QEW northbound off-ramp	Signalized	B (14)	-	B (12)	-
Montrose Road & Oakwood Drive	Signalized	A (9)	-	B (11)	-

¹ Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'D' or worse for an unsignalized intersection.

The results with the signalized control in place show that the two study intersections improve significantly to LOS 'B' with no critical movements under 2036 and 2041 future background conditions. Therefore, there is a need for these traffic signals under 2036 and 2041 future background conditions (as it relates to general traffic growth and background developments), consistent with the Montrose/Biggar/Lyons Creek EA infrastructure recommendations.

4 SITE-GENERATED TRAFFIC

4.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The Grand Niagara development features residential, commercial and employment land uses. The development is expected to be 50% built and occupied by 2031 and fully constructed and occupied by 2036. The detailed breakdown of the land uses as well as the minimum and maximum densities achievable for the subject site are detailed as follows:

- Back to back Townhouses: 57 to 74 units
- Townhouses: 374 to 455 units
- Detached with Coach house: 98 to 128 units
- Semi-detached house: 348 to 678 units
- Detached house: 27 to 29 units
- Small-lot Detached house: 142 to 184 units
- Medium Density: 403 to 605 units
- Apartments: 633 to 1,266 units
- Mixed-use lands: 1,476 to 1,968 residential units with a total of 8,750 sq.m. retail/office GFA

To be conservative, this study evaluated the maximum density of the subject site which is 5,387 residential units including 1,019 detached and semi-detached units, 529 townhouses and 3,839 medium-density (condo/apartment) units. Based on discussions with the project team, it was assumed that 50% of the non-residential uses will be commercial and 50% employment use (4,375 sq.m. for each use). Please refer to Figure 1-2 for the proposed site plan and the locations of various blocks and land uses.

4.2 SITE ACCESS

As shown in Figure 1-2, access to the subject Grand Niagara development is proposed via Street Q (Grassy Brook Road), an east-west road (Street HH), a private driveway onto Montrose Road (serving mixed-use block 93) and a north-south road (Street A) onto Biggar Road. Streets A and HH form the main spine roads of the development providing access to various blocks within the development.

It should be noted that the private driveway onto Montrose Road only serves the site-generated traffic from the Grand Niagara mixed-use block 93. Notwithstanding, there may be a potential for the extension of Street JJ (north of block 93) to Montrose Road if the adjacent industrial parcel redevelops in the future. For the purpose of our assessment, it is assumed that mixed use block 93 will be served via a private driveway onto Montrose Road.

As part of the Grand Niagara development, Street A will be extended to intersect Street Q (Grassy Brook Road) and form a four-legged all-way stop intersection. Street HH will connect with Street A and form a T intersection. Therefore, the following access intersections and key internal intersections have been evaluated in this study:

- Street A and Biggar Road;
- Street HH and Montrose Road;
- Montrose Road and Driveway of mixed-use block 93;
- Street A and Street HH; and
- Street A and Street Q (Grassy Brook Road).

Based on the future total assessments completed in Section 5, the intersections of Street HH and Montrose Road and Street A and Biggar Road are recommended as signalized intersections to support the site-generated traffic. In addition, the all-way stop control warrant is met at the new intersection of Street A and Street Q (Grassy Brook Road) based on the OTM requirements. The future total lane configurations are illustrated in Figure 4-1.

4.3 MODAL SPLIT

Consistent with the Montrose/Biggar/Lyons Creek EA (2021) and the Grand Niagara SP (2017), a conservative 10% non-auto modal split was applied for the trip generation to acknowledge the ongoing efforts from the City and Region to promote sustainable transportation modes such as transit, walk and cycling.

4.4 TRIP GENERATION

The auto trips generated by the proposed development during the weekday a.m. and p.m. peak hours were estimated using the vehicle trip generation equation rates outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. The trip generation for the residential, commercial and employment uses were estimated using the following ITE land use codes:

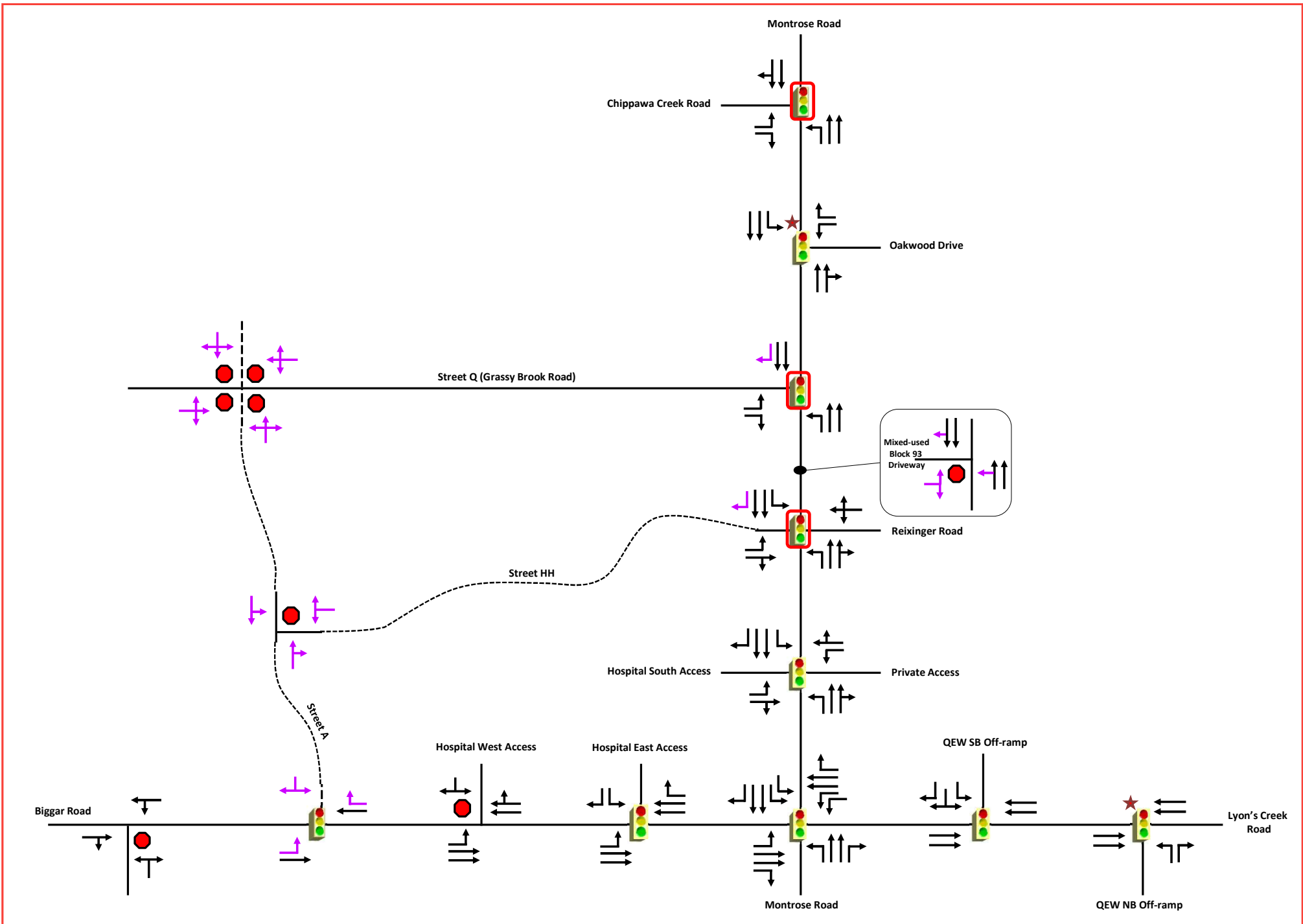
- Single-Family Detached Housing – General Urban/Suburban (Code 210): used for Single Detached, Semi-Detached and Coach House – equation rate
- Multifamily Housing (Low-Rise)- General Urban/Suburban (Code 220): used for Townhouse, Back to Back Townhouse and Medium Density – equation rate
- General Office Building (Code 710): Office/Employment use – equation rate
- Shopping Plaza 40-150K (Code 821): Retail/commercial use – average rate was used due to the R² value consideration

This TIS evaluates the maximum density of 5,387 residential units, 4,375 sq.m. of retail and 4,375 sq.m. of office GFA. It should also be noted that a parcel has been designated within the development as a school. Based on the community fabric within the development, almost all of the trips generated by the school will be internal trips within the Grand Niagara development. In this circumstance, a notable portion of the internal trips will be via active transportation, school bus or pass-by type of drop-off or pick-up trips. Since these trips will not materialized at the boundary study intersections, no additional trip generation has been completed for school use.

It is anticipated that there will be internal interactions between the proposed residential use and office/retail uses since there is the convenience factor and live work opportunities without having to leave the site. Therefore, a multi-use internal trip adjustment was applied based on information contained in the NCHRP Project 8-51. The internal trip calculation tables are provided in Appendix I. The multi-use adjustment rates for the mixed-use development are summarized in Table 4-1.

Table 4.1: Multi-use Adjustment Factors

Land Use	Weekday A.M. Peak		Weekday P.M. Peak	
	Inbound	Outbound	Inbound	Outbound
Residential	2%	1%	10%	8%
Office	7%	28%	88%	22%
Retail	7%	10%	16%	28%



- Legend**
-  Signalized Intersection
 -  Stop Control
 -  Future Background Configurations
 -  Future Total Lane Improvements
 -  New Road
 -  Provisions for future signals Required by 2031 Future Total
 -  Signals already identified as part of future background conditions as shown in Table 3.2 and are assumed to be signalized in the future total evaluation.

Figure 4-1
Future Total
Lane Configurations

Retail developments often attract a notable portion of their trips from traffic passing by the site on the way from an origin to an ultimate destination. These pass-by trips are vehicles that are already on the adjacent roadways in the future background passing by the subject site, and whose main origin and destination relate to a purpose or land use other than those proposed for the subject site (e.g. a person stops in to buy groceries on the way home from work). ITE Trip Generation Manual provides the average pass-by rate of 34% for retail type of land uses during the p.m. peak hour. Given the size of the proposed retail use, the location of the site (along major arterial corridors), this pass-by rate is appropriate and has been applied to the retail use during the p.m. peak hour. A summary of the trip generation for the Grand Niagara development is provided in Table 4-2.

Table 4.2: Site Generated Vehicle Trips (Full build-out)

ITE Land Use (Code)		Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing - General Urban/ Suburban (210) (1,019 units)	Equation (x = residential units)	$\text{Ln}(T) = 0.91 \text{Ln}(X) + 0.12$			$\text{Ln}(T) = 0.94 \text{Ln}(X) + 0.27$		
	Directional Splits	26%	74%	100%	63%	37%	100%
	Trips	160	456	616	555	326	881
	Multi-use Adjustment	-3	-5	-8	-19	-9	-28
	Modal Split Adjustment	-16	-45	-61	-54	-32	-86
	Net Trips	141	406	547	482	285	767
Multifamily Housing (Low-Rise)- General Urban/ Suburban (220) (4,368 units)	Equation (x = residential units)	$T = 0.31X + 22.85$			$T = 0.43X + 20.55$		
	Directional Splits	24%	76%	100%	63%	37%	100%
	Trips	330	1046	1376	1196	703	1899
	Multi-use Adjustment	-6	-12	-18	-40	-20	-60
	Modal Split Adjustment	-32	-103	-135	-116	-68	-184
	Net Trips	292	931	1223	1040	615	1655
General Office Building (710) (47,092 ft ²)	Equation (X=residential units)	$\text{Ln}(T) = 0.86 \text{Ln}(X) + 1.16$			$\text{Ln}(T) = 0.83 \text{Ln}(X) + 1.29$		
	Directional Splits	88%	12%	100%	17%	83%	100%
	Trips	77	11	88	15	74	89
	Multi-use Adjustment	-5	-3	-8	-13	-16	-29
	Modal Split Adjustment	-7	-1	-8	0	-6	-6
	Net Trips	65	7	72	2	52	54
Shopping Plaza 40-150K (821) (47,092 ft ²)	Average (X=1000 ft ²)	$T = 3.53X$			$T = 9.03X$		
	Directional Splits	62%	38%	100%	48%	52%	100%
	Trips	103	63	166	204	221	425
	Multi-use Adjustment	-18	-12	-30	-35	-62	-97
	Modal Split Adjustment	-9	-5	-14	-17	-16	-33
	Pass-by Trips (34%)	-	-	-	-49	-49	-98
	Net Trips	76	46	122	103	94	197
Full Build-out Net Vehicle Trips (2036 and 2041 Horizons)		574	1390	1964	1627	1046	2673
50% Build-out Net Vehicle Trips (2031 Horizon)		287	695	982	814	523	1337

As shown in Table 4.1, the full build out of the Grand Niagara development is forecast to generate 1,964 trips during the weekday a.m. peak hour and 2,673 auto trips during the weekday p.m. peak hour. As noted earlier, this is a conservative estimate for the site since the maximum buildable density has been evaluated.

The 50% buildout trip generation was estimated by prorating half of the ultimate trip generation summarized in Table 4.1. By 2031, the proposed development is expected to generate 982 trips during the a.m. peak hour and 1337 trips during the p.m. peak hour.

4.5 TRIP DISTRIBUTION AND ASSIGNMENT

Consistent with the approach used in Grand Niagara SP TIS in 2017, the projected distribution for the trips generated by the Grand Niagara development is based on the Transportation Tomorrow Survey (TTS). The same TTS planning district (57) was used as the 2017 TIS, while using the more up to date information from the 2016 TTS. The trip distribution derived from the TTS data was adjusted based on considerations relating to the local road network and the planned connections to the area road network. Table 4-3 outlines the resulting trip distribution, and the TTS queries are provided in Appendix I.

Table 4-3: Site Traffic Analysis Zone Trip Distribution

Direction	Planning District	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		Inbound	Outbound	Inbound	Outbound
North	54, 55, 57 (Niagara Falls)	64%	69%	68%	66%
South	59, 60	5%	3%	3%	5%
East	57 (Niagara Falls)	18%	17%	17%	17%
West	44,53,61,62,45,46,51,52,1 to 43	13%	11%	12%	12%
TOTAL		100%	100%	100%	100%

The site-generated auto traffic assignments were developed based on the proposed site access arrangement, the road network, the trip distribution information presented in Table 4-3 and the most logical path for vehicles to minimize travel time and distance. Figures 4-2 and 4-3 illustrate the resulting traffic assignments of the net site-generated traffic to the boundary road network under 50% buildout (2031) and full buildout horizons (2036 and 2041), respectively. The retail pass-by trips have been assumed to follow the same traffic assignment and distribution along arterial roads. Trip assignments for the pass-by volumes are shown in Figures 4-4 and 4-5 for the 2031 and 2036/2041 horizons.

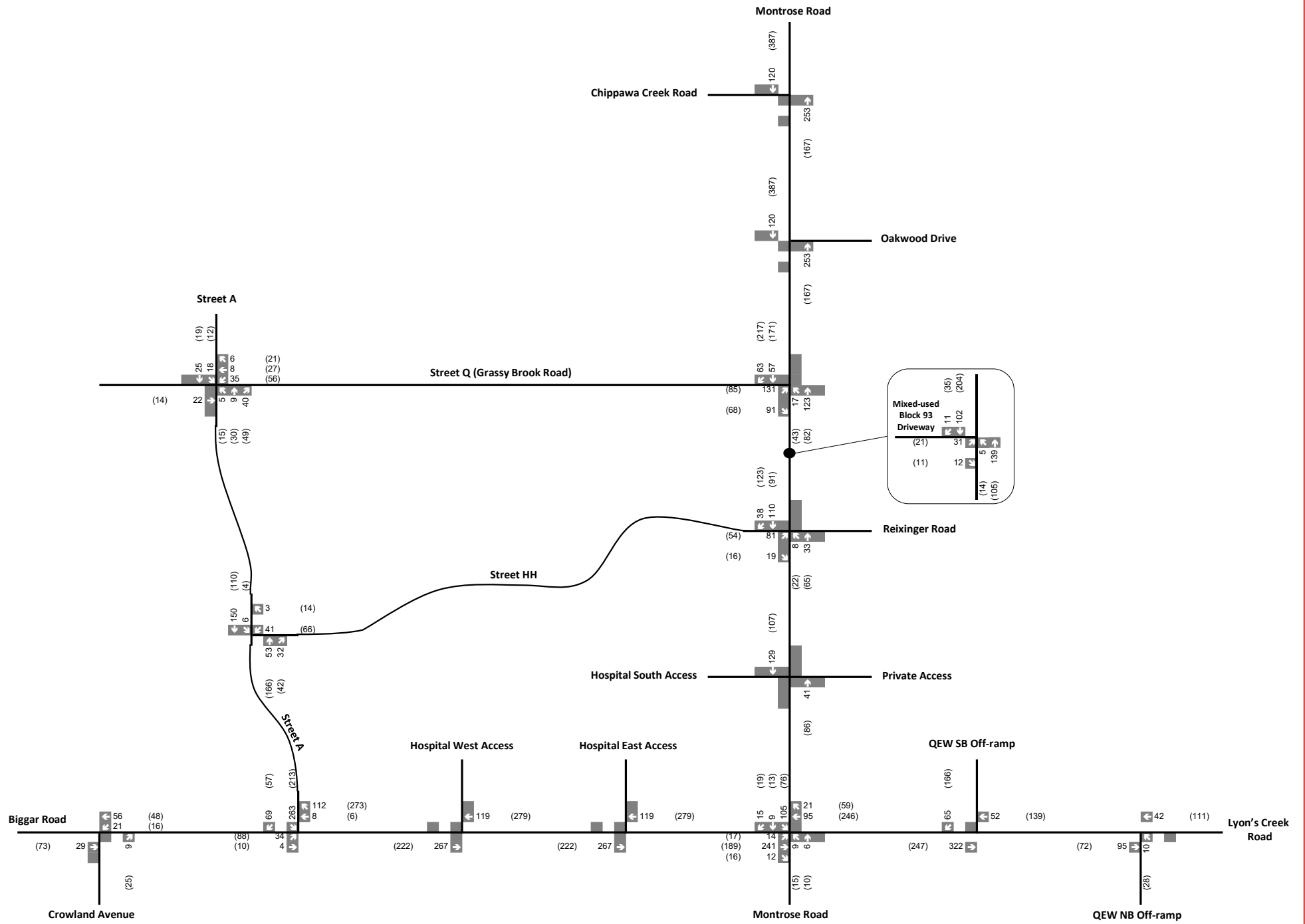


Figure 4-2
Net Site-Generated Traffic Volumes (50% Built-out)

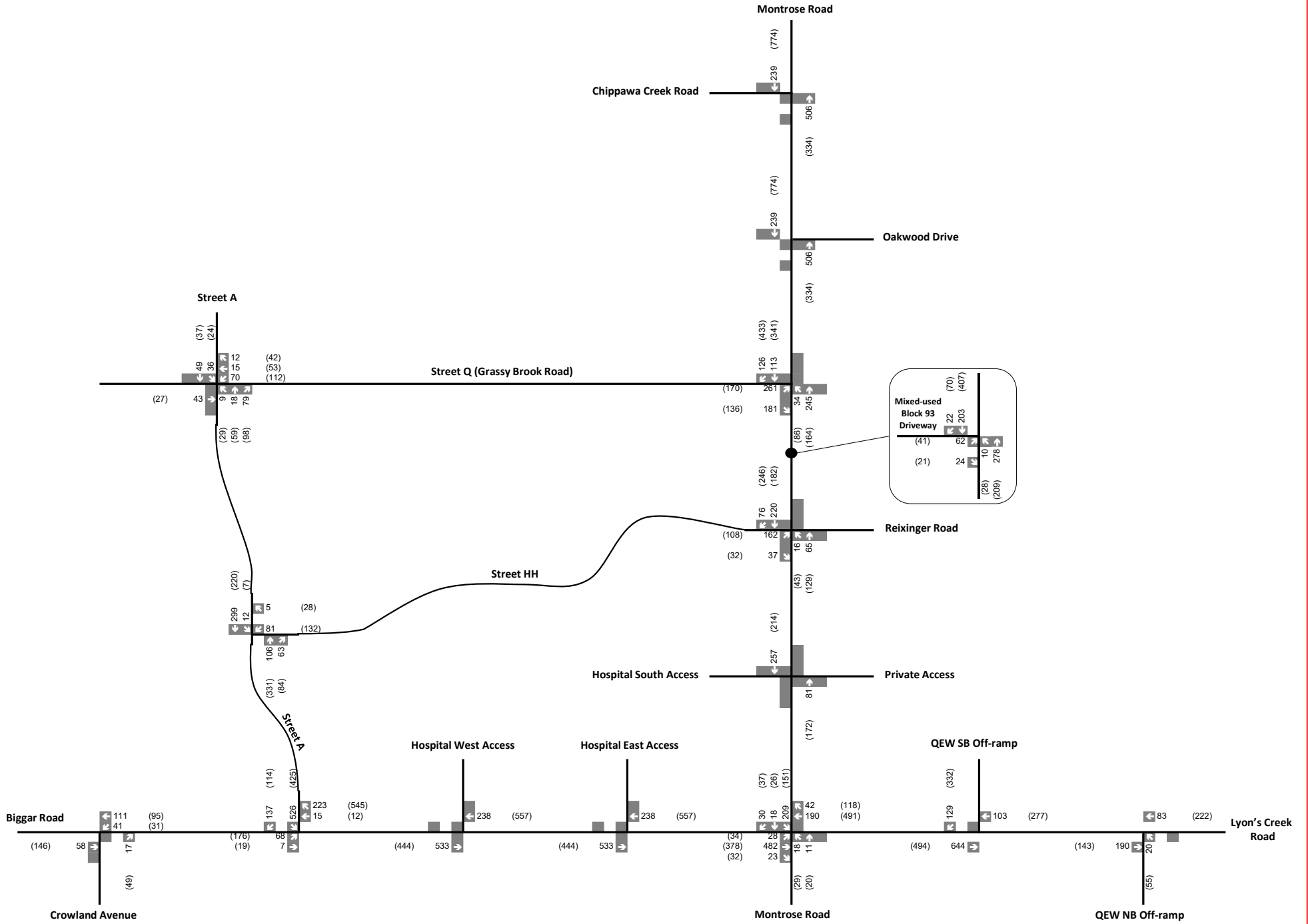
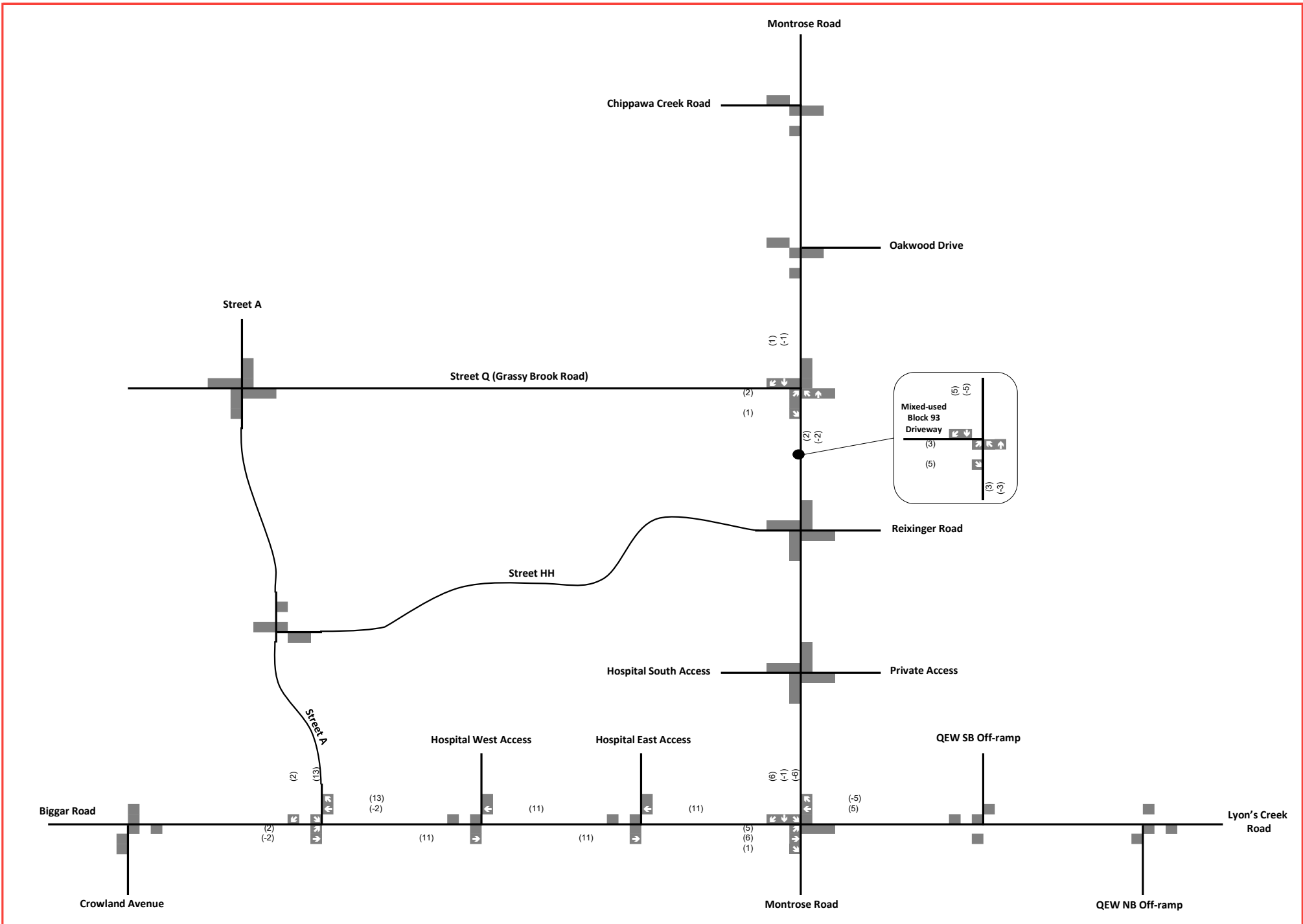
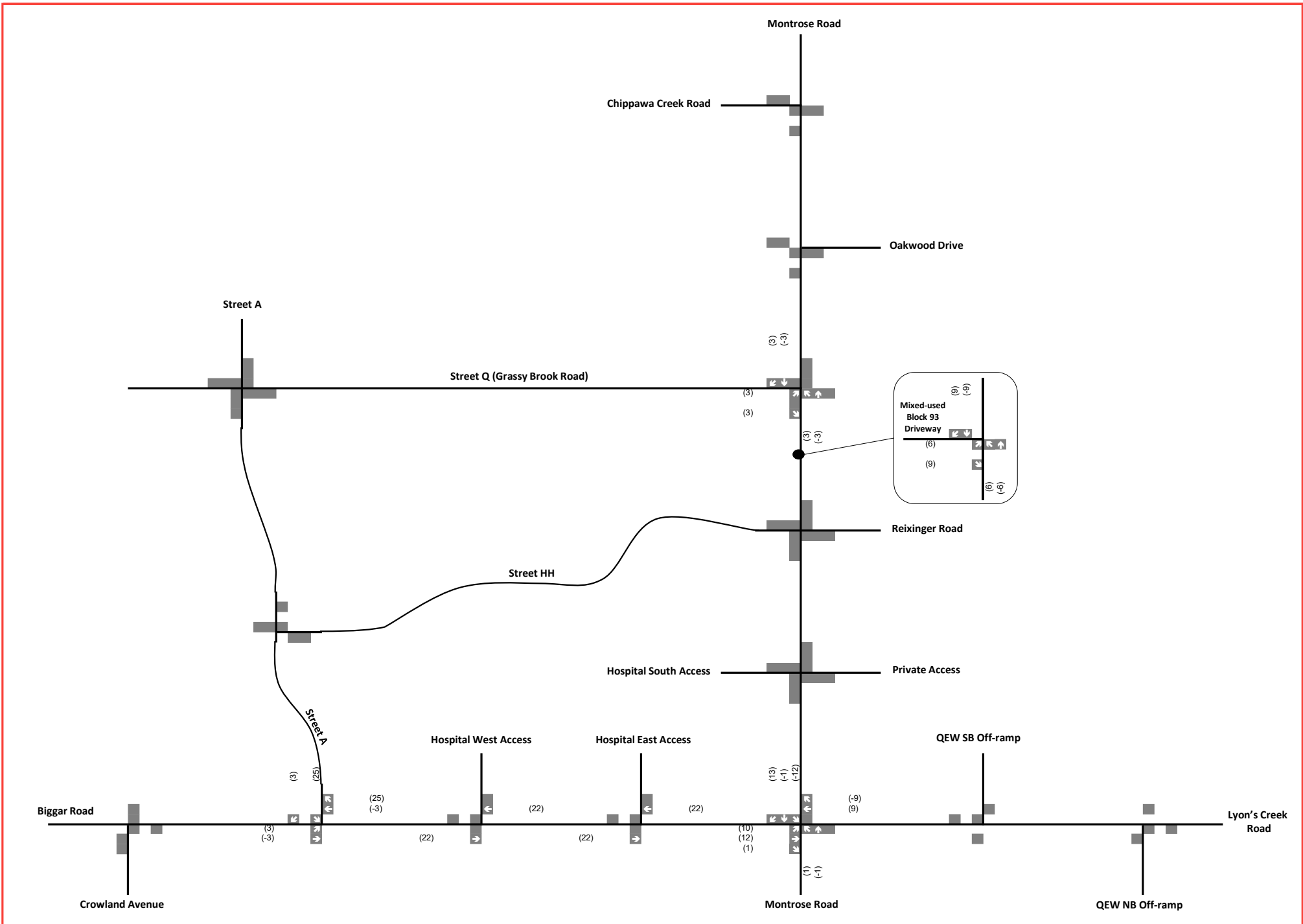


Figure 4-3
Net Site-Generated Traffic Volumes (Full Built-out)



Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-4
 Pass-by Traffic Volumes
 (50% Built-out)



Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-5
 Pass-by Traffic Volumes
 (100% Built-out)

5 FUTURE TOTAL CONDITIONS

5.1 FUTURE TOTAL VOLUMES

The future total traffic volumes were developed by aggregating the future background traffic volumes, site-generated traffic volumes and pass-by traffic volumes. Below is the summary of the future total volume development for each horizon year.

The 2031 future total traffic volumes

- 2031 future background traffic volumes (Figure 3-9);
- Adding the net site-generated traffic volumes (50% Build out) (Figure 4-2); and
- Adding the pass-by traffic volumes (50% Build out) (Figure 4-4).

The 2036 future total traffic volumes

- 2036 future background traffic volumes (Figure 3-10);
- Adding the net site-generated traffic volumes (full build out) (Figure 4-3); and
- Adding the pass-by traffic volumes (full build out) (Figure 4-5).

The 2041 future total traffic volumes

- 2041 future background traffic volumes (Figure 3-11);
- Adding the net site-generated traffic volumes (full build out) (Figure 4-3); and
- Adding the pass-by traffic volumes (full build out) (Figure 4-5).

The resulting 2031, 2036 and 2041 future total traffic volumes are shown in Figures 5-1, 5-2 and 5-3, respectively.

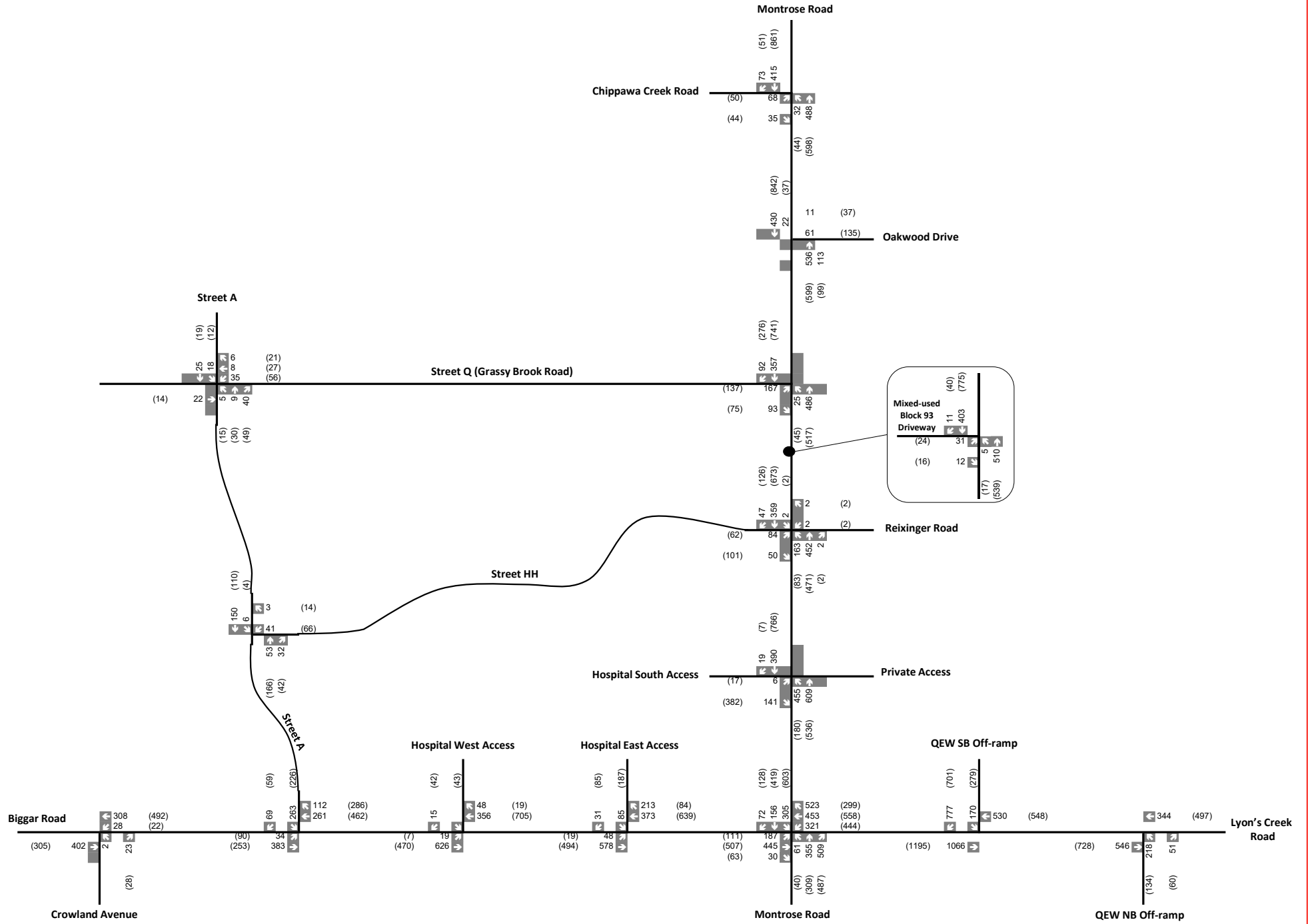
5.2 FUTURE ROADWAY IMPROVEMENTS EVALUATION

In addition to the future road network outlined in Section 3.4 for the study area, more improvements such as intersection controls at the study intersections have been evaluated where logical based on the future total traffic volumes. These are summarized in the following sections and Figure 4-1 illustrates the resulting recommended intersection controls and lane configurations for the new access intersections formed through the Grand Niagara development.

5.2.1 SIGNAL WARRANT ANALYSIS

A signal warrant analysis following Ontario Traffic Manual (OTM) Book 12 – Justification 7 was used to determine if traffic signals are warranted at the busier unsignalized intersections where the critical movements operate at LOS of 'E' or worse or are faced with a capacity constraint. For the purpose of this assessment, signal warrant was completed at the unsignalized intersections based on the forecast 2041 future total traffic volumes (Figure 5-3). As discussed earlier in the Section 3.4, three intersections are already provisioned to be signalized as part of the future background conditions and not included in the warrant analysis.

The signal warrant results indicate that signalized controls are not warranted at any of the unsignalized intersections. The detailed warrant analysis is shown in Appendix H.



Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-1
 Future Total Traffic Volumes (2031)

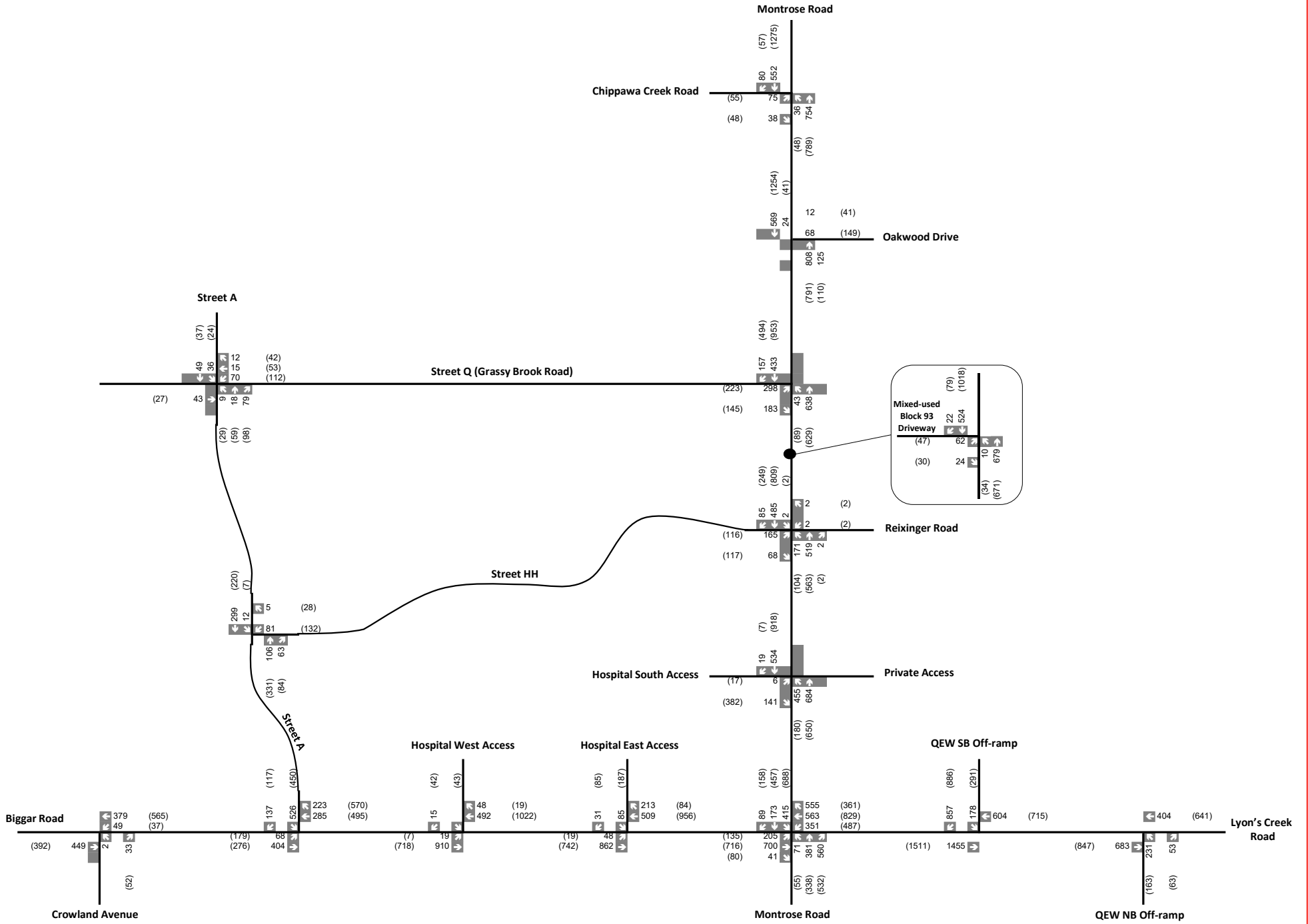
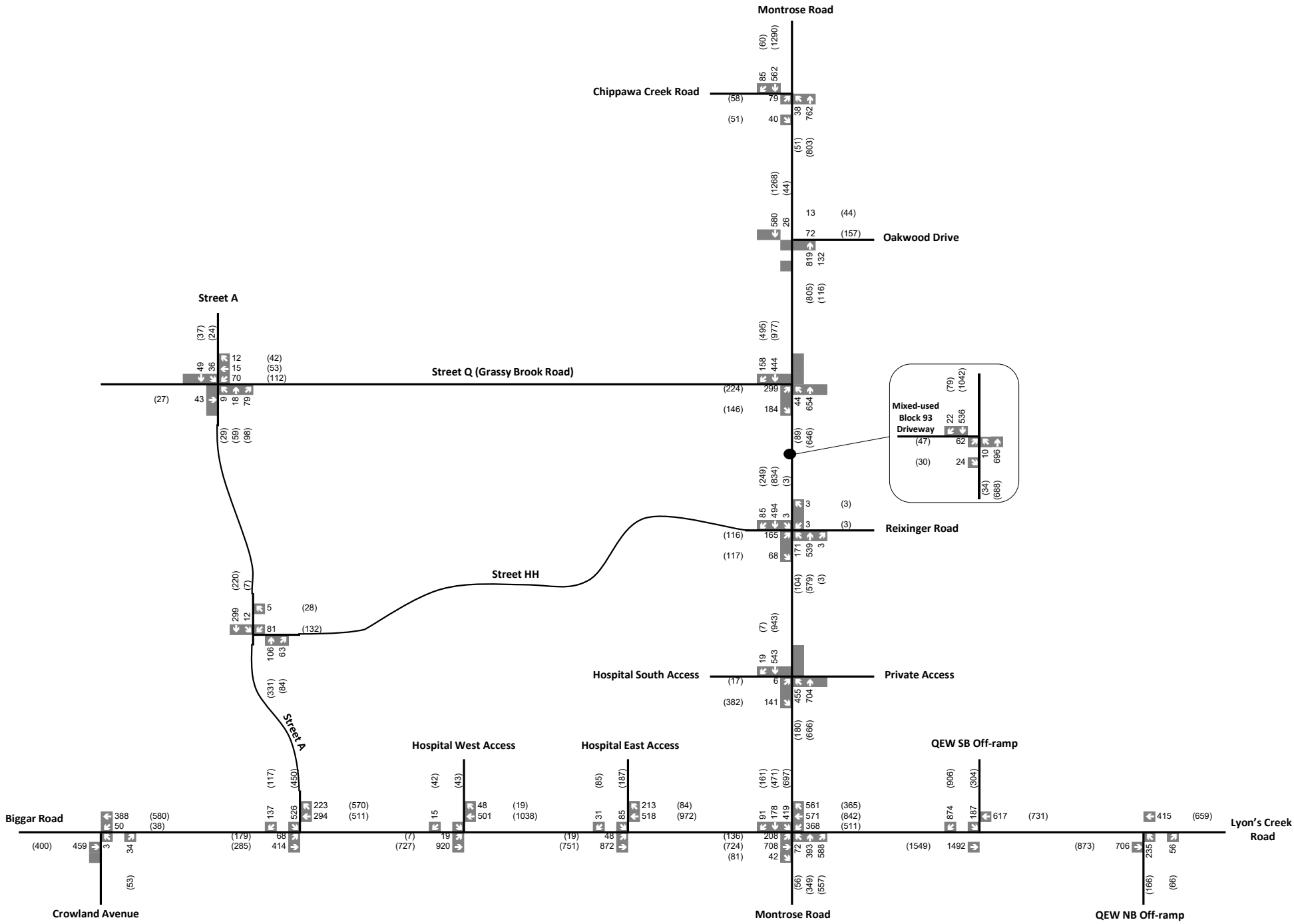


Figure 5-2
Future Total
Traffic Volumes (2036)



Legend
 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-3
 Future Total Traffic Volumes (2041)

5.2.2 ALL-WAY STOP CONTROL WARRANT ANALYSIS

All-way stop warrant analyses have been completed at the two new intersections of Street A and Street Q (Grassy Brook Road) and Street A and Street HH based on the OTM Book 5 method to determine if the implementation of all-way stop control is warranted. Based on the OTM requirements and the 2041 future total volumes in Figure 5-3, the all-way stop control warrant is met only for the intersection of Street A and Street Q (Grassy Brook Road). The detailed warrant analysis is shown in Appendix H.

5.2.3 AUXILIARY RIGHT TURN LANE

Based on the forecast future total volumes, an auxiliary southbound right turn lane is recommended at the Grassy Brook Road and Street HH intersections with Montrose Road. Moreover, an auxiliary westbound right turn lane is recommended at the Street A and Biggar Road intersection to accommodate the traffic generated by the Grand Niagara development. These are included in the future total lane configuration figure in Figure 4-1.

5.3 FUTURE TOTAL OPERATIONS

5.3.1 FUTURE TOTAL OPERATIONS

Intersection capacity analyses were completed for the 2031, 2036 and 2041 future total traffic conditions based on the volumes in Figures 5-1, 5-2 and 5-3, respectively and the future total lane configurations in Figure 4-1. The resulting Level of Service during the weekday a.m. and p.m. peak hours are summarized in Table 5-1. Synchro intersection capacity sheets are provided in Appendix J. As part of the future total assessment, the signal timings have been optimized but the cycle lengths maintained from the future background conditions. The critical movements that are operating at or over capacity, or at LOS E or worse are in red for distinction.

Table 5.1: 2031, 2036 and 2041 Future Total Intersection Operations

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2031 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (28)	-	D (39)	WB-L (0.87) E
Lyons Creek Road & QEW southbound off-ramp	Signalized	B (11)	-	B (13)	-
Montrose Road & Hospital South Access	Signalized	B (17)	-	B (16)	-
Biggar Road & Hospital East Access	Signalized	A (10)	-	B (12)	-
Lyons Creek Road & QEW northbound off-ramp	Unsignalized ²	E (44)	NB-L (0.75) E	F (70)	NB-L (0.78) F
Montrose Road & Chippawa Creek Road	Unsignalized	C (24)	EB-L (0.29) C	F (55)	EB-L (0.44) F
Montrose Road & Oakwood Drive	Unsignalized	D (25)	WB-L (0.27) D	F (107)	WB-L (0.92) F
Montrose Road & Street Q (Grassy Brook Road)	Unsignalized	D (27)	EB-L (0.54) D	F (93)	EB-L (0.87) F
Montrose Road & Reixinger Road/ Street HH	Unsignalized	E (40)	EB-L (0.47) E	E (47)	EB-L (0.45) E

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
Biggar Road & Crowland Avenue	Unsignalized	A (10)	SB-LR (0.02) A	B (10)	NB-LR (0.04) B
Biggar Road & Hospital West Access	Unsignalized	A (10)	SB-LR (0.02) A	C (16)	SB-LR (0.23) C
Biggar Road & Street A	Unsignalized	F (57)	SB-LR (0.90) F	F (128)	SB-LR (1.11) F
Street A & Street Q (Grassy Brook Road)	Unsignalized	A (8)	SB-TLR (0.06) A	A (8)	WB-TLR (0.13) A
Street A & Street HH	Unsignalized	B (10)	WB-LR (0.06) B	B (11)	WB-LR (0.13) B
Montrose Road & mixed-use block 93 Driveway	Unsignalized	B (15)	EB-LR (0.11) B	C (23)	EB-LR (0.18) C
2036 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (34)	EB-T (0.85) D WB-L (0.85) E SB-L (0.86) E	D (49)	EB-T (0.98) F WB-L (0.95) F SB-L (0.97) E
Lyons Creek Road & QEW southbound off-ramp	Signalized	B (17)	EB-T (0.91) C	C (21)	EB-T (0.95) C SB-LR (0.88) C
Montrose Road & Hospital South Access	Signalized	C (22)	NB-L (0.88) C	B (18)	-
Biggar Road & Hospital East Access	Signalized	B (11)	-	B (13)	-
Lyons Creek Road & QEW northbound off-ramp	Signalized	B (14)	-	B (13)	-
Montrose Road & Oakwood Drive	Signalized	B (13)	-	B (16)	-
Montrose Road & Chippawa Creek Road	Unsignalized ²	F (51)	EB-L (0.52) F	F (332)	EB-L (1.22) F
Montrose Road & Street Q (Grassy Brook Road)	Unsignalized	F (223)	EB-L (1.35) F	F (9999)	EB-L (3.04) F
Montrose Road & Reixinger Road/ Street HH	Unsignalized	F (226)	EB-L (1.27) F	F (277)	EB-L (1.31) F
Biggar Road & Crowland Avenue	Unsignalized	B (12)	NB-LR (0.06) B	B (11)	NB-LR (0.09) B
Biggar Road & Hospital West Access	Unsignalized	A (9)	SB-LR (0.02) A	D (26)	SB-LR (0.35) D
Biggar Road & Street A	Unsignalized	F (392)	SB-LR (1.79) F	F (9999)	SB-LR (3.91) F
Street A & Street Q (Grassy Brook Road)	Unsignalized	A (8)	WB-TLR (0.17) A	A (9)	WB-TLR (0.29) A
Street A & Street HH	Unsignalized	B (11)	WB-LR (0.14) B	C (18)	WB-LR (0.38) C
Montrose Road & mixed-use block 93 Driveway	Unsignalized	C (22)	EB-LR (0.31) C	F (69)	EB-LR (0.63) F
2041 horizon					
Montrose Road & Biggar Road/Lyons Creek Road	Signalized ¹	C (35)	EB-T (0.87) D WB-L (0.88) E SB-L (0.86) E	D (51)	EB-T (0.99) F WB-L (1.00) F SB-L (0.98) F
Lyons Creek Road & QEW southbound off-ramp	Signalized	B (19)	EB-T (0.93) C	C (23)	EB-T (0.97) C SB-LR (0.91) C
Montrose Road & Hospital South Access	Signalized	C (22)	NB-L (0.89) D	B (19)	-
Biggar Road & Hospital East Access	Signalized	B (12)	-	B (13)	-

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
Lyons Creek Road & QEW northbound off-ramp	Signalized	B (14)	-	B (14)	-
Montrose Road & Oakwood Drive	Signalized	B (13)	-	B (16)	-
Montrose Road & Chippawa Creek Road	Unsignalized ²	F (57)	EB-L (0.57) F	F (392)	EB-L (1.35) F
Montrose Road & Street Q (Grassy Brook Road)	Unsignalized	F (243)	EB-L (1.40) F	F (9999)	EB-L (3.25) F
Montrose Road & Reixinger Road/ Street HH	Unsignalized	F (244)	EB-L (1.31) F	F (321)	EB-L (1.41) F
Biggar Road & Crowland Avenue	Unsignalized	B (13)	NB-LR (0.08) B	B (11)	NB-LR (0.09) B
Biggar Road & Hospital West Access	Unsignalized	A (9)	SB-LR (0.02) A	D (27)	SB-LR (0.37) D
Biggar Road & Street A	Unsignalized	F (600)	SB-LR (2.25) F	F (9999)	SB-LR (4.08) F
Street A & Street Q (Grassy Brook Road)	Unsignalized	A (8)	WB-TLR (0.13) A	A (10)	WB-TLR (0.29) A
Street A & Street HH	Unsignalized	B (13)	WB-LR (0.17) B	A (10)	WB-LR (0.38) C
Montrose Road & mixed-use block 93 Driveway	Unsignalized	D (23)	EB-LR (0.32) D	F (76)	EB-LR (0.66) F

¹ Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'D' or worse for an unsignalized intersection.

² The LOS at an unsignalized intersection is defined by the movement with the highest delay.

The results presented in Table 5.1 show that with the 50% built out of the Grand Niagara development, all of the signalized intersections are forecast to continue operating at acceptable levels of service 'D' or better with all movements operating within capacity under 2031 future total conditions.

With the full build out of the Grand Niagara development by 2036 and 2041, there are some busier movements at the Montrose and Biggar Road intersection operating at or near capacity, which is not uncommon for an arterial to arterial intersection. However, all of the signalized study intersections are still forecast to operate at acceptable levels of service 'D' or better, with all movements operating within capacity in 2036 and 2041 future total conditions.

Based on the future total evaluations, the two internal unsignalized intersections of Street A and Street Q (Grassy Brook Road) and Street A and Street HH will operate adequately during both the a.m. and p.m. peak hours. Under 2036 and 2041 future total conditions, the eastbound shared left and right-turn movements at the Montrose Road and mixed-use block 93 Driveway intersection is projected to operate at LOS 'F' during the weekday p.m. peak hour. However, this critical movement will improve to LOS 'C' or better (as demonstrated in Table 5.2) after the introduction of traffic signal controls at the upstream and downstream intersections of Chippawa Creek Road and Street HH at Montrose Road.

Under 2031 future total conditions, the findings indicate that most of the unsignalized intersections along Montrose Road are projected to operate with longer delays from the minor-street stop-controlled approaches. For example, the eastbound left-turn movement at the Chippawa Creek Road, Grassy Brook Road and Oakwood Drive intersections to Montrose Road are projected to operate at LOS 'F' during the weekday p.m. peak hour. This is due to the higher north-south through volumes that is free flow along Montrose Road. In addition, the QEW northbound off-ramp movement is projected to operate at LOS 'E' and 'F' with v/c ratios of 0.75 and 0.78 during

the a.m. and p.m. peak hours, respectively, under the 2031 horizon. These results are similar to what was presented in the Montrose/Biggar/Lyons Creek Region EA under 2041 future conditions.

As discussed in Section 5.2.1, WSP completed signal warrants based on the 2041 future total traffic volumes to determine if signals are warranted at the busier unsignalized intersections that operate at LOS of 'E' or 'F'. The results show that the OTM signal warrants are not met at these intersections. However, consistent with the Montrose/Biggar/Lyons EA by the Region, WSP recommends the implementation of provisions for traffic signals at the following intersections under future total traffic conditions by early as 2031. This is due to the longer minor-street delays incurred at these intersections under the future total horizon years of 2031, 2036 and 2041.

- Lyons Creek Road & QEW northbound off-ramp, which is already identified as a provisional signal under 2036 and 2041 future background conditions and recommended in the Region's EA.
- Montrose Road & Oakwood Drive, which is already identified as a provisional signal under 2036 and 2041 future background conditions and recommended in the Region's EA.
- Montrose Road & Chippawa Creek Road
- Montrose Road & Grassy Brook Road
- Montrose Road & Reixinger Road/ Street HH
- Biggar Road & Street A

A sensitivity analysis has been conducted with traffic signal implemented at the above-noted stop controlled intersections. The results are presented in Table 5.2 and detailed Synchro sheets are provided in Appendix J. It should be noted that the signalized sensitivity assessment for the Montrose and Oakwood, and Lyons Creek and QEW northbound off-ramp intersections are only presented for the 2031 horizon since signalization at these two intersections were already triggered as part of the 2036 and 2041 future background conditions.

Table 5.2: Future Total Intersection Operations with Improvements

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2031 horizon					
Lyons Creek Road & QEW northbound off-ramp	Signalized ¹	B (14)	-	B (12)	-
Montrose Road & Chippawa Creek Road	Signalized	B (12)	-	B (13)	-
Montrose Road & Oakwood Drive	Signalized	A (7)	-	B (10)	-
Montrose Road & Street Q (Grassy Brook Road)	Signalized	B (19)	-	B (12)	-
Montrose Road & Reixinger Road/ Street HH	Signalized	B (12)	-	B (14)	-
Biggar Road & Street A	Signalized	B (17)	-	B (15)	-
Montrose Road & mixed-use block 93 Driveway	Unsignalized ²	B (14)	EB-LR (0.10) B	C (16)	EB-LR (0.11) C
2036 horizon					
Montrose Road & Chippawa Creek Road	Signalized ¹	B (17)	-	B (20)	SB-TR (0.85) C
Montrose Road & Street Q (Grassy Brook Road)	Signalized	B (19)	-	B (15)	--
Montrose Road & Reixinger Road/ Street HH	Signalized	B (14)	-	B (15)	
Biggar Road & Street A	Signalized	C (30)	SB-LR (0.85) C	C (31)	EB-L (0.90) E SB-LR (0.92) D
Montrose Road & mixed-use block 93 Driveway	Unsignalized ²	C (17)	EB-LR (0.23) C	C (23)	EB-LR (0.30) C

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay in Seconds)	Critical Movement (V/C) LOS	LOS (Delay in Seconds)	Critical Movement (V/C) LOS
2041 horizon					
Montrose Road & Chippawa Creek Road	Signalized ¹	B (17)	-	C (20)	SB-TR (0.87) C
Montrose Road & Street Q (Grassy Brook Road)	Signalized	B (19)	-	B (15)	-
Montrose Road & Reixinger Road/ Street HH	Signalized	B (14)	-	B (15)	-
Biggar Road & Street A	Signalized	C (31)	SB-LR (0.85) C	C (32)	EB-L (0.95) E SB-LR (0.92) D
Montrose Road & mixed-use block 93 Driveway	Unsignalized ²	C (17)	EB-LR (0.23) C	C (23)	EB-LR (0.30) C

The signalization improvements greatly improve the operations of the above-noted intersections from LOS 'E' and 'F' (as unsignalized) to LOS 'C' or better with no critical movements under 2031, 2036 and 2041 future total conditions. In addition, at the minor-street stop controlled intersection of the mixed-use block 93 driveway onto Montrose Road improves notably to LOS 'C' or better during both the morning and afternoon peak hours once the upstream and downstream intersections are signalized.

The results demonstrate that the site-generated traffic from the proposed development can be accommodated by the future road network once the recommended intersection control improvements are in place. These improvements are similar to what was recommended in the Montrose/Biggar/Lyons Creek EA to accommodate future traffic volumes. It should be noted that under 2031 conditions, all of the unsignalized intersections along Montrose Road are operating at within capacity despite the conservative Synchro parameters applied. Therefore, signals are likely required after the 2031 horizon, at which time traffic volume monitoring is recommended along Montrose Road. In the meantime, provisions for future signals at these intersections may be planned in 2031. This is particularly the case since the assessment is based on the maximum density achievable on the site and 90% of the trips are assumed to be auto-oriented. With ongoing investment into active transportation and transit facilities in the Niagara Region (i.e., improvements to fixed-route and higher-order transit services such as GO transit), more residents, visitors and employees at the development will shift to non-auto modes. Therefore, the forecast traffic impacts of the proposed development are likely overstated. From signal spacing perspective, based on the spacing available between the existing and proposed signals along Montrose Road and Biggar Road (ranging approximately from 280m to 950m), intersection spacing is not an issue. In summary the following is recommended from a network improvement perspective as it relates to the subject development:

2031: Signalize the intersection of Biggar Road & Street A and implement provisions for future signals implemented at the following intersections:

- o Montrose Road & Chippawa Creek Road
- o Montrose Road & Grassy Brook Road
- o Montrose Road & Reixinger Road/ Street HH

In addition, it is recommended to monitor future traffic volumes/condition at the study intersections along Montrose Road at the 50% buildout milestone to determine if traffic volumes meet the OTM signal warrant, and or the resulting traffic conditions warrant consideration for signals due to excessive delay.

2036 and 2041: Signalize the following intersections (if not yet in place at the 50% milestone review)

- o Montrose Road & Chippawa Creek Road
- o Montrose Road & Grassy Brook Road
- o Montrose Road & Reixinger Road/ Street HH

6 INTERNAL FUNCTIONAL DESIGN

6.1 ROAD HIEARCHY AND INTERNAL CONTROLS

Based on the Draft Plan of Subdivision as presented in Figure 1-2, the internal roads may be classified as follows:

Collector roads:

- Street A: 23m right-of-way (ROW) south of Street Q and 20m ROW north of Street Q
- Street Q (west of existing Grassy Brook Road): 26m ROW
- Street HH: 20m ROW
- Street I (west of school): 20m ROW

All of the remaining labeled streets will be local streets with a 18m ROW. A series of 7 lanes are also proposed within the development with a ROW of 10m. Overall, the proposed hierarchy and network porosity is logical and builds off of the Grand Niagara SP work completed in 2017.

From an intersection control perspective, the following strategy is recommended:

- All of the local street intersecting onto the collector roads will be minor-street stop controlled.
- The collector to collector road intersections will be all-way stop controlled as noted in Section 5.
- Where a local road intersects with another local road, the longer segment will be free flow while the shorter one (serving fewer trips) will be stop controlled.
- The lanes will be stop controlled when intersecting with the local streets.

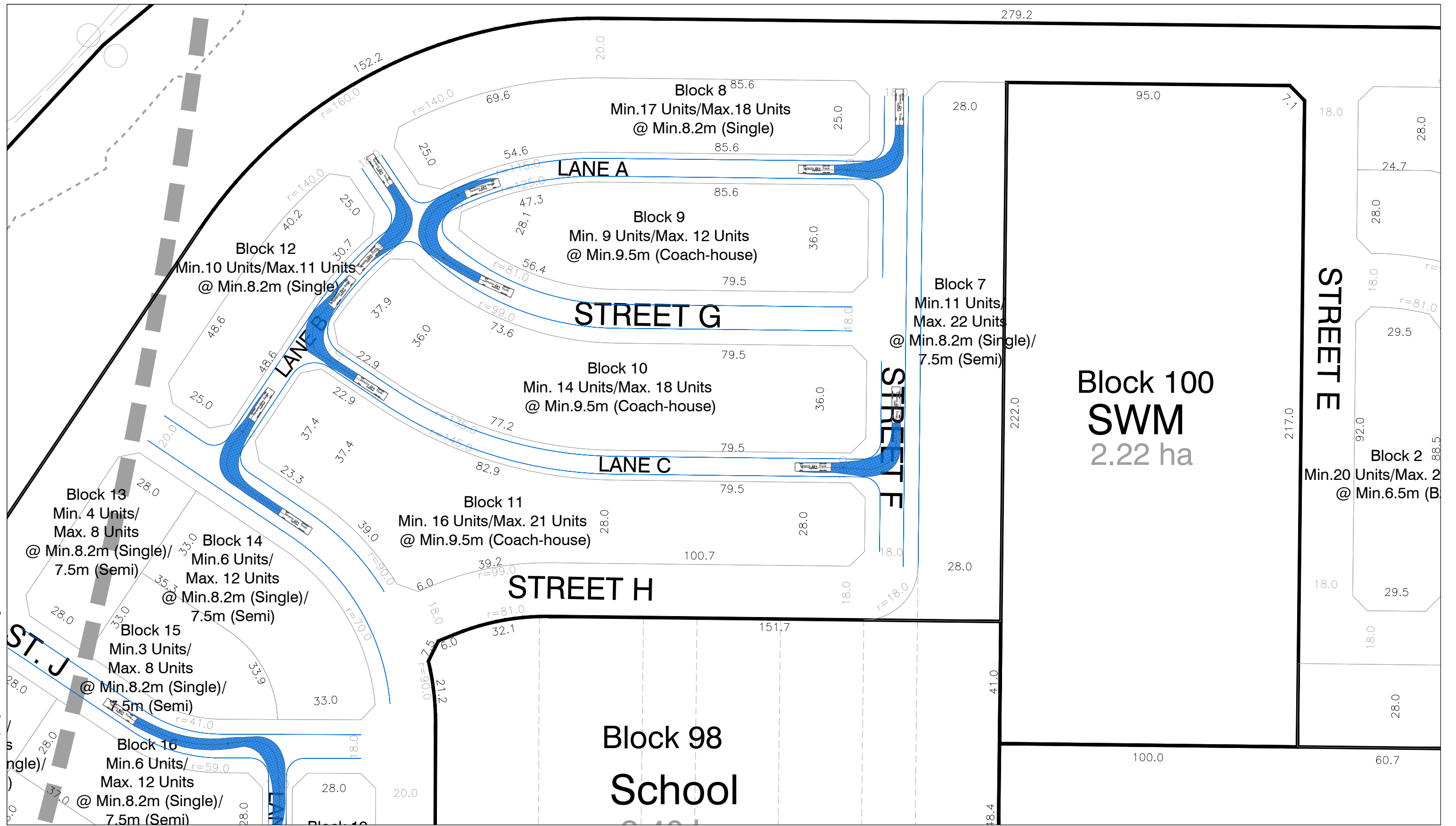
Almost all of the internal intersections intersect at a 90 degree angle. With consideration of the Transportation Association of Canada (TAC) allowance of 70 to 90 degree intersection angles, this aspect will be reviewed in further detail in the subsequent submission. Daylighting triangles are proposed at all of the internal intersections. This aspect will also be reviewed in detail in the subsequent submission relative to the City's requirement.

6.2 FIRE TRUCK CIRCULATION REVIEW

A typical fire truck vehicle template has been evaluated circulating the internal road network – particularly along the laneways. All of the internal roads will have a pavement width of more than 6m, thus satisfying the Ontario Building Code requirements. The fire truck circulation review is presented in Figures 6-1 to 6-4 and all of the manoeuvres work adequately with no dead-ends in the site.

6.3 RAIL CROSSING

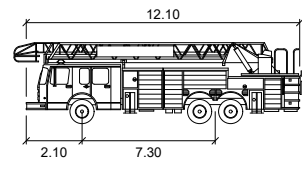
In addition to the existing rail crossing via Grassy Brook Road extending into Street Q, one new rail crossing is proposed via Street A. WSP understands that the rail authorities have been contacted and discussions are ongoing. From an intersection spacing perspective, rail authorities typically require that driveways and new streets be set back at least 30m from the rail crossing to minimize the potential for cars queuing back to the rail crossing. In this case, the all-way stop controlled intersection of Street A and Street HH is more than 30m south of the rail crossing. Similarly, the minor-street stop intersection at Street A and Street GG is also more than 30m north of the rail crossing.



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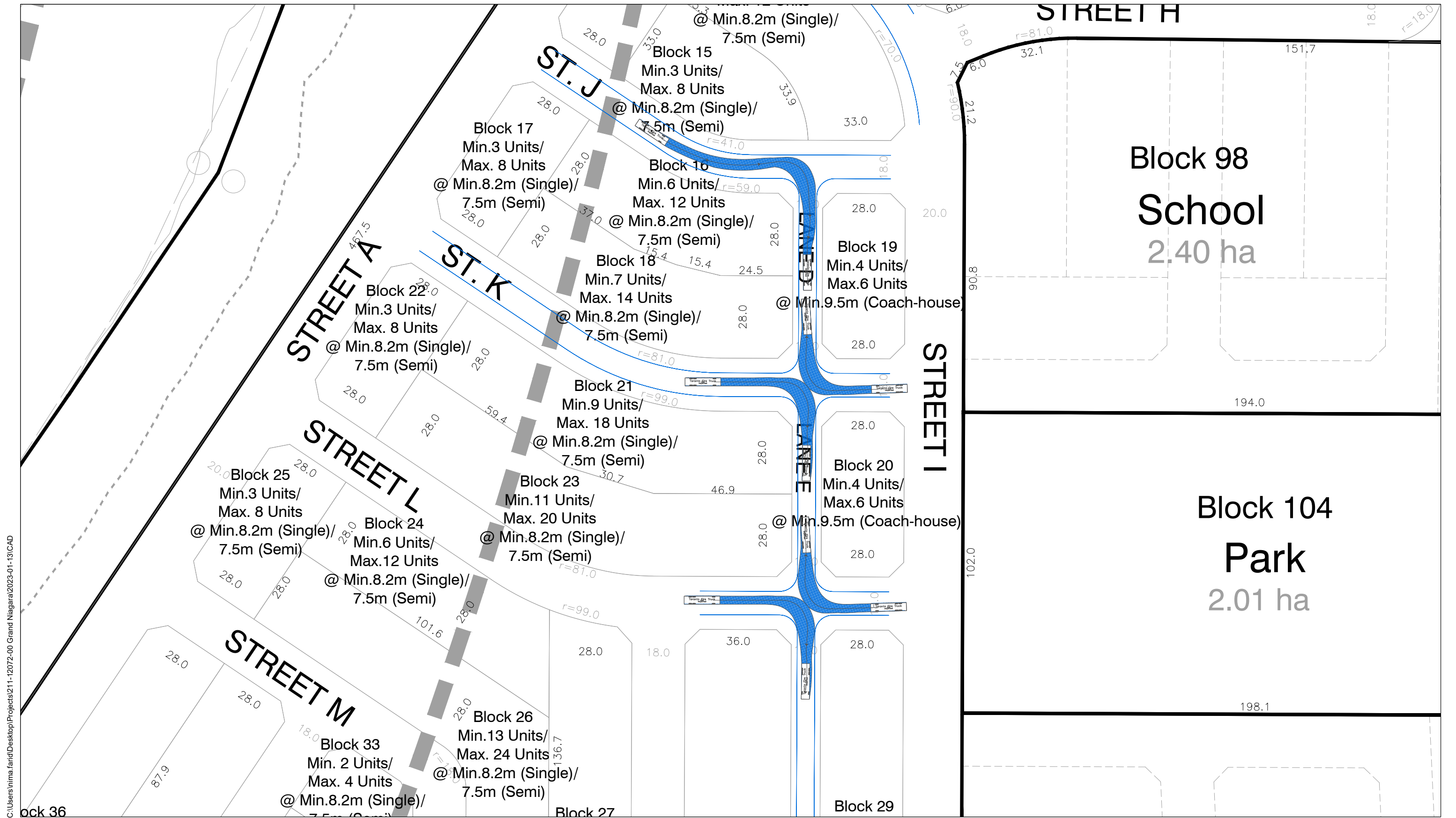
Date Site Plan Received: 2023-01-13

Scale: 1:1200



Toronto Fire Truck	
	meters
Width	: 2.75
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 37.5

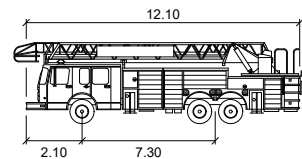
Figure 6-1
Fire Truck Maneuver Review
Grand Niagara



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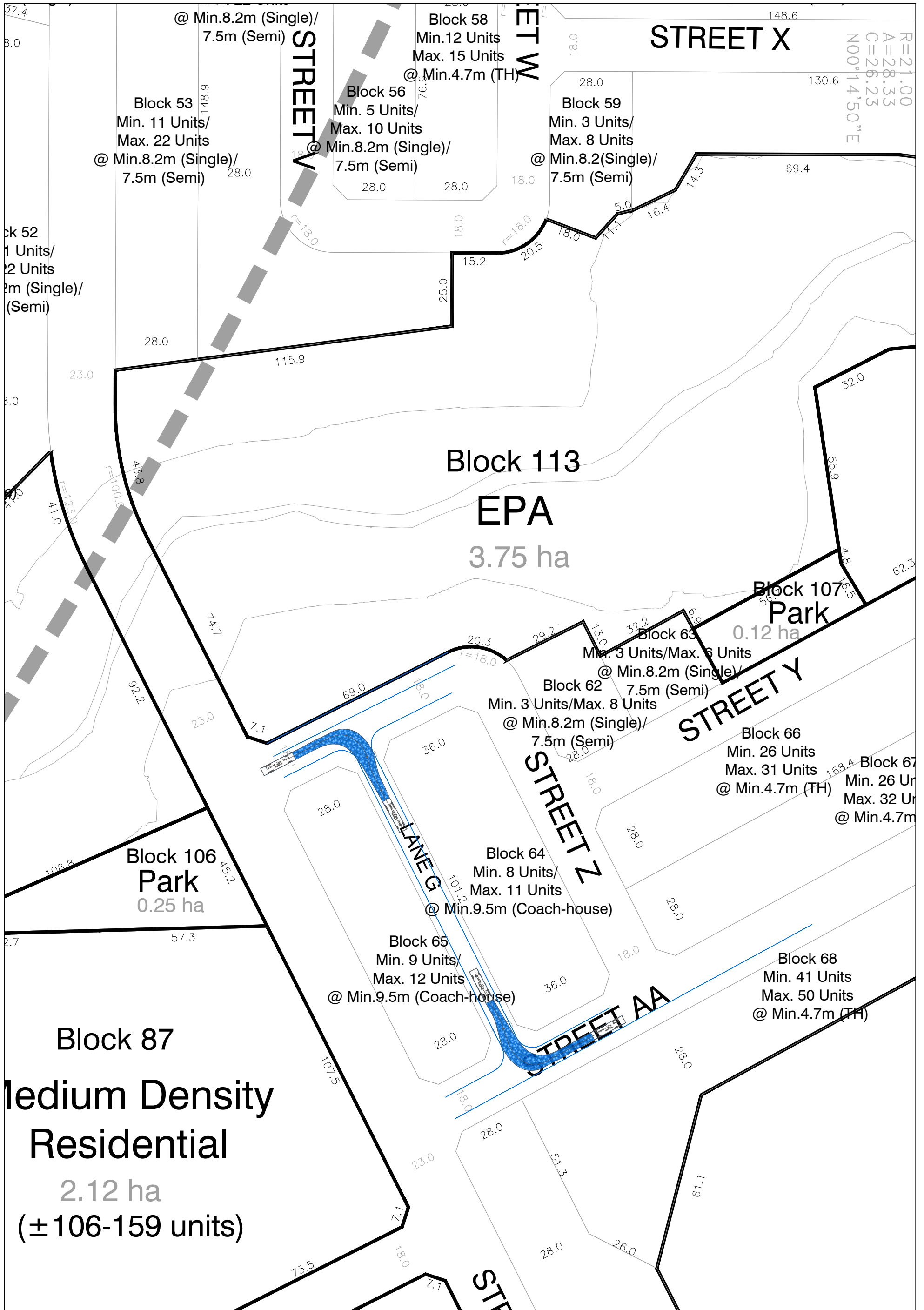
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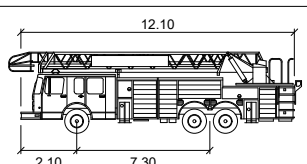
Toronto Fire Truck	
	meters
Width	: 2.75
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 37.5

Figure 6-2
Fire Truck Maneuver Review
Grand Niagara



Date Site Plan Received: 2023-01-13

Scale: 1:1200



Toronto Fire Truck

	units	meters
Width	: 2.75	
Track	: 2.50	
Lock to Lock Time	: 6.0	
Steering Angle	: 37.5	

Figure 6-4
Fire Truck Maneuver Review
Grand Niagara

7 CONCLUSIONS

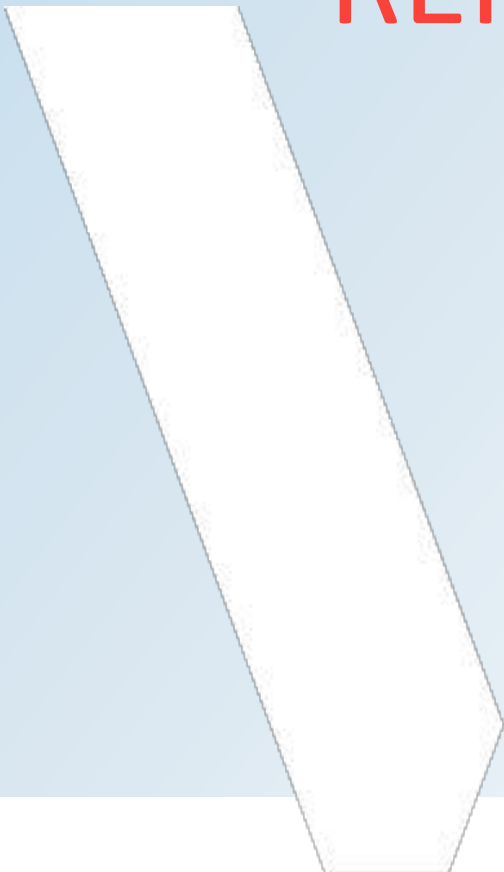
This Traffic Impact Study has evaluated the impact of the proposed Grand Niagara development located in the City of Niagara Falls. The Grand Niagara development is a mixed-use community consisting of a maximum of 5,387 residential units (1,019 detached and semi-detached units, 529 townhouses and 3,839 medium density units) and a total of 8,750 sq.m. retail/office GFA uses. The subject site will be served by Grassy Brook Road, two new roads: Street A and Street HH connecting onto Biggar Road and Montrose Road and a private driveway onto Montrose Road. The development is expected to be 50% built and occupied by 2031 and fully constructed and occupied by 2036.

Based on the analysis contained in this report and following the ToR established with the City, Region and MTO, our conclusions are as follows:

- Under the existing conditions, all of the study intersections are operating at an acceptable LOS.
- The full built-out of the Grand Niagara development based on the maximum buildable density is forecast to generate 1,964 trips during the weekday a.m. peak hour and 2,673 auto trips during the weekday p.m. peak hour. Under 50% buildout, the proposed development is expected to generate 982 auto trips during the a.m. peak hour and 1337 auto trips during the p.m. peak hour.
- Under 2031, 2036 and 2041 future background conditions, all of the study signalized intersections operate at acceptable levels of service 'D' or better during the a.m. and p.m. peak hours. Provisions for traffic signal installations are required at the intersections of Lyons Creek Road and QEW northbound off-ramp and Montrose Road and Oakwood Drive under 2036 and 2041 future background traffic conditions.
- Based on the future total evaluations, all of the signalized intersections are forecast to operate at an acceptable levels of service 'D' or better with all movements operating within capacity during the a.m. and p.m. peak hours. Under 2031 future total conditions, most of the unsignalized intersections in the study area are projected to be busier but still operational and it is recommended that the volumes be monitored and a series of traffic assessment and warrants be done at the time (50% buildout) to determine whether intersection control improvements are required. Traffic signals are not likely triggered by 2031 except for Biggar Road and Street A, since the traffic evaluation conducted is based on the maximum density and very conservative Synchro parameters that assume traffic patterns remain the same as existing conditions.
- Based on the maximum density scenario, by 2036 and 2041, it is anticipated that the 3 minor-street stop controlled study intersections along Montrose Road at Chippawa Creek Road, Grassy Brook Road and Reixinger Road/Street HH will need to be signalized. The findings are very similar to those presented in the Montrose/Biggar/Lyons EA completed by the Region in 2021.
- Overall, the findings indicate that the site-generated traffic from the Grand Niagara development can be accommodated by the future planned road network and all of the study intersections will operate adequately with the planned and recommended improvements. The study findings may be considered worst-case scenario since it is based on the maximum buildable density, and assumes that the existing traffic patterns (PHF, saturation flow rate, etc) continue to apply for the future horizons (including 18 years into the future) This is very conservative since as traffic volumes increase, the uniformity of traffic arrival pattern and flow rates tend to increase as well. Hence, the recommended updated traffic assessments and warrants at 50% build out is intended to confirm the required improvements.
- Based on the Draft Plan of Subdivision, the internal road layout and respective ROW and intersection daylight triangle will conform with the City's requirements and road design best practices. Fire trucks have also been demonstrated to manoeuvre adequately through the internal lanes.

APPENDIX

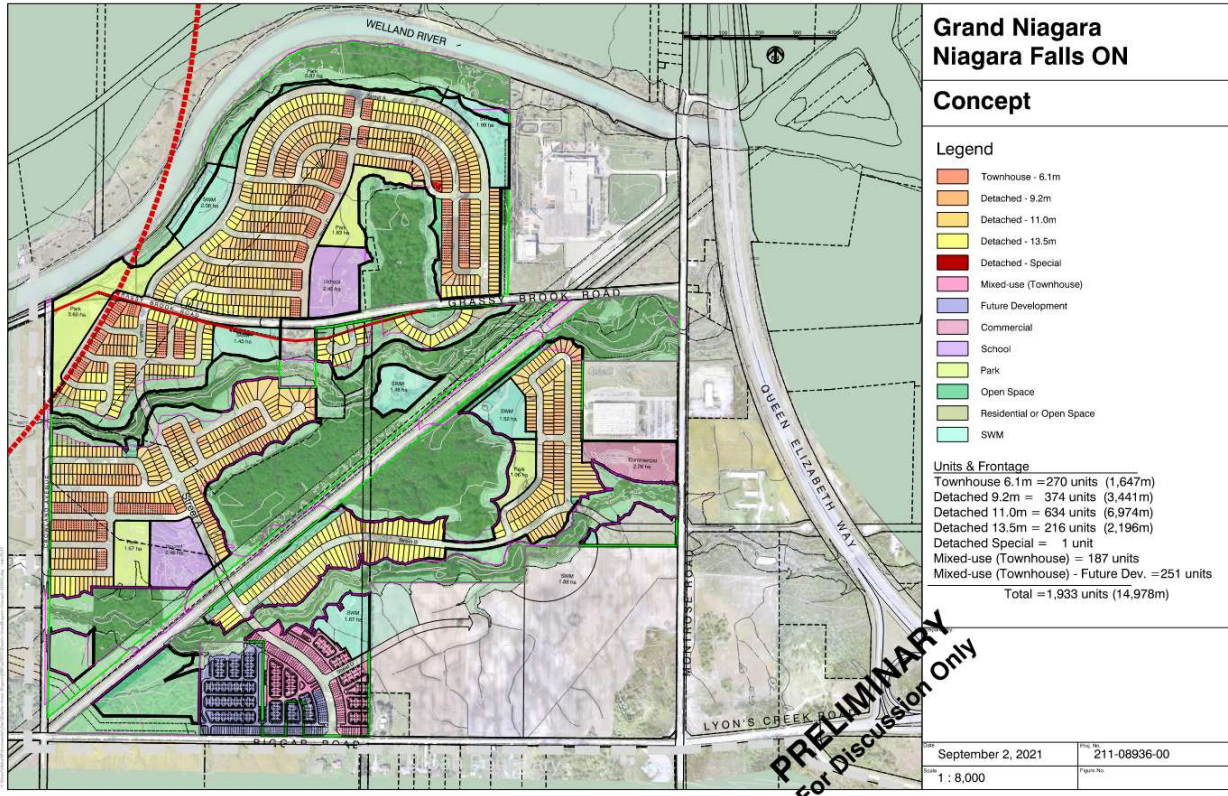
A TERMS OF REFERENCE



To: Review Agencies (MTO, Region & City)
 From: Peter Yu, P.Eng.,PMP WSP Canada
 Subject: Terms of Reference – Grand Niagara

Date: October 29, 2021
 Job No.:
 CC:

WSP Canada Inc. is undertaking a Transportation Impact Study (TIS) in support of the proposed Grand Niagara development located in the City of Niagara Falls. The preliminary site plan is shown below and features approximately 1,933 residential units. By way of background, WSP had completed the June 2017 Traffic Impact Study (TIS) in support of the Secondary Plan. The study approach described herein accounts for the density proposed and our familiarity with the study area.



1 Study Area

Based on the location of the site within the Secondary Plan we will include the following 8 study intersections in our analysis:

- Biggar Road/Lyon's Creek Road/Montrose Road (signalized);
- Lyon's Creek Road/QEW southbound off-ramp (unsignalized);
- Lyon's Creek Road/QEW northbound off-ramp (unsignalized);
- Chippawa Creek Road at Montrose Road (unsignalized);
- Montrose Road and Oakwood Drive (unsignalized);
- Grassy Brook Road/Montrose Road (unsignalized);
- Reixinger Road/Montrose Road (unsignalized); and
- Biggar Road/Crowland Avenue (unsignalized).

We will obtain the turning movement counts for vehicles and pedestrians during a typical weekday a.m. and p.m. peak hours at all of the above locations and obtain the latest signal timing plans from the road authority. Since the proposed development is primarily residential and away from tourist centres of the region, we will only evaluate the weekday a.m. and p.m. peak hour periods.

Given the current status of COVID-19 and lifting of various restrictions, we would like to confirm that traffic counts would be acceptable to the review agencies.

2 Existing Traffic Conditions

The existing conditions will be analyzed using the Synchro 11 Traffic Software, which is a software implementation of the Highway Capacity Manual 2010, the recognized standard for traffic operations analysis in North America. The existing conditions will be modelled based on the existing transportation network and peak hour traffic volumes as collected. This will be the baseline scenario to which all subsequent scenarios will be compared with.

3 Future Background Traffic Conditions

- a For the purpose of the draft plan submission, the ultimate buildout year and 5 years beyond will be evaluated in the TIS.
- b We will incorporate the background road network improvements (i.e., improvement of Montrose Road, signalized intersection improvement at Montrose Road/Biggar Road) and other relevant improvements as identified from the Secondary Plan as part of the future background assessment.
- c Confirm with the City which background developments need to be considered and estimate the traffic increases related to the other developments if not available through site specific traffic impact studies. For example, we will include the hospital proposed by Infrastructure Ontario at the north-west corner of Biggar Road and Montrose Road.
- d Apply general growth rates based on discussions with various road authorities and review of background documents.
- e Distribute and assign the other development traffic to the study road network.
- f Develop the future background traffic forecasts for the two horizon years.
- g Analyze the operations of the boundary road intersection as noted above on the basis of future background volumes. We will conduct capacity analyses for the weekday a.m. and p.m. peak hours using the Synchro 11 traffic analysis software.
- h We will identify whether improvements to the study area road network are required as a result of the other background developments and general background traffic growth in the area, which should not be your responsibility to construct or finance.

4 Site-Generated Traffic

We will develop the weekday a.m. and p.m. peak hour site traffic from the development using the methodology outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition. 2016 Transportation Tomorrow Survey (TTS) information will be consulted to determine the applicable non-auto traffic adjustments to be applied.

5 Future Total Traffic Conditions

- a The two sets of future total traffic volumes at the proposed street intersections with the boundary roads will be developed by superimposing the weekday a.m. and p.m. peak hour site-generated traffic volumes onto the future background traffic forecasts.
- b Perform a detailed capacity analysis for the two horizon years to determine the future total traffic operations for the study intersection and the proposed major internal intersections along the proposed collector road. Based on the findings, we will provide quantitative results and commentary on traffic operations within the study area. The focus of the assessment will be to quantify the level traffic impact the proposed development will have on the boundary road network.
- c Identify any road and/or traffic operation improvements that may be required based on the future total traffic operations. Sensitivity scenarios will be evaluated if necessary to understand the implication of different improvements. The improvements may entail signal warrant analysis, recommending road widenings or addition of auxiliary turning lanes.

6 Internal Functional Design Review

We will review the internal roadway infrastructure requirements within the development site and advise on the following transportation aspects:

- Roadway and intersection geometrics including intersection spacing, intersection angles and sight distances; and
- Internal road intersection controls and road right-of-way conformance to the City's requirement.

Please provide your input on the above noted terms of reference at your earliest convenience. Thank you very much.

Yours Sincerely,

Peter Yu, P. Eng., PMP
Project Manager
Transportation Planning and Science

Azari, Kian

From: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Sent: April 7, 2022 4:03 PM
To: Yu, Peter
Cc: Julie Hannah; Shanks, Amy; Azari, Kian; Michael Auduong
Subject: RE: [External]-RE: Grand Niagara Proposal - TIS TOR

Hello Peter,

I have reviewed this request with our transportation group and we noted that based on the Region's new growth predictions out to 2051 we will require that you factor historic counts with a 2% growth rate annually til development buildout and then use 1% rate for the 10 years after.

Let me know if you have any further questions or concerns.

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

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661
Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7



From: Yu, Peter <Peter.Yu@wsp.com>
Sent: Wednesday, April 06, 2022 10:06 AM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Cc: Julie Hannah <jhannah@niagarafalls.ca>; Shanks, Amy <Amy.Shanks@niagararegion.ca>; Azari, Kian <Kian.Azari@wsp.com>; Michael Auduong <michael@armstrongplan.ca>
Subject: RE: [External]-RE: Grand Niagara Proposal - TIS TOR

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Hi Susan,

Further to the ToR feedback the Region provided below, I'd like to discuss with the Region the general growth rate to be applied. In our efforts to be consistent with the recently completed EA, we have reviewed the general growth approach applied. As you can see from the excerpt below from the EA, a compound growth of 1% was applied to all movements for both the 2026 and 2041 horizon years. Given that we are including the same set of background developments, and that the future road network improvements were determined based on this growth assumption, applying double of that in our study for 10 years would yield inconsistent background conditions. Furthermore MTO in their ToR feedback also confirmed that they accept a general growth rate of 1%/year.

2.8 Traffic Forecasts

Traffic forecasts for 2026 and 2041 horizons were developed through a ground-up approach following the methodology detailed in the forecasting memorandum for the DTA Version 1, included as **Appendix D**. Similar methodology was used to develop the revised forecasts for all the subsequent revisions of this report, as explained below.

- Consistent with the TISs for the planned developments within the study area, **1% compound** annual growth rate was applied to the existing TMCs for all movements to estimate future 2026 and 2041 background traffic.
- Traffic demand sourced from the following approved/planned developments' respective TISs was added to the background traffic to develop future total traffic forecasts.

Therefore, we are proposing to apply a general growth of 1% per year for all of the future traffic projections.

Please confirm that this approach is acceptable.

Thank you

Peter



Peter Yu, P.Eng., PMP
Project Manager
Transportation Planning and Science

T+ 1 289-982-4764
M+ 1 647-283-7530

From: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Sent: March 1, 2022 6:19 AM
To: Michael Auduong <michael@armstrongplan.ca>
Cc: Julie Hannah <jhannah@niagarafalls.ca>; John Castro <jcastro@empirecommunities.com>; Yu, Peter <Peter.Yu@wsp.com>; Shanks, Amy <Amy.Shanks@niagararegion.ca>
Subject: RE: [External]-RE: Grand Niagara Proposal - TIS TOR

Hello Michael,

Regional transportation staff have reviewed your terms of reference and have the following comments:

- If the development will be built in multiple phases, the study should include capacity analysis at the end of each phase additional to the ultimate buildout year, 5 and 10 years after buildout.
- Given the current COVID-19 conditions (remote working/study conditions), any traffic counts at this time wouldn't represent typical conditions. Therefore, an adjustment factor is to be applied to the carried counts and to be justified within the report.
- For historical count data, please factor the data into a baseline condition (year of the TIS report submission) using a growth rate of 2% per annum.
- For future background & total traffic conditions analysis, please use 2% growth rate to project traffic into development's buildout year, then apply 1% for the 10 years analysis after buildout year.
- For the capacity analysis of Regional intersections, please follow the Region's TIA guidelines (May 2012)
- The site plan, which will be submitted with the TIS, to include all existing and proposed accesses in the study area.

Most current Information on the Montrose/Biggar/Lyon's Creek EA can be found at the following link: <https://niagararegion.ca/projects/montrose-lyons-creek-ea/default.aspx> regarding future connections/signalizations, overall road design.

Regional traffic data is to be obtained through the website at the following link: <https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx>.

If any improvements are required based on the TIS findings, functional designs are to be provided in the report.

If you require anything further please contact the undersigned at your convenience.

Thank you,

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

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661
Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7



From: Michael Auduong <michael@armstrongplan.ca>
Sent: Wednesday, February 23, 2022 9:47 AM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Cc: Julie Hannah <jhannah@niagarafalls.ca>; John Castro <JCastro@empirecommunities.com>; Yu, Peter <Peter.Yu@wsp.com>; Shanks, Amy <Amy.Shanks@niagararegion.ca>
Subject: FW: [External]-RE: Grand Niagara Proposal - TIS TOR

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Hi Susan,

Further to the Region's Pre-con comments, we've received the below comments from MTO on the TIS TOR. We've updated the TOR to reflect MTO's comments as well as the City's comments. Can you review and advise if acceptable?

Thanks
Michael

From: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>
Sent: Tuesday, February 22, 2022 10:43 AM
To: Michael Auduong <michael@armstrongplan.ca>
Cc: Julie Hannah <jhannah@niagarafalls.ca>; Yu, Peter <Peter.Yu@wsp.com>; John Castro <JCastro@empirecommunities.com>; Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>
Subject: [External]-RE: Grand Niagara Proposal - TIS TOR

[This message comes from an external organization. Be careful of embedded links or unexpected attachments]

Hi Michael,

Re: TIS Terms of Reference – Request for Comments
Proposed redevelopment of the Grand Niagara Golf Course
8547 Grassy Brook Road, Niagara Falls, ON. (QEW)

After review of the submitted TIS terms of reference, and in accordance with the PTHIA, the MTO Traffic Office offers the following comments:

- MTO will require 5 and 10 horizon year analysis from buildout year as per the TIS guidelines.
- Please note we've proposed many changes under the Montrose EA/DD project undertaken by Niagara Region, Parsons and MTO. The proponent will be required to prepare analysis using the "new" geometric plan. Considering it will be fully constructed by the time this development is forecasted to be built.
- Both QEW at Lyons Creek Rd off-ramps will be signalized with some geometrics changes, this should be captured in the submission.
- A growth rate of 1% will be acceptable by MTO to forecast for background and future horizon years.
- It will be preferred by MTO to use the most recent counts (2022 may be available in the near future), however, if no other data is present, the proponent may use volumes used under the Grand Secondary Niagara Plan.

Please do not hesitate to contact me if you have any questions.

Thanks,

Paul Nunes
Planner (Niagara/Hamilton)
Highway Corridor Management Section – Central Operations

Ministry of Transportation
159 Sir William Hearst Avenue, 7th Floor
Toronto, ON M3M 0B7

E-Mail: paul.nunes@ontario.ca

Web: **[MailScanner has detected a possible fraud attempt from "can01.safelinks.protection.outlook.com" that could be a fraud attempt as the link does not match the site its claiming to be www.mto.gov.on.ca/english/engineering/management/corridor](http://www.mto.gov.on.ca/english/engineering/management/corridor)**



From: Michael Auduong <michael@armstrongplan.ca>
Sent: February 18, 2022 8:05 AM
To: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>
Cc: Julie Hannah <jhannah@niagarafalls.ca>; Yu, Peter <Peter.Yu@wsp.com>; John Castro <JCastro@empirecommunities.com>
Subject: RE: Grand Niagara Proposal - TIS TOR

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Hi Paul,

I just wanted to follow on the below. Do you know when you expect to provide comments on this TIS TOR?

Thanks
Michael

From: Michael Auduong
Sent: Friday, January 21, 2022 8:30 AM
To: paul.nunes@ontario.ca
Cc: Julie Hannah <jhannah@niagarafalls.ca>; Yu, Peter <Peter.Yu@wsp.com>; Jeffrey Swartz <JSwartz@empirecommunities.com>
Subject: Grand Niagara Proposal - TIS TOR

Hi Paul,

We had a Pre-consultation meeting with City of Niagara Falls and agency staff yesterday on a proposed redevelopment of the Grand Niagara Golf Course. It's located at the NW corner of Biggar Road and Montrose Road, just west of the QEW.

I've attached our concept plan as well as draft TIS Terms of Reference. Would you be able to provide your feedback on the TOR?

Thanks,

Michael Auduong, RPP

Azari, Kian

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: April 6, 2022 10:53 AM
To: Yu, Peter
Cc: Mathew Bilodeau; Azari, Kian; Dunsmore, Susan; Michael Auduong
Subject: RE: Grand Niagara - TIS Terms of Reference
Attachments: 20220406104716930.pdf

Peter;

Attached is the trip diagram for the hospital site from the December 2020 TIS.

Please note that the northern site driveway on Montrose Road has been relocated and will now connect with the future collector road (opposite of Reixinger) north of the hospital.

John Grubich, C.E.T. | Traffic Planning Supervisor | Municipal Works - Transportation Services | City of Niagara Falls
8208 Heartland Forest Road | Niagara Falls, ON L2H 0L7 | (905) 356-7521 ext 5214 | Fax 905-356-5576 | jgrubich@niagarafalls.ca

From: Yu, Peter <Peter.Yu@wsp.com>
Sent: Wednesday, April 6, 2022 10:07 AM
To: John Grubich <jgrubich@niagarafalls.ca>
Cc: Mathew Bilodeau <mbilodeau@niagarafalls.ca>; Azari, Kian <Kian.Azari@wsp.com>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Michael Auduong <michael@armstrongplan.ca>
Subject: RE: Grand Niagara - TIS Terms of Reference

Hi John,

We're proceeding with the TIS based on feedback from the Region, MTO and City. One thing that we noticed was missing from the EA reporting is the site traffic figure for the South Niagara Hospital land use. They show diverted trip figures only, but not the actual volumes related to the hospital. Can you send me the latest (December 2020) TIS for the South Niagara Hospital, or the site-generated traffic assignment figure?

- Niagara Square Redevelopment and Niagara Falls Costco (completed August 2019)
- Grand Niagara Secondary Plan (completed June 2017) – Site volumes without the proposed hospital as shown in Figure 16 and 17 of the TIS.
- South Niagara Hospital (completed December 2020)
- Riverfront Community Secondary Plan (completed 2017)
- Warren Woods Community Secondary Plan (completed August 2014) - 65% built and occupied at the time of the traffic counts consistent with the assumptions in the South Niagara Hospital TIS.

Appreciate your assistance at your earliest convenience.

Thank you

Peter

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: January 26, 2022 2:36 PM
To: Yu, Peter <Peter.Yu@wsp.com>
Cc: Mathew Bilodeau <mbilodeau@niagarafalls.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Subject: Grand Niagara - TIS Terms of Reference

Peter;

I am following up on last week's pre-consultation meeting concerning the redevelopment of the Grand Niagara golf course to a proposed subdivision.

As noted during the meeting, both the Niagara Region and the Ministry of Transportation will also need to review the terms of reference for your study.

The Niagara Region recently completed an EA for the Montrose Road corridor and included part of Biggar Road and Lyon Creek Road. The recently filed EA can be found here <https://niagararegion.ca/projects/montrose-lyons-creek-ea/default.aspx>

Biggar Road is under the City's jurisdiction. Please expand your study area to include an analysis of the Biggar Road / Street A intersection – signal warrants, turning lane warrants, existing/future analysis, etc. as well as the two proposed hospital accesses on Biggar Road. The City has 2019 traffic counts along Biggar Road. Any counts carried out at this time would likely be lower than normal volumes.

Since the estimated traffic from the secondary plan was incorporated into the EA future traffic volumes, the work could be limited to updating trip generation, distribution & assignment figures and comparing it to the information used in the EA report for this secondary plan and complete new Synchro analyses. I recommend waiting for direction from both the Niagara Region and MTO, as they are upper tier jurisdictions. As you may recall, there was discussion at pre-con with the municipal planners recommending that the employment lands along Biggar Road and Montrose Road be maintained, so I expect that there will be changes to the plan.

The CP rail line bisects the site. The applicant should be getting a guarantee from CP for the proposed Street A crossing. As far as I know, other developers have not been granted permission to add in a new road crossing on this line. If a crossing is not granted, each side of the subdivision separated by the rail line will operate independently of one another. The northwestern part will be landlocked if the Grassybrook Road crossing, west of Montrose Road, is blocked for whatever reason, as this will be the only access in and out of the neighbourhood. It appears from the concept plan that Crowland Avenue / Grand Niagara Boulevard does not connect to Biggar Road (nor should it, given the existing rail crossing diagonally through the intersection), and that there is no connection to Grassy Brook Road to the west. In the event that Street A cannot cross the rail line and given the size of the northwestern half of the development, another permanent secondary connection to the road network will be required.

If a crossing is permitted across Street A, please provide documentation that the separation between this crossing and the Grassybrook Road crossing is sufficient. City Staff would like an assessment of the proposed at-grade road/rail crossing of Street A completed, to ensure all requirements of the Transport Canada's Grade Crossing Regulations are met. This will be a condition of draft plan approval, to be undertaken at detailed design.

The internal functional design review (item #6) is adequate. Be advised that the speed control devices (speed cushions, traffic circles, for example) will be required within the neighbourhood. City Staff will develop a plan.

I trust this information is satisfactory.

John Grubich, C.E.T. | Traffic Planning Supervisor | Municipal Works - Transportation Services | City of Niagara Falls
8208 Heartland Forest Road | Niagara Falls, ON L2H 0L7 | (905) 356-7521 ext 5214 | Fax 905-356-5576 | jgrubich@niagarafalls.ca



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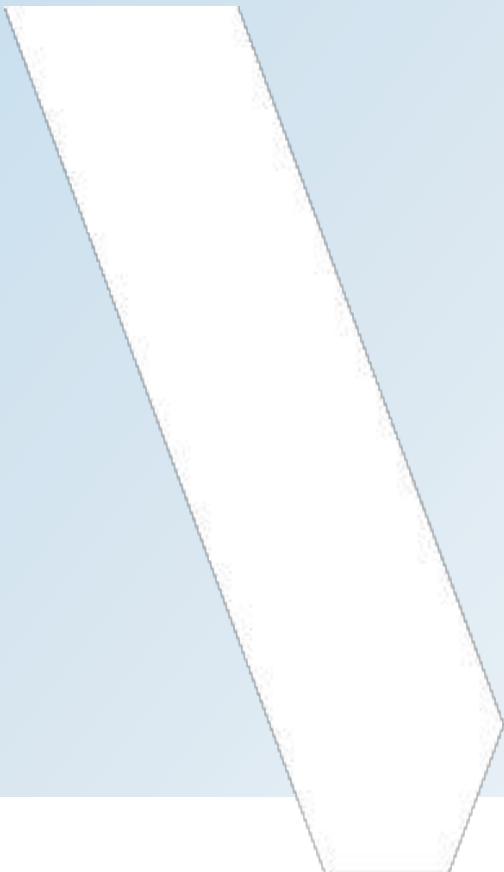
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-LAEmHhHzdJzBITWfa4Hgs7pbKI

APPENDIX

B TRAFFIC DATA





Turning Movement Count (1 . BIGGAR RD & CROWLAND AVE)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:30:00	0	0	0	0	0	0	0	22	2	0	0	24	4	0	0	0	0	4	0	22	0	0	0	22	50		
06:45:00	0	0	0	0	0	0	0	26	1	0	0	27	0	0	0	0	0	0	0	32	0	0	0	32	59		
07:00:00	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	17	0	0	0	17	27		
07:15:00	0	0	0	0	0	0	0	12	2	0	0	14	0	0	0	0	0	0	0	27	0	0	0	27	41	177	
07:30:00	0	0	0	0	0	0	0	34	0	0	0	34	1	0	0	0	0	1	0	28	0	0	0	28	63	190	
07:45:00	0	0	0	0	0	0	0	19	1	0	0	20	2	0	0	0	0	2	0	28	0	0	0	28	50	181	
08:00:00	0	0	0	0	0	0	0	26	3	0	0	29	2	0	1	0	0	3	0	35	0	0	0	35	67	221	
08:15:00	0	0	0	0	0	0	0	37	0	0	0	37	2	0	0	0	0	2	0	36	0	0	0	36	75	255	
08:30:00	2	0	0	0	0	2	0	34	0	0	0	34	5	0	0	0	0	5	0	34	1	0	0	35	76	268	
08:45:00	0	0	0	0	0	0	0	27	2	0	0	29	2	0	0	0	0	2	0	29	0	0	0	29	60	278	
09:00:00	0	0	1	0	0	1	0	22	1	0	0	23	1	0	0	0	0	1	0	9	1	0	0	10	35	246	
09:15:00	0	0	0	0	0	0	0	12	1	0	0	13	0	0	0	0	0	0	0	26	0	0	0	26	39	210	
BREAK																											
16:00:00	0	0	0	0	0	0	0	55	2	0	0	57	1	0	0	0	0	1	0	29	0	0	0	29	87		
16:15:00	0	0	0	0	0	0	0	44	2	0	0	46	0	0	0	0	0	0	0	26	0	0	0	26	72		
16:30:00	0	0	0	0	0	0	0	49	0	0	0	49	1	0	0	0	0	1	0	29	0	0	0	29	79		
16:45:00	0	0	0	0	0	0	0	54	0	0	0	54	0	0	0	0	0	0	0	22	0	0	0	22	76	314	
17:00:00	0	0	0	0	0	0	0	48	3	0	0	51	1	0	0	0	0	1	0	31	0	0	0	31	83	310	
17:15:00	0	0	0	0	0	0	0	45	0	0	0	45	1	0	0	0	0	1	1	21	0	0	0	22	68	306	
17:30:00	0	0	0	0	0	0	0	37	1	0	0	38	0	0	0	0	0	0	0	16	0	0	0	16	54	281	
17:45:00	1	0	1	0	0	2	0	37	1	0	0	38	0	0	0	0	0	0	0	15	2	0	0	17	57	262	
18:00:00	0	0	0	0	0	0	0	26	0	0	0	26	0	0	0	0	0	0	1	18	0	0	0	19	45	224	
18:15:00	0	0	0	0	0	0	0	27	1	0	0	28	0	0	0	0	0	0	0	11	0	0	0	11	39	195	
18:30:00	0	0	0	0	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	18	0	0	0	18	37	178	
18:45:00	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	6	0	0	0	6	19	140	
Grand Total	3	0	2	0	0	5	0	735	23	0	0	758	23	0	1	0	0	24	2	565	4	0	0	571	1358	-	
Approach%	60%	0%	40%	0%	-	-	0%	97%	3%	0%	-	-	95.8%	0%	4.2%	0%	-	-	0.4%	98.9%	0.7%	0%	-	-	-	-	
Totals %	0.2%	0%	0.1%	0%	0.4%	0.4%	0%	54.1%	1.7%	0%	55.8%	55.8%	1.7%	0%	0.1%	0%	1.8%	1.8%	0.1%	41.6%	0.3%	0%	42%	42%	-	-	
Heavy	0	0	0	0	-	-	0	22	2	0	-	-	2	0	0	0	-	-	0	24	0	0	-	-	-	-	
Heavy %	0%	0%	0%	0%	-	-	0%	3%	8.7%	0%	-	-	8.7%	0%	0%	0%	-	-	0%	4.2%	0%	0%	-	-	-	-	
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 08:00 AM - 09:00 AM Weather: Light Rain (16.55 °C)

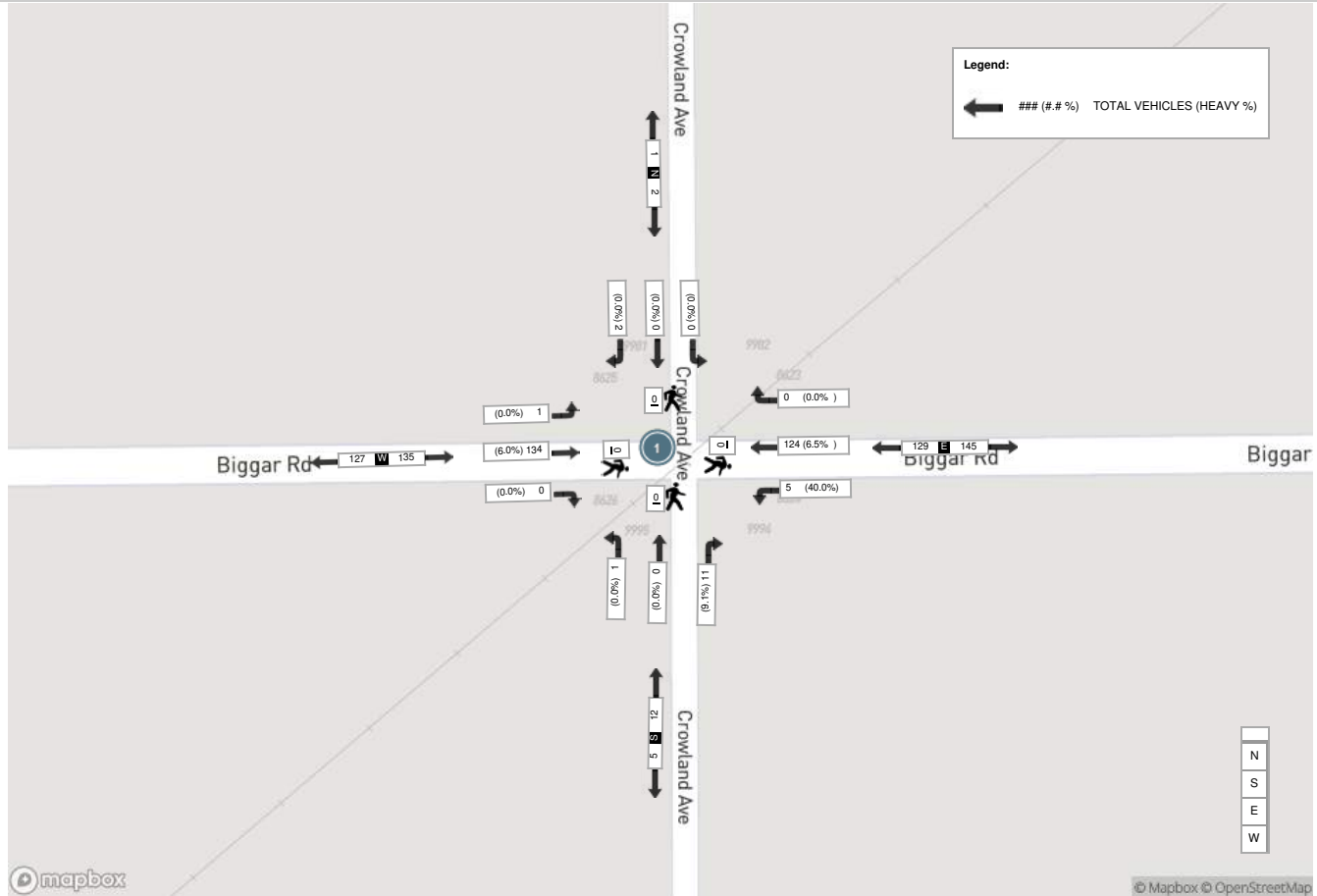
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	0	0	0	0	0	0	0	26	3	0	0	29	2	0	1	0	0	3	0	35	0	0	0	35	67
08:15:00	0	0	0	0	0	0	0	37	0	0	0	37	2	0	0	0	0	2	0	36	0	0	0	36	75
08:30:00	2	0	0	0	0	2	0	34	0	0	0	34	5	0	0	0	0	5	0	34	1	0	0	35	76
08:45:00	0	0	0	0	0	0	0	27	2	0	0	29	2	0	0	0	0	2	0	29	0	0	0	29	60
Grand Total	2	0	0	0	0	2	0	124	5	0	0	129	11	0	1	0	0	12	0	134	1	0	0	135	278
Approach%	100%	0%	0%	0%		-	0%	96.1%	3.9%	0%		-	91.7%	0%	8.3%	0%		-	0%	99.3%	0.7%	0%		-	-
Totals %	0.7%	0%	0%	0%		0.7%	0%	44.6%	1.8%	0%		46.4%	4%	0%	0.4%	0%		4.3%	0%	48.2%	0.4%	0%		48.6%	-
PHF	0.25	0	0	0		0.25	0	0.84	0.42	0		0.87	0.55	0	0.25	0		0.6	0	0.93	0.25	0		0.94	-
Heavy	0	0	0	0		0	0	8	2	0		10	1	0	0	0		1	0	8	0	0		8	-
Heavy %	0%	0%	0%	0%		0%	0%	6.5%	40%	0%		7.8%	9.1%	0%	0%	0%		8.3%	0%	6%	0%	0%		5.9%	-
Lights	2	0	0	0		2	0	116	3	0		119	10	0	1	0		11	0	126	1	0		127	-
Lights %	100%	0%	0%	0%		100%	0%	93.5%	60%	0%		92.2%	90.9%	0%	100%	0%		91.7%	0%	94%	100%	0%		94.1%	-
Single-Unit Trucks	0	0	0	0		0	0	8	2	0		10	1	0	0	0		1	0	4	0	0		4	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	6.5%	40%	0%		7.8%	9.1%	0%	0%	0%		8.3%	0%	3%	0%	0%		3%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	2	0	0		2	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1.5%	0%	0%		1.5%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	2	0	0		2	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1.5%	0%	0%		1.5%	-



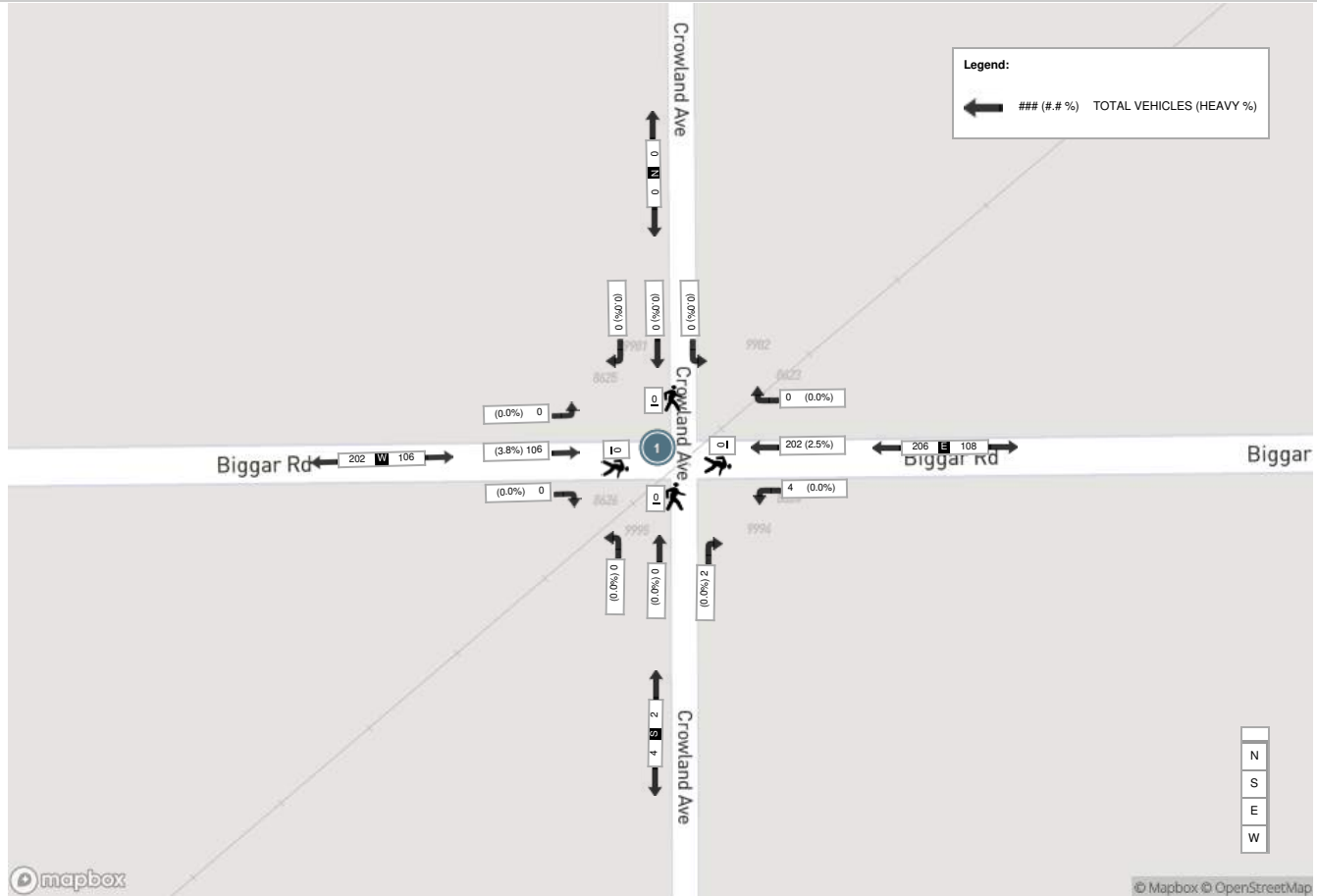
Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	0	0	0	0	0	0	0	55	2	0	0	57	1	0	0	0	0	1	0	29	0	0	0	29	87
16:15:00	0	0	0	0	0	0	0	44	2	0	0	46	0	0	0	0	0	0	0	26	0	0	0	26	72
16:30:00	0	0	0	0	0	0	0	49	0	0	0	49	1	0	0	0	0	1	0	29	0	0	0	29	79
16:45:00	0	0	0	0	0	0	0	54	0	0	0	54	0	0	0	0	0	0	0	22	0	0	0	22	76
Grand Total	0	0	0	0	0	0	0	202	4	0	0	206	2	0	0	0	0	2	0	106	0	0	0	106	314
Approach%	0%	0%	0%	0%	-	-	0%	98.1%	1.9%	0%	-	-	100%	0%	0%	0%	-	-	0%	100%	0%	0%	-	-	-
Totals %	0%	0%	0%	0%	0%	0%	0%	64.3%	1.3%	0%	65.6%	0.6%	0%	0%	0%	0.6%	0%	33.8%	0%	0%	33.8%	-	-	-	
PHF	0	0	0	0	0	0	0	0.92	0.5	0	0.9	0.5	0	0	0	0.5	0	0.91	0	0	0.91	-	-	-	
Heavy	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	-	-	-	
Heavy %	0%	0%	0%	0%	0%	0%	0%	2.5%	0%	0%	2.4%	0%	0%	0%	0%	0%	0%	3.8%	0%	0%	3.8%	-	-	-	
Lights	0	0	0	0	0	0	0	197	4	0	201	2	0	0	0	2	0	102	0	0	102	-	-	-	
Lights %	0%	0%	0%	0%	0%	0%	0%	97.5%	100%	0%	97.6%	100%	0%	0%	0%	100%	0%	96.2%	0%	0%	96.2%	-	-	-	
Single-Unit Trucks	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	2	0	0	2	-	-	-		
Single-Unit Trucks %	0%	0%	0%	0%	0%	0%	0%	2.5%	0%	0%	2.4%	0%	0%	0%	0%	0%	1.9%	0%	0%	1.9%	-	-	-		
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	-	-	-		
Buses %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1.9%	0%	0%	1.9%	-	-	-		
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%	-	-	-		

Peak Hour: 08:00 AM - 09:00 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)





Turning Movement Count (2 . BIGGAR RD & MONTROSE RD)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:30:00	1	8	9	0	0	18	23	27	45	0	0	95	99	34	0	0	0	133	0	24	2	0	0	26	272		
06:45:00	2	11	11	0	0	24	26	19	29	0	0	74	72	40	0	0	0	112	0	21	9	0	0	30	240		
07:00:00	0	19	16	0	0	35	15	9	45	0	0	69	63	26	0	0	0	89	0	15	2	0	0	17	210		
07:15:00	0	11	8	0	0	19	11	18	61	0	0	90	71	29	0	0	0	100	0	25	3	0	0	28	237	959	
07:30:00	0	17	14	0	0	31	30	37	62	0	0	129	95	38	0	0	0	133	0	25	3	0	0	28	321	1008	
07:45:00	2	13	12	0	0	27	21	18	48	0	0	87	111	52	1	0	0	164	0	25	7	0	0	32	310	1078	
08:00:00	4	17	9	0	0	30	13	24	64	0	0	101	92	36	2	0	0	130	1	22	10	0	0	33	294	1162	
08:15:00	8	15	10	0	0	33	14	29	55	0	0	98	90	36	0	0	0	126	1	35	9	0	0	45	302	1227	
08:30:00	5	18	7	0	0	30	25	31	49	0	0	105	93	30	0	0	0	123	1	32	7	0	0	40	298	1204	
08:45:00	1	31	9	0	0	41	20	25	35	0	0	80	80	28	0	0	0	108	0	30	2	0	0	32	261	1155	
09:00:00	2	12	14	0	0	28	19	21	26	0	0	66	52	31	0	0	0	83	0	8	4	0	0	12	189	1050	
09:15:00	4	17	15	0	0	36	22	8	24	0	0	54	61	29	3	0	0	93	1	24	2	0	0	27	210	958	
BREAK																											
16:00:00	14	52	25	0	0	91	13	44	93	0	0	150	79	48	3	0	0	130	1	34	0	0	0	35	406		
16:15:00	6	50	30	0	0	86	14	45	80	0	0	139	99	36	1	0	0	136	0	22	5	0	0	27	388		
16:30:00	8	50	36	0	0	94	13	40	75	0	0	128	71	31	0	0	0	102	1	25	6	0	0	32	356		
16:45:00	9	34	25	0	0	68	13	43	78	0	0	134	93	31	0	0	0	124	1	19	2	0	0	22	348	1498	
17:00:00	5	54	39	0	0	98	21	39	79	0	0	139	72	24	2	0	0	98	1	27	4	0	0	32	367	1459	
17:15:00	11	50	36	0	0	97	19	35	114	0	0	168	64	34	1	0	0	99	0	16	3	0	0	19	383	1454	
17:30:00	10	52	34	0	0	96	12	30	65	0	0	107	59	25	1	0	0	85	1	16	2	0	0	19	307	1405	
17:45:00	4	32	23	0	0	59	17	33	50	0	0	100	38	19	0	0	0	57	0	15	2	0	0	17	233	1290	
18:00:00	4	35	20	0	0	59	11	22	67	0	0	100	48	27	0	0	0	75	0	12	5	0	0	17	251	1174	
18:15:00	6	33	12	0	0	51	16	21	59	0	0	96	46	28	0	0	0	74	1	9	3	0	0	13	234	1025	
18:30:00	3	29	18	0	0	50	16	18	57	0	0	91	36	28	0	0	0	64	0	10	6	0	0	16	221	939	
18:45:00	3	20	18	0	0	41	13	8	43	0	0	64	25	26	0	0	0	51	0	7	2	0	0	9	165	871	
Grand Total	112	680	450	0	0	1242	417	644	1403	0	0	2464	1709	766	14	0	0	2489	10	498	100	0	0	608	6803	-	
Approach%	9%	54.8%	36.2%	0%	-	-	16.9%	26.1%	56.9%	0%	-	-	68.7%	30.8%	0.6%	0%	-	-	1.6%	81.9%	16.4%	0%	-	-	-	-	
Totals %	1.6%	10%	6.6%	0%	-	18.3%	6.1%	9.5%	20.6%	0%	-	36.2%	25.1%	11.3%	0.2%	0%	-	36.6%	0.1%	7.3%	1.5%	0%	-	8.9%	-	-	
Heavy	1	27	45	0	-	-	25	27	55	0	-	-	45	27	2	0	-	-	4	22	2	0	-	-	-	-	
Heavy %	0.9%	4%	10%	0%	-	-	6%	4.2%	3.9%	0%	-	-	2.6%	3.5%	14.3%	0%	-	-	40%	4.4%	2%	0%	-	-	-	-	
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)

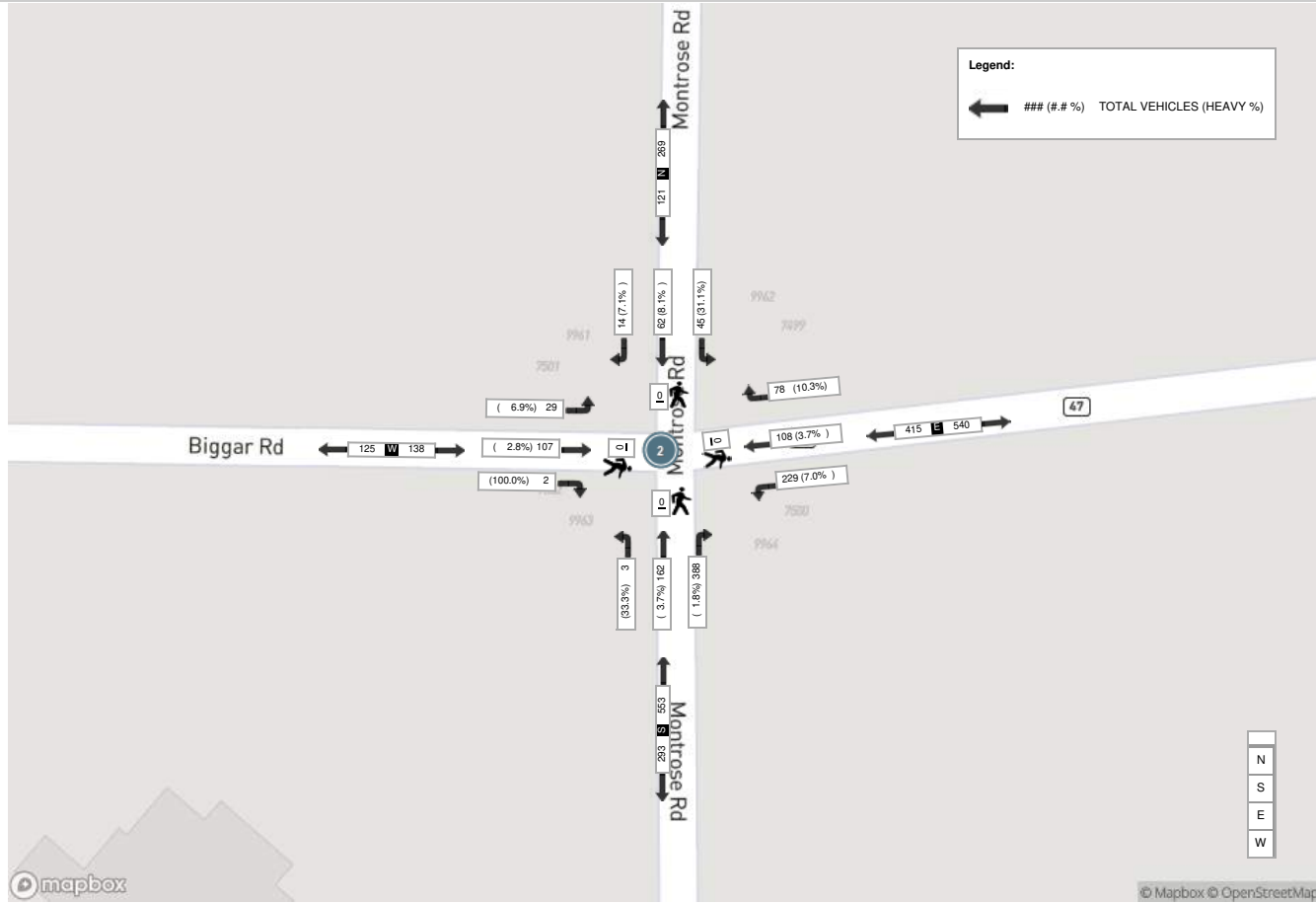
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	0	17	14	0	0	31	30	37	62	0	0	129	95	38	0	0	0	133	0	25	3	0	0	28	321
07:45:00	2	13	12	0	0	27	21	18	48	0	0	87	111	52	1	0	0	164	0	25	7	0	0	32	310
08:00:00	4	17	9	0	0	30	13	24	64	0	0	101	92	36	2	0	0	130	1	22	10	0	0	33	294
08:15:00	8	15	10	0	0	33	14	29	55	0	0	98	90	36	0	0	0	126	1	35	9	0	0	45	302
Grand Total	14	62	45	0	0	121	78	108	229	0	0	415	388	162	3	0	0	553	2	107	29	0	0	138	1227
Approach%	11.6%	51.2%	37.2%	0%	-	-	18.8%	26%	55.2%	0%	-	-	70.2%	29.3%	0.5%	0%	-	-	1.4%	77.5%	21%	0%	-	-	-
Totals %	1.1%	5.1%	3.7%	0%	9.9%	9.9%	6.4%	8.8%	18.7%	0%	33.8%	33.8%	31.6%	13.2%	0.2%	0%	45.1%	45.1%	0.2%	8.7%	2.4%	0%	11.2%	11.2%	-
PHF	0.44	0.91	0.8	0	0.92	0.92	0.65	0.73	0.89	0	0.8	0.8	0.87	0.78	0.38	0	0.84	0.84	0.5	0.76	0.73	0	0.77	0.77	-
Heavy	1	5	14	0	20	20	8	4	16	0	28	28	7	6	1	0	14	14	2	3	2	0	7	7	-
Heavy %	7.1%	8.1%	31.1%	0%	16.5%	16.5%	10.3%	3.7%	7%	0%	6.7%	6.7%	1.8%	3.7%	33.3%	0%	2.5%	2.5%	100%	2.8%	6.9%	0%	5.1%	5.1%	-
Lights	13	57	31	0	101	101	70	104	213	0	387	387	381	156	2	0	539	539	0	104	27	0	131	131	-
Lights %	92.9%	91.9%	68.9%	0%	83.5%	83.5%	89.7%	96.3%	93%	0%	93.3%	93.3%	98.2%	96.3%	66.7%	0%	97.5%	97.5%	0%	97.2%	93.1%	0%	94.9%	94.9%	-
Single-Unit Trucks	1	2	8	0	11	11	4	3	12	0	19	19	4	3	1	0	8	8	1	2	1	0	4	4	-
Single-Unit Trucks %	7.1%	3.2%	17.8%	0%	9.1%	9.1%	5.1%	2.8%	5.2%	0%	4.6%	4.6%	1%	1.9%	33.3%	0%	1.4%	1.4%	50%	1.9%	3.4%	0%	2.9%	2.9%	-
Buses	0	2	1	0	3	3	2	0	2	0	4	4	2	3	0	0	5	5	1	0	1	0	2	2	-
Buses %	0%	3.2%	2.2%	0%	2.5%	2.5%	2.6%	0%	0.9%	0%	1%	1%	0.5%	1.9%	0%	0%	0.9%	0.9%	50%	0%	3.4%	0%	1.4%	1.4%	-
Articulated Trucks	0	1	5	0	6	6	2	1	2	0	5	5	1	0	0	0	1	1	0	1	0	0	1	1	-
Articulated Trucks %	0%	1.6%	11.1%	0%	5%	5%	2.6%	0.9%	0.9%	0%	1.2%	1.2%	0.3%	0%	0%	0%	0.2%	0.2%	0%	0.9%	0%	0%	0.7%	0.7%	-



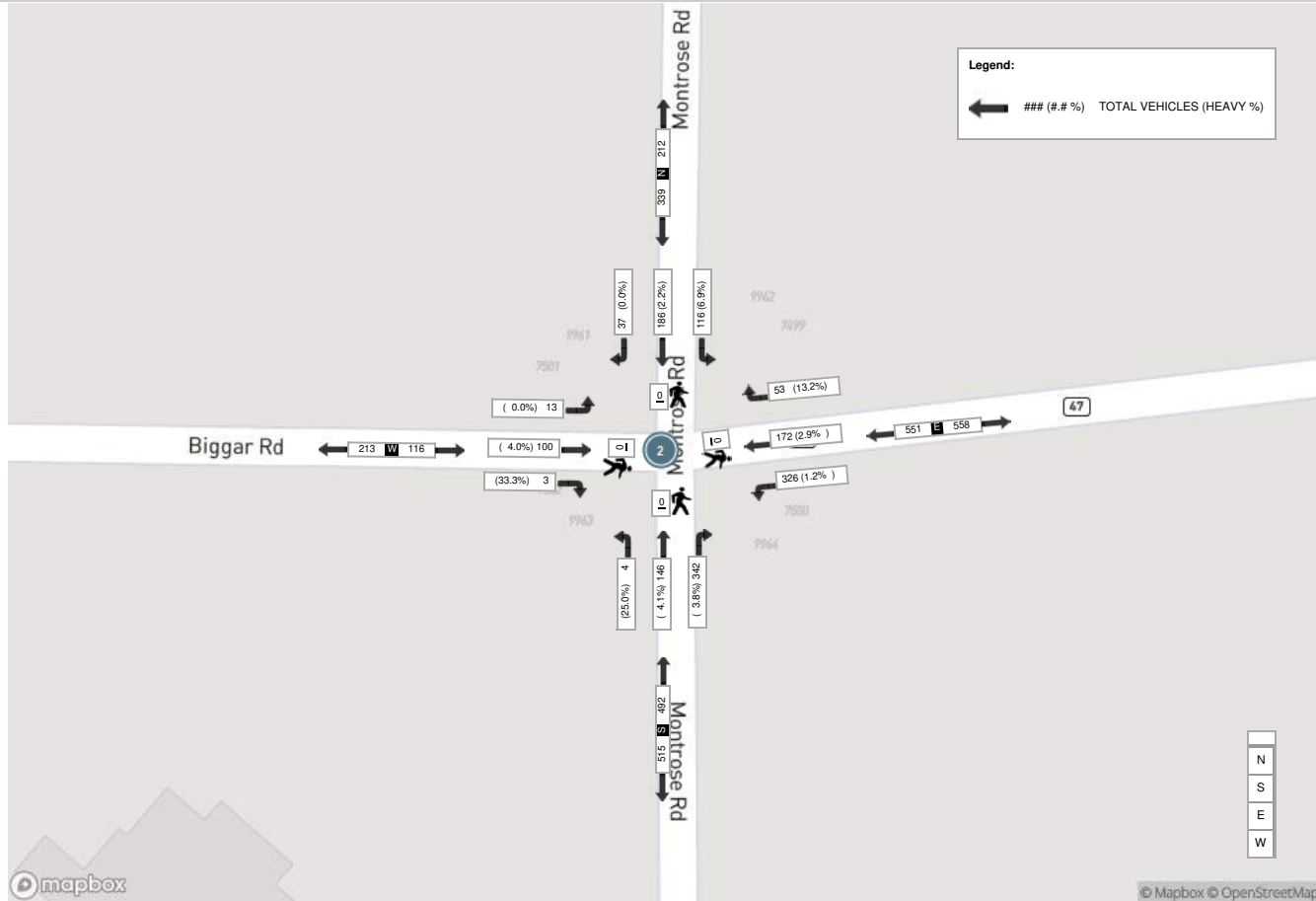
Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	14	52	25	0	0	91	13	44	93	0	0	150	79	48	3	0	0	130	1	34	0	0	0	35	406
16:15:00	6	50	30	0	0	86	14	45	80	0	0	139	99	36	1	0	0	136	0	22	5	0	0	27	388
16:30:00	8	50	36	0	0	94	13	40	75	0	0	128	71	31	0	0	0	102	1	25	6	0	0	32	356
16:45:00	9	34	25	0	0	68	13	43	78	0	0	134	93	31	0	0	0	124	1	19	2	0	0	22	348
Grand Total	37	186	116	0	0	339	53	172	326	0	0	551	342	146	4	0	0	492	3	100	13	0	0	116	1498
Approach%	10.9%	54.9%	34.2%	0%	-	-	9.6%	31.2%	59.2%	0%	-	-	69.5%	29.7%	0.8%	0%	-	-	2.6%	86.2%	11.2%	0%	-	-	-
Totals %	2.5%	12.4%	7.7%	0%	22.6%	36.8%	3.5%	11.5%	21.8%	0%	36.8%	36.8%	22.8%	9.7%	0.3%	0%	32.8%	32.8%	0.2%	6.7%	0.9%	0%	7.7%	7.7%	-
PHF	0.66	0.89	0.81	0	0.9	0.92	0.95	0.96	0.88	0	0.92	0.92	0.86	0.76	0.33	0	0.9	0.9	0.75	0.74	0.54	0	0.83	0.83	-
Heavy	0	4	8	0	12	16	7	5	4	0	16	16	13	6	1	0	20	20	1	4	0	0	5	5	-
Heavy %	0%	2.2%	6.9%	0%	3.5%	2.9%	13.2%	2.9%	1.2%	0%	2.9%	2.9%	3.8%	4.1%	25%	0%	4.1%	4.1%	33.3%	4%	0%	0%	4.3%	4.3%	-
Lights	37	182	108	0	327	535	46	167	322	0	535	535	329	140	3	0	472	472	2	96	13	0	111	111	-
Lights %	100%	97.8%	93.1%	0%	96.5%	97.1%	86.8%	97.1%	98.8%	0%	97.1%	97.1%	96.2%	95.9%	75%	0%	95.9%	95.9%	66.7%	96%	100%	0%	95.7%	95.7%	-
Single-Unit Trucks	0	2	4	0	6	8	1	5	2	0	8	8	7	2	0	0	9	9	0	2	0	0	2	2	-
Single-Unit Trucks %	0%	1.1%	3.4%	0%	1.8%	1.5%	1.9%	2.9%	0.6%	0%	1.5%	1.5%	2%	1.4%	0%	0%	1.8%	1.8%	0%	2%	0%	0%	1.7%	1.7%	-
Buses	0	2	2	0	4	1	1	0	0	0	1	1	1	3	1	0	5	5	1	2	0	0	3	3	-
Buses %	0%	1.1%	1.7%	0%	1.2%	0.2%	1.9%	0%	0%	0%	0.2%	0.2%	0.3%	2.1%	25%	0%	1%	1%	33.3%	2%	0%	0%	2.6%	2.6%	-
Articulated Trucks	0	0	2	0	2	7	5	0	2	0	7	7	5	1	0	0	6	6	0	0	0	0	0	0	-
Articulated Trucks %	0%	0%	1.7%	0%	0.6%	1.3%	9.4%	0%	0.6%	0%	1.3%	1.3%	1.5%	0.7%	0%	0%	1.2%	1.2%	0%	0%	0%	0%	0%	0%	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)





Turning Movement Count (4 . LYONS CREEK & QEW NB RAMPS)

Start Time	E Approach LYONS CREEK RD					Approach Total	S Approach QEW NB ON RAMP [FROM EB LYONS CREEK RD]				Approach Total	SW Approach QEW NB OFF RAMP		Approach Total	W Approach LYONS CREEK RD					Approach Total	NW Approach QEW NB ON RAMP [FROM WB LYONS CREEK RD]		Approach Total	Int. Total (15 min)	Int. Total (1 hr)
	Bear Right E:NW	Thru E:W	Left E:S	U-Turn E:E	Peds E:		Right S:E	Left S:W	U-Turn S:S	Peds S:		Peds SW:	Hard Right W:SW		Right W:S	Thru W:E	U-Turn W:W	Peds W:	Peds NW:						
06:30:00	24	26	0	0	0	50	13	21	0	0	34	0	0	62	0	76	0	0	138	0	0	222			
06:45:00	27	27	0	0	0	54	7	12	0	0	19	0	0	53	0	77	0	0	130	0	0	203			
07:00:00	30	29	0	0	0	59	10	6	0	0	16	0	0	52	0	46	0	0	98	0	0	173			
07:15:00	37	30	0	0	0	67	6	12	0	0	18	0	0	64	0	61	0	0	125	0	0	210	808		
07:30:00	52	57	0	0	0	109	9	17	0	0	26	0	0	85	0	77	0	0	162	0	0	297	883		
07:45:00	55	21	0	0	0	76	11	10	0	0	21	0	0	84	0	88	0	0	172	0	0	269	949		
08:00:00	50	30	0	0	0	80	11	17	0	0	28	0	0	79	0	66	0	0	145	0	0	253	1029		
08:15:00	46	35	0	0	0	81	5	10	0	0	15	0	0	93	0	85	0	0	178	0	0	274	1093		
08:30:00	50	39	0	0	0	89	8	13	0	0	21	0	0	93	0	62	0	0	155	0	0	265	1061		
08:45:00	48	29	0	0	0	77	7	9	0	0	16	0	0	85	0	70	0	0	155	0	0	248	1040		
09:00:00	37	22	0	0	0	59	7	13	0	0	20	0	0	48	0	48	0	0	96	0	0	175	962		
09:15:00	30	23	0	0	0	53	2	9	0	0	11	0	0	58	0	67	0	0	125	0	0	189	877		
BREAK																									
16:00:00	54	92	0	0	0	146	9	13	0	0	22	0	0	82	0	75	0	0	157	0	0	325			
16:15:00	44	51	0	0	0	95	13	14	0	0	27	0	0	97	0	97	0	0	194	0	0	316			
16:30:00	49	57	0	0	0	106	8	6	0	0	14	0	0	78	0	92	0	0	170	0	0	290			
16:45:00	35	48	0	0	0	83	14	9	0	0	23	0	0	86	0	96	0	0	182	0	0	288	1219		
17:00:00	48	56	0	0	0	104	12	11	0	0	23	0	0	85	0	98	0	0	183	0	0	310	1204		
17:15:00	33	51	0	0	0	84	6	16	0	0	22	0	0	59	0	103	0	0	162	0	0	268	1156		
17:30:00	37	36	0	0	0	73	6	8	0	0	14	0	0	62	0	74	0	0	136	0	0	223	1089		
17:45:00	28	36	0	0	0	64	11	9	0	0	20	0	0	41	0	67	0	0	108	0	0	192	993		
18:00:00	33	28	0	0	0	61	6	12	0	0	18	0	0	37	0	71	0	0	108	0	0	187	870		
18:15:00	33	40	0	0	0	73	5	9	0	0	14	0	0	32	0	64	0	0	96	0	0	183	785		
18:30:00	20	38	0	0	0	58	5	3	0	0	8	0	0	38	0	36	0	0	74	0	0	140	702		
18:45:00	27	27	0	0	0	54	11	5	0	0	16	0	0	26	0	53	0	0	79	0	0	149	659		
Grand Total	927	928	0	0	0	1855	202	264	0	0	466	0	0	1579	0	1749	0	0	3328	0	0	5649	-		
Approach%	50%	50%	0%	0%	-	43.3%	56.7%	0%	-	-	47.4%	0%	52.6%	0%	-	-	-	-	58.9%	-	-	-	-		
Totals %	16.4%	16.4%	0%	0%	32.8%	3.6%	4.7%	0%	8.2%	0%	28%	0%	31%	0%	58.9%	0%	0%	0%	0%	0%	0%	0%	0%		
Heavy	48	41	0	0	-	10	28	0	-	-	52	0	87	0	-	-	-	-	-	-	-	-	-		
Heavy %	5.2%	4.4%	0%	0%	-	5%	10.6%	0%	-	-	3.3%	0%	5%	0%	-	-	-	-	-	-	-	-	-		
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		



Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)

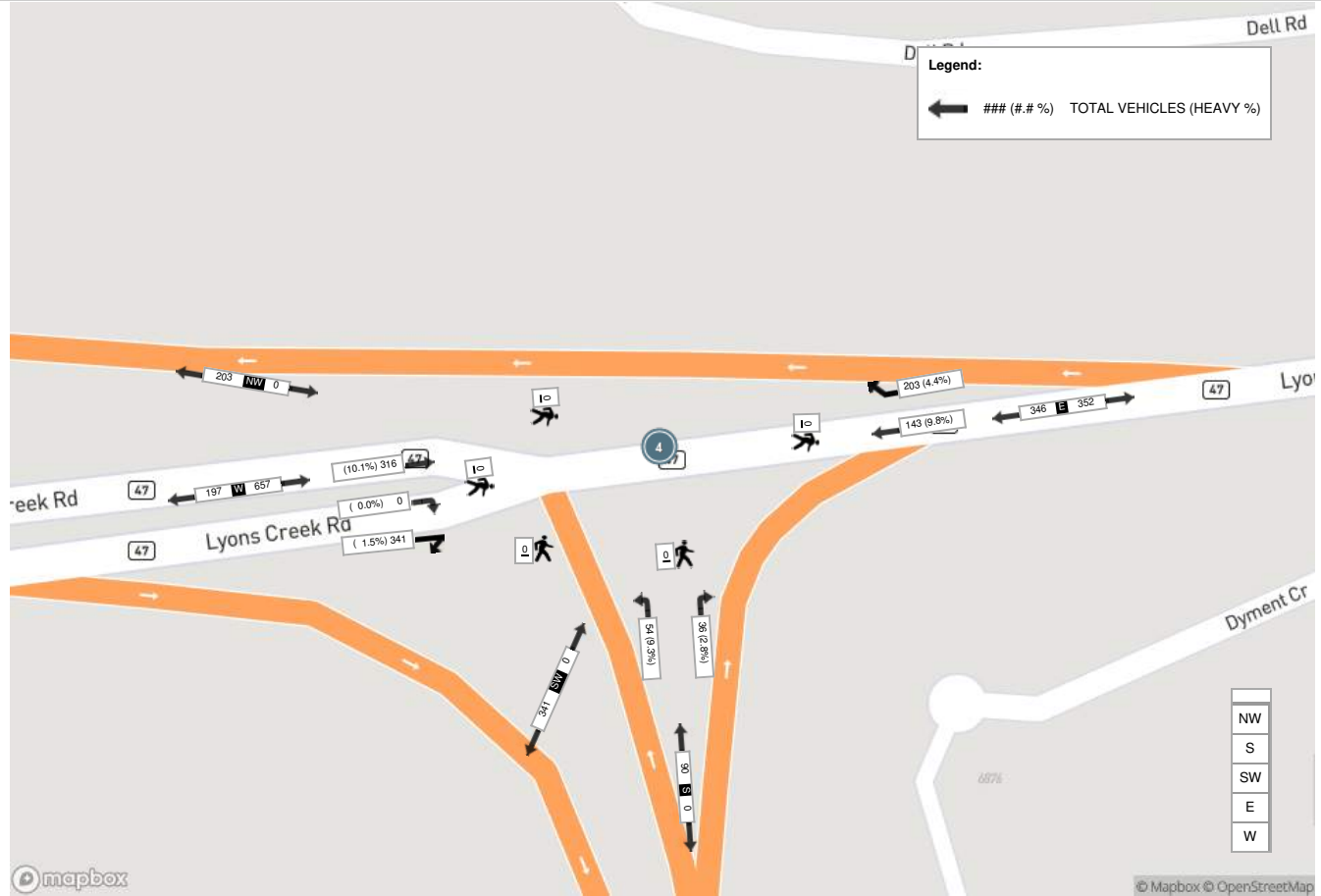
Start Time	E Approach LYONS CREEK RD					S Approach QEW NB ON RAMP [FROM EB LYONS CREEK RD]					SW Approach QEW NB OFF RAMP			W Approach LYONS CREEK RD					NW Approach QEW NB ON RAMP [FROM WB LYONS CREEK RD]		Int. Total (15 min)	
	Bear Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Peds	Approach Total	Hard Right	Right	Thru	U-Turn	Peds	Approach Total	Peds		Approach Total
07:30:00	52	57	0	0	0	109	9	17	0	0	26	0	0	85	0	77	0	0	162	0	0	297
07:45:00	55	21	0	0	0	76	11	10	0	0	21	0	0	84	0	88	0	0	172	0	0	269
08:00:00	50	30	0	0	0	80	11	17	0	0	28	0	0	79	0	66	0	0	145	0	0	253
08:15:00	46	35	0	0	0	81	5	10	0	0	15	0	0	93	0	85	0	0	178	0	0	274
Grand Total	203	143	0	0	0	346	36	54	0	0	90	0	0	341	0	316	0	0	657	0	0	1093
Approach%	58.7%	41.3%	0%	0%	-	-	40%	60%	0%	-	-	-	-	51.9%	0%	48.1%	0%	-	-	-	-	-
Totals %	18.6%	13.1%	0%	0%	31.7%	3.3%	4.9%	0%	8.2%	0%	31.2%	0%	28.9%	0%	60.1%	0%	0%	0%	0%	0%	0%	-
PHF	0.92	0.63	0	0	0.79	0.82	0.79	0	0.8	0	0.92	0	0.9	0	0.92	0	0	0	0.92	0	0	-
Heavy	9	14	0	0	23	1	5	0	6	0	5	0	32	0	37	0	0	0	0	0	0	-
Heavy %	4.4%	9.8%	0%	0%	6.6%	2.8%	9.3%	0%	6.7%	0%	1.5%	0%	10.1%	0%	5.6%	0%	0%	0%	0%	0%	0%	-
Lights	194	129	0	0	323	35	49	0	84	0	336	0	284	0	620	0	0	0	0	0	0	-
Lights %	95.6%	90.2%	0%	0%	93.4%	97.2%	90.7%	0%	93.3%	0%	98.5%	0%	89.9%	0%	94.4%	0%	0%	0%	0%	0%	0%	-
Single-Unit Trucks	5	9	0	0	14	0	2	0	2	0	3	0	15	0	18	0	0	0	0	0	0	-
Single-Unit Trucks %	2.5%	6.3%	0%	0%	4%	0%	3.7%	0%	2.2%	0%	0.9%	0%	4.7%	0%	2.7%	0%	0%	0%	0%	0%	0%	-
Buses	4	2	0	0	6	0	1	0	1	0	1	0	8	0	9	0	0	0	0	0	0	-
Buses %	2%	1.4%	0%	0%	1.7%	0%	1.9%	0%	1.1%	0%	0.3%	0%	2.5%	0%	1.4%	0%	0%	0%	0%	0%	0%	-
Articulated Trucks	0	3	0	0	3	1	2	0	3	0	1	0	9	0	10	0	0	0	0	0	0	-
Articulated Trucks %	0%	2.1%	0%	0%	0.9%	2.8%	3.7%	0%	3.3%	0%	0.3%	0%	2.8%	0%	1.5%	0%	0%	0%	0%	0%	0%	-



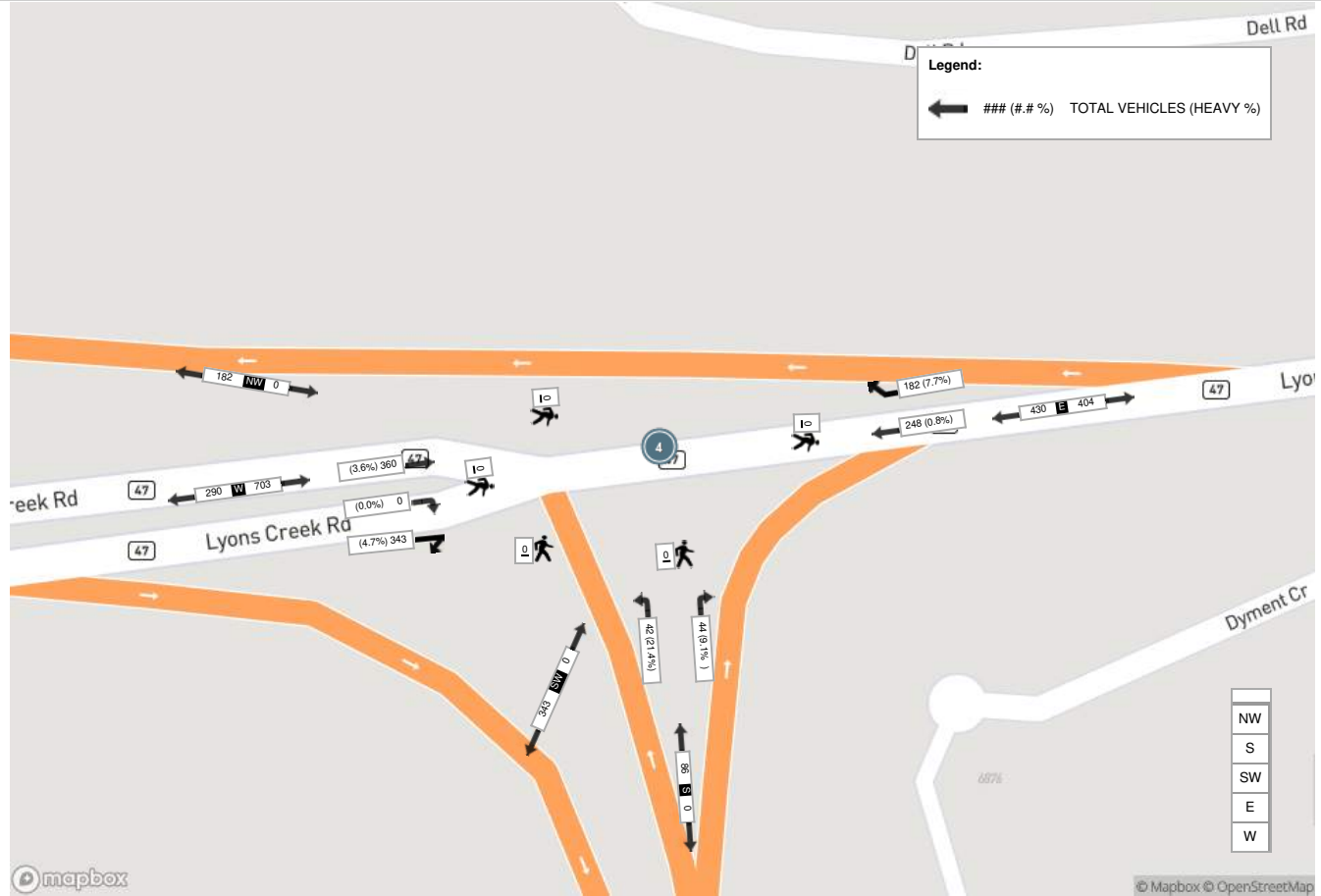
Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	E Approach LYONS CREEK RD					S Approach QEW NB ON RAMP [FROM EB LYONS CREEK RD]					SW Approach QEW NB OFF RAMP			W Approach LYONS CREEK RD					NW Approach QEW NB ON RAMP [FROM WB LYONS CREEK RD]		Int. Total (15 min)	
	Bear Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Peds	Approach Total	Hard Right	Right	Thru	U-Turn	Peds	Approach Total	Peds		Approach Total
16:00:00	54	92	0	0	0	146	9	13	0	0	22	0	0	82	0	75	0	0	157	0	0	325
16:15:00	44	51	0	0	0	95	13	14	0	0	27	0	0	97	0	97	0	0	194	0	0	316
16:30:00	49	57	0	0	0	106	8	6	0	0	14	0	0	78	0	92	0	0	170	0	0	290
16:45:00	35	48	0	0	0	83	14	9	0	0	23	0	0	86	0	96	0	0	182	0	0	288
Grand Total	182	248	0	0	0	430	44	42	0	0	86	0	0	343	0	360	0	0	703	0	0	1219
Approach%	42.3%	57.7%	0%	0%	-	-	51.2%	48.8%	0%	-	-	-	-	48.8%	0%	51.2%	0%	-	-	-	-	-
Totals %	14.9%	20.3%	0%	0%	35.3%	3.6%	3.4%	0%	7.1%	0%	28.1%	0%	29.5%	0%	57.7%	0%	0%	0%	0%	0%	0%	-
PHF	0.84	0.67	0	0	0.74	0.79	0.75	0	0.8	0	0.88	0	0.93	0	0.91	0	0	0	0	0	0	-
Heavy	14	2	0	0	16	4	9	0	13	0	16	0	13	0	29	0	0	0	0	0	0	-
Heavy %	7.7%	0.8%	0%	0%	3.7%	9.1%	21.4%	0%	15.1%	0%	4.7%	0%	3.6%	0%	4.1%	0%	0%	0%	0%	0%	0%	-
Lights	168	246	0	0	414	40	33	0	73	0	327	0	347	0	674	0	0	0	0	0	0	-
Lights %	92.3%	99.2%	0%	0%	96.3%	90.9%	78.6%	0%	84.9%	0%	95.3%	0%	96.4%	0%	95.9%	0%	0%	0%	0%	0%	0%	-
Single-Unit Trucks	6	2	0	0	8	4	2	0	6	0	11	0	6	0	17	0	0	0	0	0	0	-
Single-Unit Trucks %	3.3%	0.8%	0%	0%	1.9%	9.1%	4.8%	0%	7%	0%	3.2%	0%	1.7%	0%	2.4%	0%	0%	0%	0%	0%	0%	-
Buses	4	0	0	0	4	0	1	0	1	0	1	0	4	0	5	0	0	0	0	0	0	-
Buses %	2.2%	0%	0%	0%	0.9%	0%	2.4%	0%	1.2%	0%	0.3%	0%	1.1%	0%	0.7%	0%	0%	0%	0%	0%	0%	-
Articulated Trucks	4	0	0	0	4	0	6	0	6	0	4	0	3	0	7	0	0	0	0	0	0	-
Articulated Trucks %	2.2%	0%	0%	0%	0.9%	0%	14.3%	0%	7%	0%	1.2%	0%	0.8%	0%	1%	0%	0%	0%	0%	0%	0%	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)





Turning Movement Count (3 . LYONS CREEK & QEW SB RAMPS)

Start Time	N Approach QEW SB OFF RAMP					NE Approach QEW SB ON RAMP [FROM WB LYONS CREEK RD]			E Approach LYONS CREEK RD					S Approach QEW SB ON RAMP		W Approach LYONS CREEK RD					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	U-Turn N:N	Peds N:	Approach Total	Peds NE:	Approach Total		Hard Right E:NE	Thru E:W	U-Turn E:E	Peds E:	Approach Total	Peds S:	Approach Total	Right W:S	Thru W:E	U-Turn W:W	Peds W:	Approach Total		
06:30:00	53	19	0	0	72	0	0	3	44	0	0	47	0	0	11	118	0	0	129	248		
06:45:00	36	24	0	0	60	0	0	1	41	0	0	42	0	0	7	100	0	0	107	209		
07:00:00	39	19	0	0	58	0	0	1	35	0	0	36	0	0	9	85	0	0	94	188		
07:15:00	60	25	0	0	85	0	0	4	39	0	0	43	0	0	7	99	0	0	106	234	879	
07:30:00	71	35	0	0	106	0	0	6	65	0	0	71	0	0	10	125	0	0	135	312	943	
07:45:00	76	40	0	0	116	0	0	5	27	0	0	32	0	0	5	136	0	0	141	289	1023	
08:00:00	72	29	0	0	101	0	0	5	39	0	0	44	0	0	4	116	0	0	120	265	1100	
08:15:00	61	41	0	0	102	0	0	3	42	0	0	45	0	0	8	131	0	0	139	286	1152	
08:30:00	56	30	0	0	86	0	0	1	49	0	0	50	0	0	6	129	0	0	135	271	1111	
08:45:00	49	35	0	0	84	0	0	5	33	0	0	38	0	0	8	114	0	0	122	244	1066	
09:00:00	36	28	0	0	64	0	0	4	33	0	0	37	0	0	7	68	0	0	75	176	977	
09:15:00	35	23	0	0	58	0	0	5	28	0	0	33	0	0	5	103	0	0	108	199	890	
BREAK																						
16:00:00	83	29	0	0	112	0	0	14	83	0	0	97	0	0	17	120	0	0	137	346		
16:15:00	75	57	0	0	132	0	0	11	61	0	0	72	0	0	21	143	0	0	164	368		
16:30:00	82	42	0	0	124	0	0	11	48	0	0	59	0	0	20	120	0	0	140	323		
16:45:00	80	54	0	0	134	0	0	4	53	0	0	57	0	0	15	129	0	0	144	335	1372	
17:00:00	90	50	0	0	140	0	0	7	58	0	0	65	0	0	16	132	0	0	148	353	1379	
17:15:00	110	56	0	0	166	0	0	9	60	0	0	69	0	0	16	102	0	0	118	353	1364	
17:30:00	72	34	0	0	106	0	0	6	39	0	0	45	0	0	11	103	0	0	114	265	1306	
17:45:00	53	44	0	0	97	0	0	4	42	0	0	46	0	0	12	68	0	0	80	223	1194	
18:00:00	68	36	0	0	104	0	0	3	36	0	0	39	0	0	10	67	0	0	77	220	1061	
18:15:00	51	39	0	0	90	0	0	5	43	0	0	48	0	0	6	56	0	0	62	200	908	
18:30:00	56	18	0	0	74	0	0	5	36	0	0	41	0	0	8	58	0	0	66	181	824	
18:45:00	34	29	0	0	63	0	0	1	33	0	0	34	0	0	10	46	0	0	56	153	754	
Grand Total	1498	836	0	0	2334	0	0	123	1067	0	0	1190	0	0	249	2468	0	0	2717	6241	-	
Approach%	64.2%	35.8%	0%	-	-	-	-	10.3%	89.7%	0%	-	-	-	-	9.2%	90.8%	0%	-	-	-	-	
Totals %	24%	13.4%	0%	-	37.4%	-	0%	2%	17.1%	0%	-	19.1%	-	0%	4%	39.5%	0%	-	43.5%	-	-	
Heavy	50	48	0	-	-	-	-	4	66	0	-	-	-	-	29	92	0	-	-	-	-	
Heavy %	3.3%	5.7%	0%	-	-	-	-	3.3%	6.2%	0%	-	-	-	-	11.6%	3.7%	0%	-	-	-	-	
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)

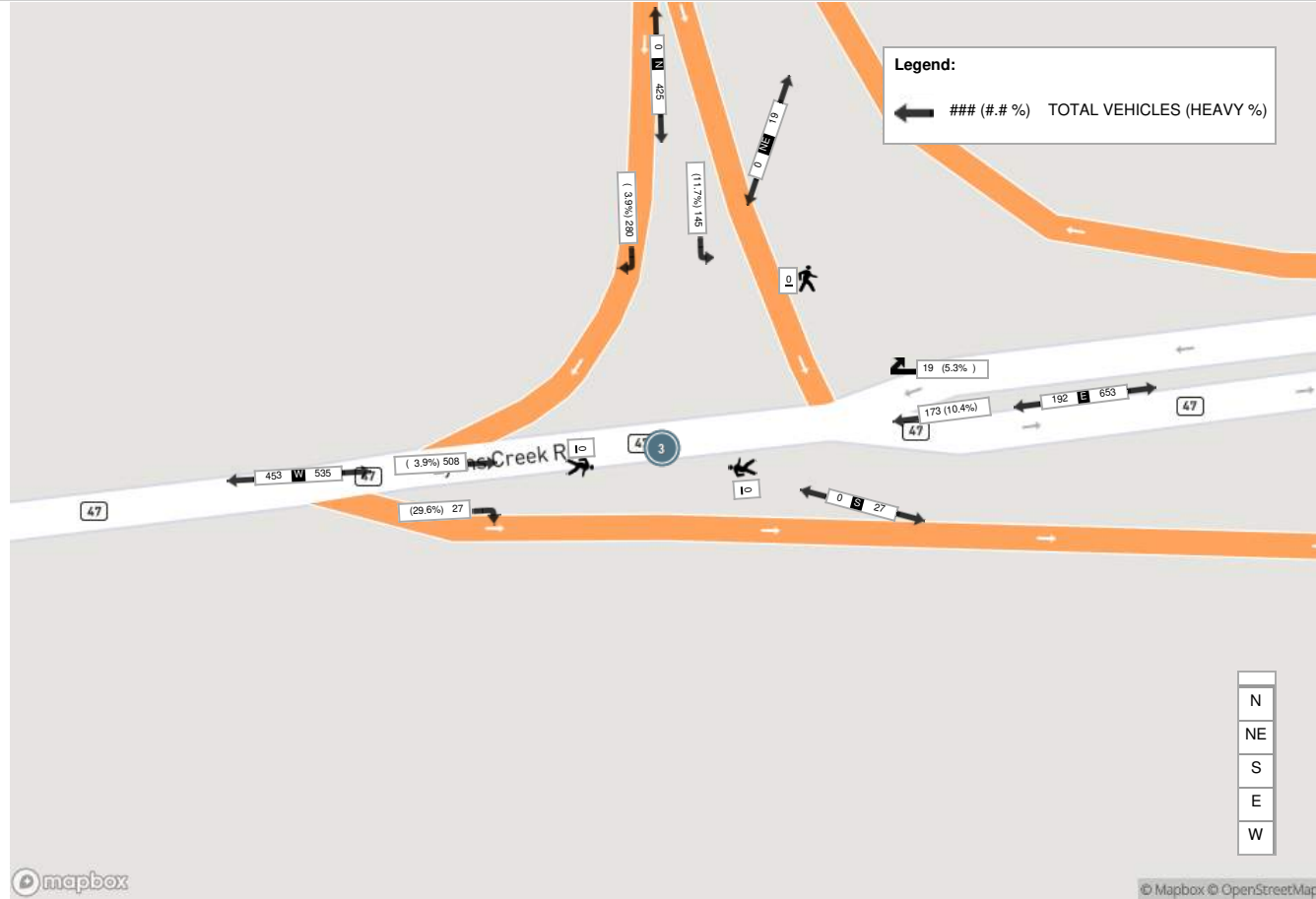
Start Time	N Approach QEW SB OFF RAMP					NE Approach QEW SB ON RAMP [FROM WB LYONS CREEK RD]		E Approach LYONS CREEK RD					S Approach QEW SB ON RAMP		W Approach LYONS CREEK RD					Int. Total (15 min)
	Right	Left	U-Turn	Peds	Approach Total	Peds	Approach Total	Hard Right	Thru	U-Turn	Peds	Approach Total	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
07:30:00	71	35	0	0	106	0	0	6	65	0	0	71	0	0	10	125	0	0	135	312
07:45:00	76	40	0	0	116	0	0	5	27	0	0	32	0	0	5	136	0	0	141	289
08:00:00	72	29	0	0	101	0	0	5	39	0	0	44	0	0	4	116	0	0	120	265
08:15:00	61	41	0	0	102	0	0	3	42	0	0	45	0	0	8	131	0	0	139	286
Grand Total	280	145	0	0	425	0	0	19	173	0	0	192	0	0	27	508	0	0	535	1152
Approach%	65.9%	34.1%	0%	-	-	-	-	9.9%	90.1%	0%	-	-	-	-	5%	95%	0%	-	-	-
Totals %	24.3%	12.6%	0%	36.9%	0%	16.7%	0%	2.3%	44.1%	0%	46.4%	-	-	-	-	-	-	-	-	-
PHF	0.92	0.88	0	0.92	0	0.68	0	0.68	0.93	0	0.95	-	-	-	-	-	-	-	-	-
Heavy	11	17	0	28	0	1	18	0	19	0	8	20	0	28	-	-	-	-	-	-
Heavy %	3.9%	11.7%	0%	6.6%	0%	5.3%	10.4%	0%	9.9%	0%	29.6%	3.9%	0%	5.2%	-	-	-	-	-	-
Lights	269	128	0	397	0	18	155	0	173	0	19	488	0	507	-	-	-	-	-	-
Lights %	96.1%	88.3%	0%	93.4%	0%	94.7%	89.6%	0%	90.1%	0%	70.4%	96.1%	0%	94.8%	-	-	-	-	-	-
Single-Unit Trucks	9	3	0	12	0	1	9	0	10	0	1	12	0	13	-	-	-	-	-	-
Single-Unit Trucks %	3.2%	2.1%	0%	2.8%	0%	5.3%	5.2%	0%	5.2%	0%	3.7%	2.4%	0%	2.4%	-	-	-	-	-	-
Buses	1	5	0	6	0	0	3	0	3	0	1	4	0	5	-	-	-	-	-	-
Buses %	0.4%	3.4%	0%	1.4%	0%	0%	1.7%	0%	1.6%	0%	3.7%	0.8%	0%	0.9%	-	-	-	-	-	-
Articulated Trucks	1	9	0	10	0	0	6	0	6	0	6	4	0	10	-	-	-	-	-	-
Articulated Trucks %	0.4%	6.2%	0%	2.4%	0%	0%	3.5%	0%	3.1%	0%	22.2%	0.8%	0%	1.9%	-	-	-	-	-	-



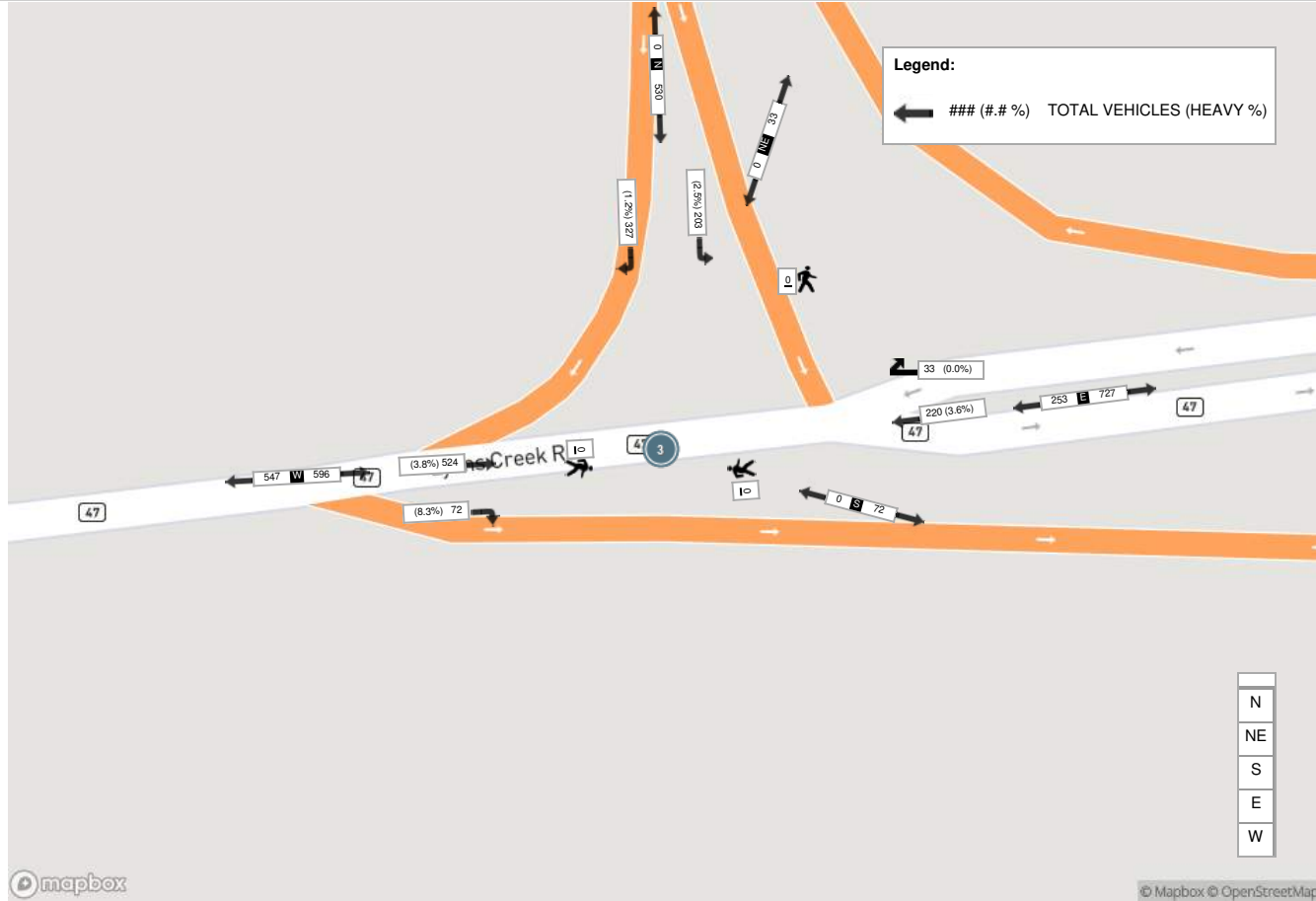
Peak Hour: 04:15 PM - 05:15 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	N Approach QEW SB OFF RAMP					NE Approach QEW SB ON RAMP [FROM WB LYONS CREEK RD]		E Approach LYONS CREEK RD					S Approach QEW SB ON RAMP		W Approach LYONS CREEK RD					Int. Total (15 min)
	Right	Left	U-Turn	Peds	Approach Total	Peds	Approach Total	Hard Right	Thru	U-Turn	Peds	Approach Total	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
16:15:00	75	57	0	0	132	0	0	11	61	0	0	72	0	0	21	143	0	0	164	368
16:30:00	82	42	0	0	124	0	0	11	48	0	0	59	0	0	20	120	0	0	140	323
16:45:00	80	54	0	0	134	0	0	4	53	0	0	57	0	0	15	129	0	0	144	335
17:00:00	90	50	0	0	140	0	0	7	58	0	0	65	0	0	16	132	0	0	148	353
Grand Total	327	203	0	0	530	0	0	33	220	0	0	253	0	0	72	524	0	0	596	1379
Approach%	61.7%	38.3%	0%	-	-	-	-	13%	87%	0%	-	-	-	-	12.1%	87.9%	0%	-	-	-
Totals %	23.7%	14.7%	0%	-	38.4%	-	-	2.4%	16%	0%	-	18.3%	0%	5.2%	38%	0%	-	-	43.2%	-
PHF	0.91	0.89	0	-	0.95	0	0	0.75	0.9	0	-	0.88	0	0.86	0.92	0	-	-	0.91	-
Heavy	4	5	0	-	9	0	0	0	8	0	-	8	0	6	20	0	-	-	26	-
Heavy %	1.2%	2.5%	0%	-	1.7%	0%	0%	0%	3.6%	0%	-	3.2%	0%	8.3%	3.8%	0%	-	-	4.4%	-
Lights	323	198	0	-	521	0	0	33	212	0	-	245	0	66	504	0	-	-	570	-
Lights %	98.8%	97.5%	0%	-	98.3%	0%	0%	100%	96.4%	0%	-	96.8%	0%	91.7%	96.2%	0%	-	-	95.6%	-
Single-Unit Trucks	2	4	0	-	6	0	0	0	3	0	-	3	0	2	11	0	-	-	13	-
Single-Unit Trucks %	0.6%	2%	0%	-	1.1%	0%	0%	0%	1.4%	0%	-	1.2%	0%	2.8%	2.1%	0%	-	-	2.2%	-
Buses	0	0	0	-	0	0	0	0	1	0	-	1	0	1	2	0	-	-	3	-
Buses %	0%	0%	0%	-	0%	0%	0%	0%	0.5%	0%	-	0.4%	0%	1.4%	0.4%	0%	-	-	0.5%	-
Articulated Trucks	2	1	0	-	3	0	0	0	4	0	-	4	0	3	7	0	-	-	10	-
Articulated Trucks %	0.6%	0.5%	0%	-	0.6%	0%	0%	0%	1.8%	0%	-	1.6%	0%	4.2%	1.3%	0%	-	-	1.7%	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:15 PM - 05:15 PM Weather: Heavy Intensity Rain (18.36 °C)





Turning Movement Count (5 . MONTROSE DR & GRASSY BROOK RD)

Start Time	N Approach					S Approach					W Approach					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	UTurn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:30:00	2	27	0	0	29	46	3	0	0	49	0	0	0	0	0	78	
06:45:00	3	44	0	0	47	64	1	0	0	65	0	0	0	0	0	112	
07:00:00	0	30	1	0	31	41	1	0	0	42	0	0	0	0	0	73	
07:15:00	1	20	1	0	22	43	0	0	0	43	0	1	0	0	1	66	329
07:30:00	1	34	0	0	35	59	0	0	0	59	0	1	0	0	1	95	346
07:45:00	1	35	0	0	36	70	1	0	0	71	0	0	0	0	0	107	341
08:00:00	4	33	2	0	39	46	3	0	0	49	0	1	0	0	1	89	357
08:15:00	2	41	0	0	43	52	1	0	0	53	1	3	0	0	4	100	391
08:30:00	3	44	0	0	47	55	1	0	0	56	0	4	0	0	4	107	403
08:45:00	2	56	0	0	58	38	3	0	0	41	2	0	0	0	2	101	397
09:00:00	2	30	1	0	33	50	3	0	0	53	0	0	0	0	0	86	394
09:15:00	0	40	0	0	40	54	2	0	0	56	0	0	0	0	0	96	390
BREAK																	
16:00:00	0	95	0	0	95	63	0	0	0	63	2	0	0	0	2	160	
16:15:00	0	85	0	0	85	59	0	0	0	59	0	1	0	0	1	145	
16:30:00	1	76	0	0	77	57	0	0	0	57	2	0	0	0	2	136	
16:45:00	0	71	0	0	71	51	0	1	0	52	0	0	0	0	0	123	564
17:00:00	0	81	0	0	81	70	1	0	0	71	3	1	0	0	4	156	560
17:15:00	1	92	0	0	93	55	0	0	0	55	0	0	0	0	0	148	563
17:30:00	1	74	0	0	75	56	1	0	0	57	0	0	0	0	0	132	559
17:45:00	0	61	0	0	61	40	1	0	0	41	0	1	0	0	1	103	539
18:00:00	2	56	0	0	58	54	1	0	0	55	1	0	0	0	1	114	497
18:15:00	2	53	0	0	55	47	2	0	0	49	1	0	0	0	1	105	454
18:30:00	0	38	0	0	38	62	0	0	0	62	0	0	0	0	0	100	422
18:45:00	0	47	0	0	47	42	0	0	0	42	0	0	0	0	0	89	408
Grand Total	28	1263	5	0	1296	1274	25	1	0	1300	12	13	0	0	25	2621	-
Approach%	2.2%	97.5%	0.4%	-	-	98%	1.9%	0.1%	-	-	48%	52%	0%	-	-	-	-
Totals %	1.1%	48.2%	0.2%	-	49.4%	48.6%	1%	0%	-	49.6%	0.5%	0.5%	0%	-	1%	-	-
Heavy	1	76	0	-	-	56	0	0	-	-	1	1	0	-	-	-	-
Heavy %	3.6%	6%	0%	-	-	4.4%	0%	0%	-	-	8.3%	7.7%	0%	-	-	-	-
Bicycles	0	1	0	-	-	1	0	0	-	-	0	1	0	-	-	-	-
Bicycle %	0%	0.1%	0%	-	-	0.1%	0%	0%	-	-	0%	7.7%	0%	-	-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Light Rain (16.55 °C)

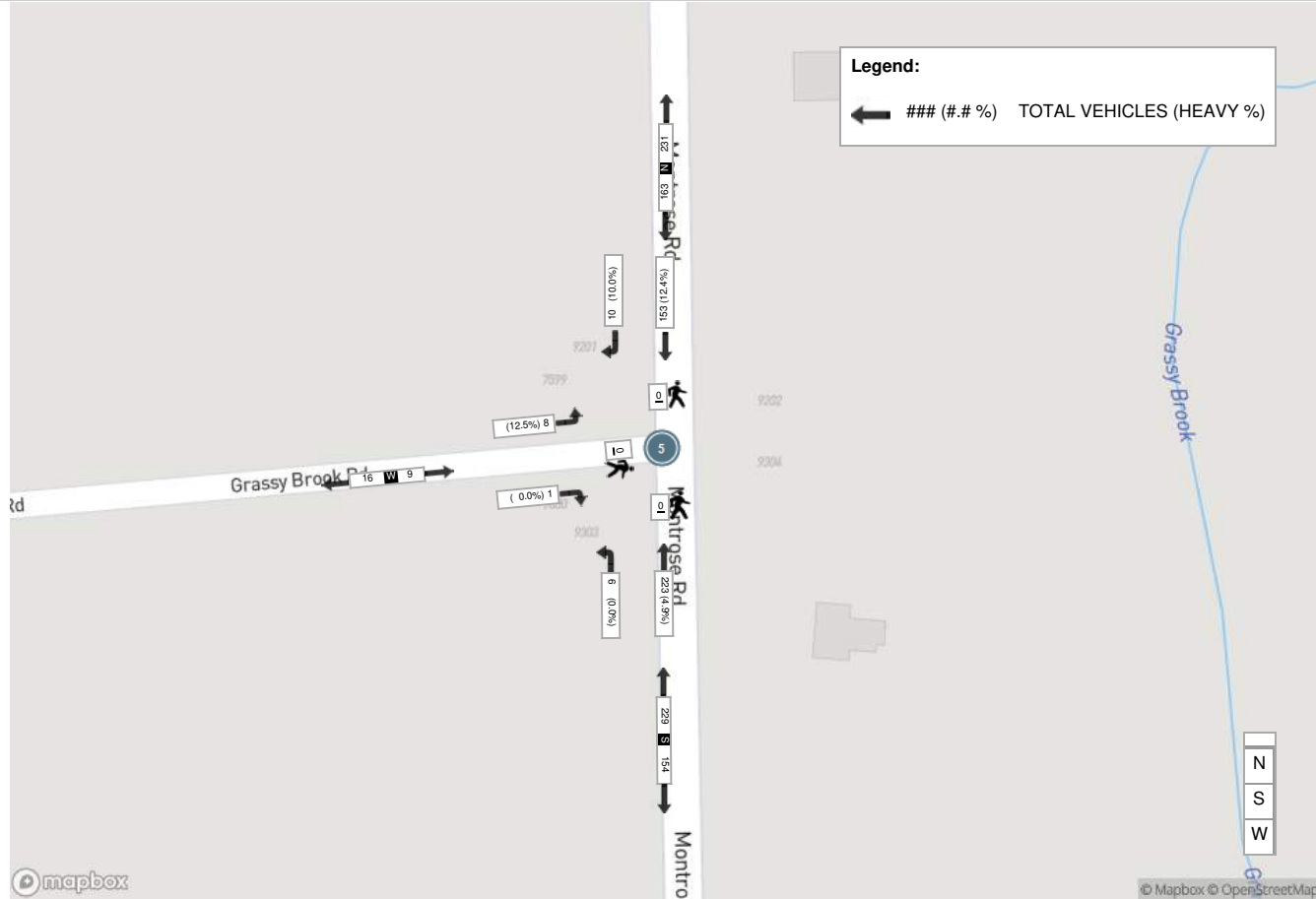
Start Time	N Approach					S Approach					W Approach					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
07:45:00	1	35	0	0	36	70	1	0	0	71	0	0	0	0	0	107
08:00:00	4	33	2	0	39	46	3	0	0	49	0	1	0	0	1	89
08:15:00	2	41	0	0	43	52	1	0	0	53	1	3	0	0	4	100
08:30:00	3	44	0	0	47	55	1	0	0	56	0	4	0	0	4	107
Grand Total	10	153	2	0	165	223	6	0	0	229	1	8	0	0	9	403
Approach%	6.1%	92.7%	1.2%		-	97.4%	2.6%	0%		-	11.1%	88.9%	0%		-	-
Totals %	2.5%	38%	0.5%		40.9%	55.3%	1.5%	0%		56.8%	0.2%	2%	0%		2.2%	-
PHF	0.63	0.87	0.25		0.88	0.8	0.5	0		0.81	0.25	0.5	0		0.56	-
Heavy	1	19	0		20	11	0	0		11	0	1	0		1	-
Heavy %	10%	12.4%	0%		12.1%	4.9%	0%	0%		4.8%	0%	12.5%	0%		11.1%	-
Lights	9	134	2		145	212	6	0		218	1	7	0		8	-
Lights %	90%	87.6%	100%		87.9%	95.1%	100%	0%		95.2%	100%	87.5%	0%		88.9%	-
Single-Unit Trucks	0	12	0		12	5	0	0		5	0	0	0		0	-
Single-Unit Trucks %	0%	7.8%	0%		7.3%	2.2%	0%	0%		2.2%	0%	0%	0%		0%	-
Buses	1	2	0		3	4	0	0		4	0	1	0		1	-
Buses %	10%	1.3%	0%		1.8%	1.8%	0%	0%		1.7%	0%	12.5%	0%		11.1%	-
Articulated Trucks	0	5	0		5	2	0	0		2	0	0	0		0	-
Articulated Trucks %	0%	3.3%	0%		3%	0.9%	0%	0%		0.9%	0%	0%	0%		0%	-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	%	-	-	-	-	%	-	-	-	-	%	-	-



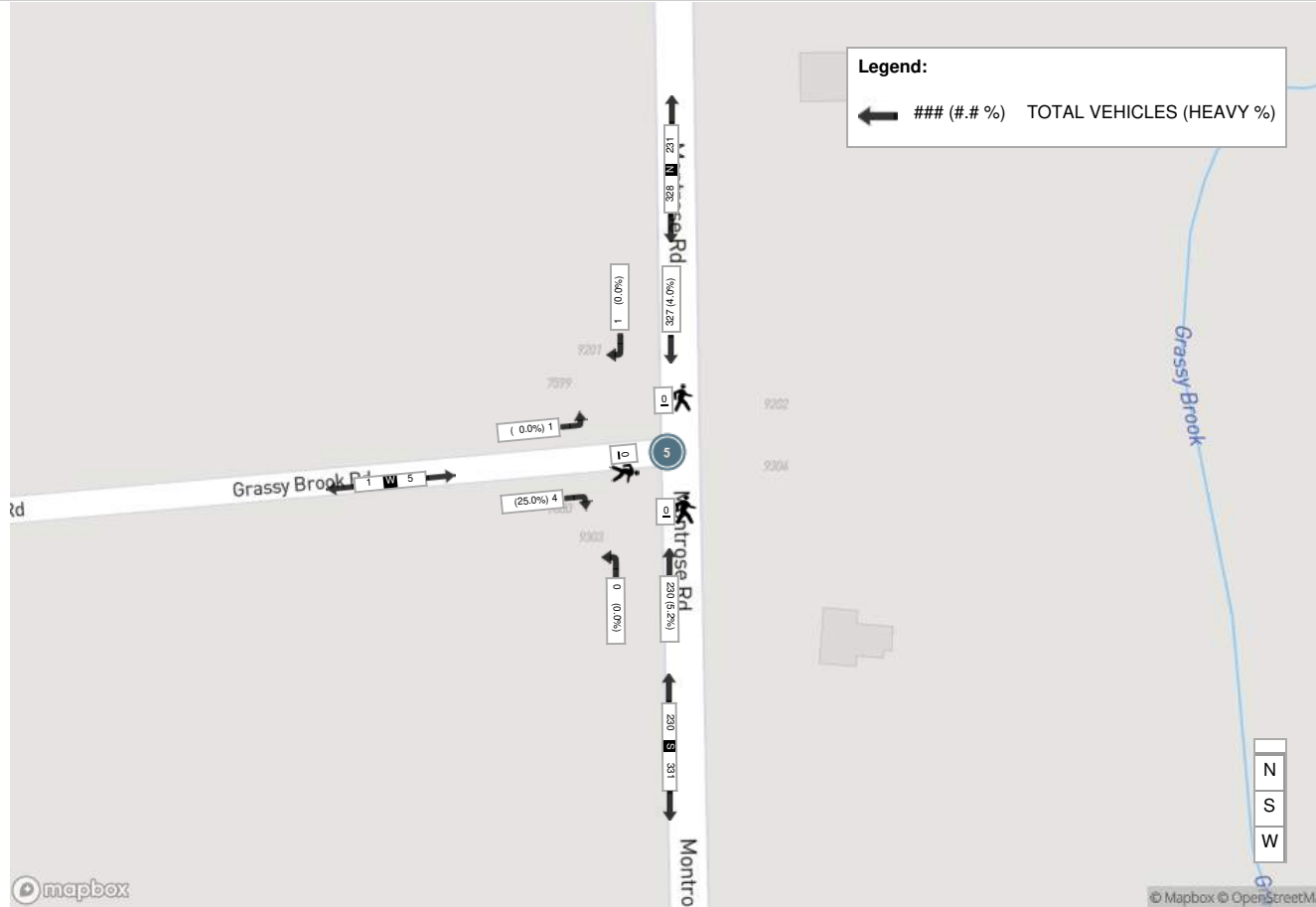
Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	N Approach					S Approach					W Approach					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
16:00:00	0	95	0	0	95	63	0	0	0	63	2	0	0	0	2	160
16:15:00	0	85	0	0	85	59	0	0	0	59	0	1	0	0	1	145
16:30:00	1	76	0	0	77	57	0	0	0	57	2	0	0	0	2	136
16:45:00	0	71	0	0	71	51	0	1	0	52	0	0	0	0	0	123
Grand Total	1	327	0	0	328	230	0	1	0	231	4	1	0	0	5	564
Approach%	0.3%	99.7%	0%		-	99.6%	0%	0.4%		-	80%	20%	0%		-	-
Totals %	0.2%	58%	0%		58.2%	40.8%	0%	0.2%		41%	0.7%	0.2%	0%		0.9%	-
PHF	0.25	0.86	0		0.86	0.91	0	0.25		0.92	0.5	0.25	0		0.63	-
Heavy	0	13	0		13	12	0	0		12	1	0	0		1	-
Heavy %	0%	4%	0%		4%	5.2%	0%	0%		5.2%	25%	0%	0%		20%	-
Lights	1	314	0		315	218	0	1		219	3	1	0		4	-
Lights %	100%	96%	0%		96%	94.8%	0%	100%		94.8%	75%	100%	0%		80%	-
Single-Unit Trucks	0	7	0		7	3	0	0		3	1	0	0		1	-
Single-Unit Trucks %	0%	2.1%	0%		2.1%	1.3%	0%	0%		1.3%	25%	0%	0%		20%	-
Buses	0	4	0		4	4	0	0		4	0	0	0		0	-
Buses %	0%	1.2%	0%		1.2%	1.7%	0%	0%		1.7%	0%	0%	0%		0%	-
Articulated Trucks	0	2	0		2	5	0	0		5	0	0	0		0	-
Articulated Trucks %	0%	0.6%	0%		0.6%	2.2%	0%	0%		2.2%	0%	0%	0%		0%	-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	%	-	-	-	-	%	-	-	-	-	%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Heavy Intensity Rain (18.36 °C)





Turning Movement Count (6 . MONTROSE DR & OAKWOOD DR)

Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
06:30:00	41	5	0	0	46	0	7	0	0	7	10	28	0	0	38	91	
06:45:00	55	2	0	0	57	2	18	0	0	20	21	26	0	0	47	124	
07:00:00	35	1	0	0	36	0	6	0	0	6	10	22	0	0	32	74	
07:15:00	28	4	0	0	32	2	0	0	0	2	14	26	0	0	40	74	363
07:30:00	34	3	0	0	37	4	10	0	0	14	17	37	0	0	54	105	377
07:45:00	42	6	0	0	48	2	10	0	0	12	27	41	0	0	68	128	381
08:00:00	41	4	0	0	45	3	8	0	0	11	22	24	0	0	46	102	409
08:15:00	31	2	0	0	33	1	14	0	0	15	23	29	0	0	52	100	435
08:30:00	35	5	0	0	40	2	16	0	0	18	17	46	0	0	63	121	451
08:45:00	44	13	0	0	57	2	13	0	0	15	19	23	0	0	42	114	437
09:00:00	25	1	0	0	26	1	8	0	0	9	22	35	0	0	57	92	427
09:15:00	30	2	0	0	32	2	10	0	0	12	19	31	0	0	50	94	421
BREAK																	
16:00:00	56	4	0	0	60	4	30	0	0	34	25	56	0	0	81	175	
16:15:00	48	4	0	0	52	5	37	0	0	42	24	41	0	0	65	159	
16:30:00	47	8	0	0	55	11	26	0	0	37	17	43	0	0	60	152	
16:45:00	46	5	0	0	51	3	24	0	0	27	24	28	0	0	52	130	616
17:00:00	47	8	0	0	55	3	22	0	0	25	19	70	0	0	89	169	610
17:15:00	51	8	0	0	59	12	34	0	0	46	18	47	0	0	65	170	621
17:30:00	46	6	0	0	52	8	28	0	0	36	21	37	0	0	58	146	615
17:45:00	37	2	0	0	39	7	21	0	0	28	7	33	0	0	40	107	592
18:00:00	39	7	0	0	46	6	18	0	0	24	19	37	0	0	56	126	549
18:15:00	35	5	0	0	40	5	20	0	0	25	15	33	0	0	48	113	492
18:30:00	26	5	0	0	31	4	15	0	0	19	17	43	0	0	60	110	456
18:45:00	35	4	0	0	39	5	12	0	0	17	8	34	0	0	42	98	447
Grand Total	954	114	0	0	1068	94	407	0	0	501	435	870	0	0	1305	2874	-
Approach%	89.3%	10.7%	0%	-	-	18.8%	81.2%	0%	-	-	33.3%	66.7%	0%	-	-	-	-
Totals %	33.2%	4%	0%	-	37.2%	3.3%	14.2%	0%	-	17.4%	15.1%	30.3%	0%	-	45.4%	-	-
Heavy	65	7	0	-	-	4	11	0	-	-	4	54	0	-	-	-	-
Heavy %	6.8%	6.1%	0%	-	-	4.3%	2.7%	0%	-	-	0.9%	6.2%	0%	-	-	-	-
Bicycles	0	3	0	-	-	0	1	0	-	-	1	1	0	-	-	-	-
Bicycle %	0%	2.6%	0%	-	-	0%	0.2%	0%	-	-	0.2%	0.1%	0%	-	-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Light Rain (16.55 °C)

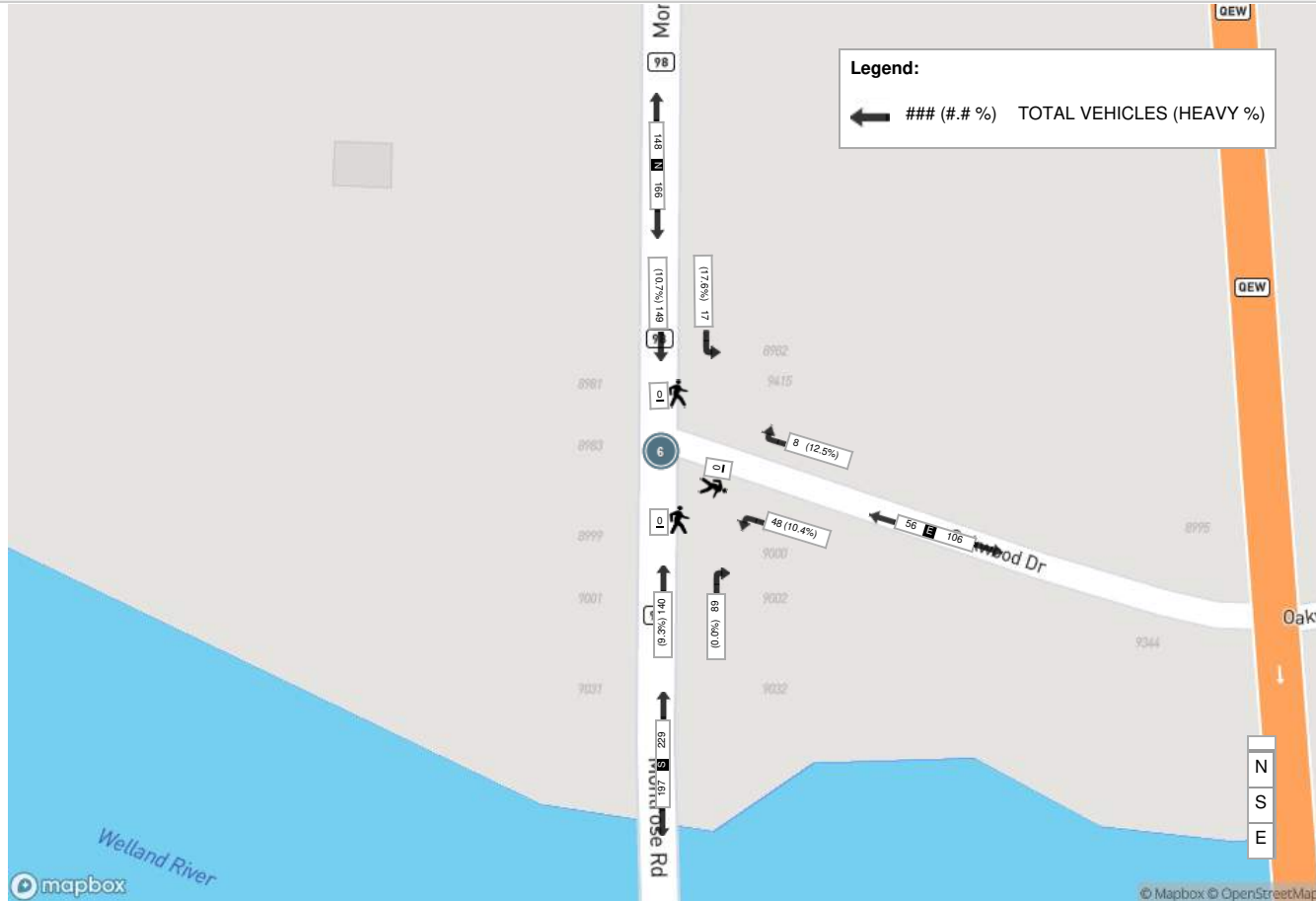
Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:45:00	42	6	0	0	48	2	10	0	0	12	27	41	0	0	68	128
08:00:00	41	4	0	0	45	3	8	0	0	11	22	24	0	0	46	102
08:15:00	31	2	0	0	33	1	14	0	0	15	23	29	0	0	52	100
08:30:00	35	5	0	0	40	2	16	0	0	18	17	46	0	0	63	121
Grand Total	149	17	0	0	166	8	48	0	0	56	89	140	0	0	229	451
Approach%	89.8%	10.2%	0%		-	14.3%	85.7%	0%		-	38.9%	61.1%	0%		-	-
Totals %	33%	3.8%	0%		36.8%	1.8%	10.6%	0%		12.4%	19.7%	31%	0%		50.8%	-
PHF	0.89	0.71	0		0.86	0.67	0.75	0		0.78	0.82	0.76	0		0.84	-
Heavy	16	3	0		19	1	5	0		6	0	13	0		13	-
Heavy %	10.7%	17.6%	0%		11.4%	12.5%	10.4%	0%		10.7%	0%	9.3%	0%		5.7%	-
Lights	133	14	0		147	7	43	0		50	89	127	0		216	-
Lights %	89.3%	82.4%	0%		88.6%	87.5%	89.6%	0%		89.3%	100%	90.7%	0%		94.3%	-
Single-Unit Trucks	8	2	0		10	1	3	0		4	0	4	0		4	-
Single-Unit Trucks %	5.4%	11.8%	0%		6%	12.5%	6.3%	0%		7.1%	0%	2.9%	0%		1.7%	-
Buses	5	0	0		5	0	0	0		0	0	5	0		5	-
Buses %	3.4%	0%	0%		3%	0%	0%	0%		0%	0%	3.6%	0%		2.2%	-
Articulated Trucks	3	1	0		4	0	2	0		2	0	4	0		4	-
Articulated Trucks %	2%	5.9%	0%		2.4%	0%	4.2%	0%		3.6%	0%	2.9%	0%		1.7%	-
Bicycles on Road	0	0	0	0	-	0	1	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	%	-	-	-	-	%	-	-	-	-	%	-	-



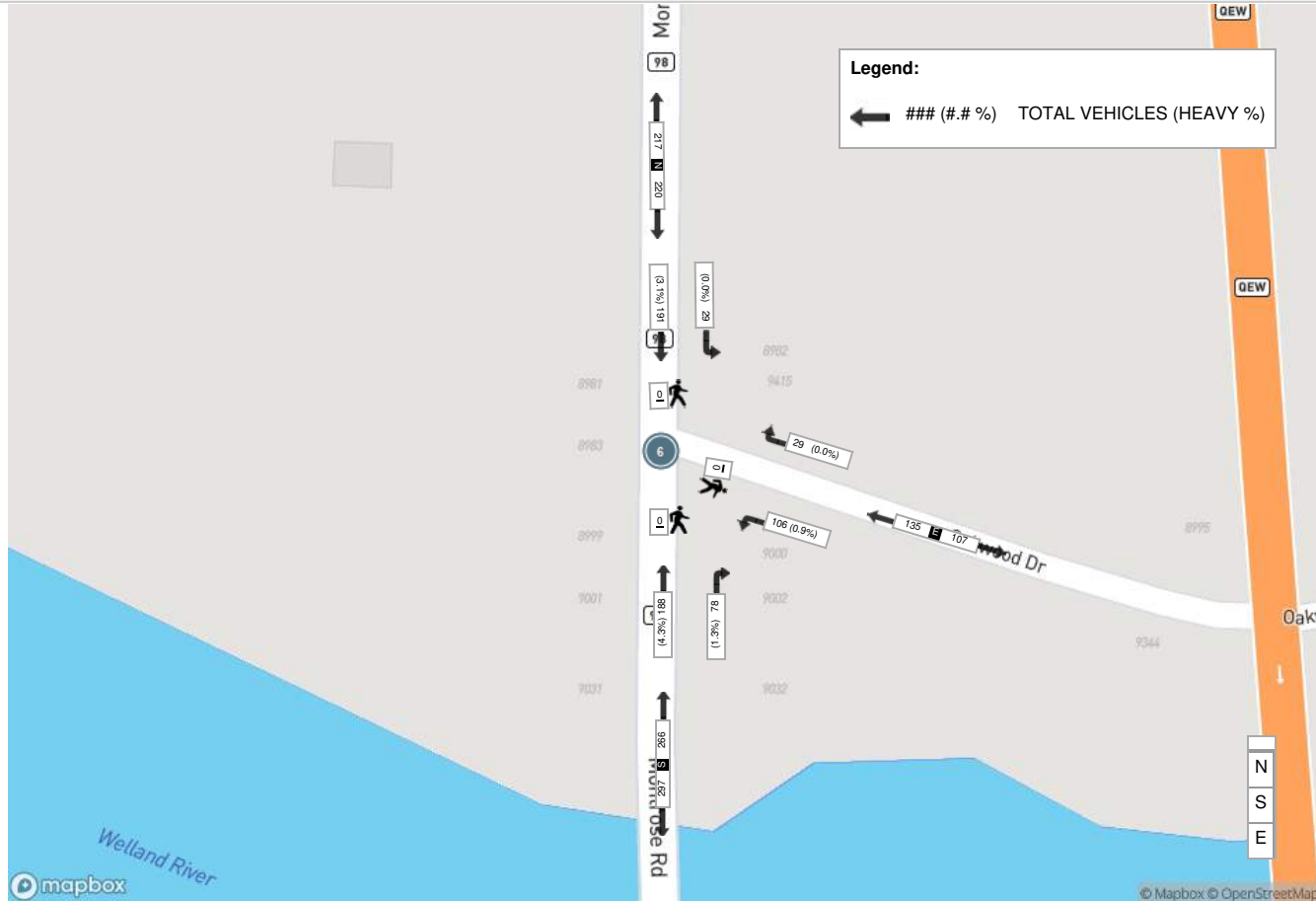
Peak Hour: 04:30 PM - 05:30 PM Weather: Heavy Intensity Rain (18.36 °C)

Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:30:00	47	8	0	0	55	11	26	0	0	37	17	43	0	0	60	152
16:45:00	46	5	0	0	51	3	24	0	0	27	24	28	0	0	52	130
17:00:00	47	8	0	0	55	3	22	0	0	25	19	70	0	0	89	169
17:15:00	51	8	0	0	59	12	34	0	0	46	18	47	0	0	65	170
Grand Total	191	29	0	0	220	29	106	0	0	135	78	188	0	0	266	621
Approach%	86.8%	13.2%	0%		-	21.5%	78.5%	0%		-	29.3%	70.7%	0%		-	-
Totals %	30.8%	4.7%	0%		35.4%	4.7%	17.1%	0%		21.7%	12.6%	30.3%	0%		42.8%	-
PHF	0.94	0.91	0		0.93	0.6	0.78	0		0.73	0.81	0.67	0		0.75	-
Heavy	6	0	0		6	0	1	0		1	1	8	0		9	-
Heavy %	3.1%	0%	0%		2.7%	0%	0.9%	0%		0.7%	1.3%	4.3%	0%		3.4%	-
Lights	185	29	0		214	29	105	0		134	77	180	0		257	-
Lights %	96.9%	100%	0%		97.3%	100%	99.1%	0%		99.3%	98.7%	95.7%	0%		96.6%	-
Single-Unit Trucks	3	0	0		3	0	1	0		1	1	3	0		4	-
Single-Unit Trucks %	1.6%	0%	0%		1.4%	0%	0.9%	0%		0.7%	1.3%	1.6%	0%		1.5%	-
Buses	3	0	0		3	0	0	0		0	0	4	0		4	-
Buses %	1.6%	0%	0%		1.4%	0%	0%	0%		0%	0%	2.1%	0%		1.5%	-
Articulated Trucks	0	0	0		0	0	0	0		0	0	1	0		1	-
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.5%	0%		0.4%	-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	%	-	-	-	-	%	-	-	-	-	%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Light Rain (16.55 °C)



Peak Hour: 04:30 PM - 05:30 PM Weather: Heavy Intensity Rain (18.36 °C)



Study Name Montrose Rd & Chippawa Creek Rd
Start Date Thursday, September 03, 2015 7:00 AM
End Date Thursday, September 03, 2015 6:15 PM
Site Code

Overview

This report contains turning movement volume (TMV) data of vehicular traffic in the intersection of study.

Content

Summary Contains a TMV summary of all vehicular traffic in the intersection for defined peak periods
TMV Table Contains a pivot table of the TMV road and crosswalk data
TMV Data Contains measured TMV data of all vehicular traffic in the intersection for each approach
Ped Data Contains detected pedestrian information for the intersection's crosswalks

Traffic Study

Start Date Thursday, September 03, 2015 7:00 AM
End Date Thursday, September 03, 2015 6:15 PM
Classification Categories Lights, Mediums, Articulated Trucks, Pedestrians
09/03/2015 AM Peaks 7:30 AM - 8:30 AM
09/03/2015 PM Peaks 4:15 PM - 5:15 PM

Study Name Montrose Rd & Chippawa Creek Rd
Start Date Thursday, September 03, 2015 7:00 AM
End Date Thursday, September 03, 2015 6:15 PM
Site Code

Report Summary

Time Period	Class.	Southbound						Northbound						Eastbound						Crosswalk	
		R	T	U	I	O	T	L	U	I	O	R	L	U	I	O	Total	pedestria	Total		
Peak 1	Lights	41	132	0	173	138	98	18	0	116	159	27	40	0	67	59	356	N	0	0	
Specified Period	%	72%	96%	0%	89%	89%	96%	72%	0%	91%	97%	100%	75%	0%	84%	72%	89%		0%		
7:00 AM - 9:15 AM	Mediums	7	4	0	11	11	4	5	0	9	4	0	7	0	7	12	27	S	0	0	
One Hour Peak	%	12%	3%	0%	6%	7%	4%	20%	0%	7%	2%	0%	13%	0%	9%	15%	7%		0%		
7:30 AM - 8:30 AM	articulated Truc	9	1	0	10	6	0	2	0	2	1	0	6	0	6	11	18	W	0	0	
	%	16%	1%	0%	5%	4%	0%	8%	0%	2%	1%	0%	11%	0%	8%	13%	4%		0%		
	Total	57	137	0	194	155	102	25	0	127	164	27	53	0	80	82	401		0	0	
	PHF	0.84	0.8	0	0.88	0.95	0.85	0.69	0	0.86	0.82	0.75	0.74	0	0.77	0.85	0.93				
	Approach %				48%	39%				32%	41%				20%	20%					
Peak 2	Lights	36	201	0	237	223	185	33	0	218	229	28	38	0	66	69	521	N	0	0	
Specified Period	%	90%	98%	0%	96%	99%	99%	97%	0%	99%	95%	82%	97%	0%	90%	93%	96%		0%		
3:00 PM - 6:15 PM	Mediums	3	5	0	8	3	2	1	0	3	8	3	1	0	4	4	15	S	0	0	
One Hour Peak	%	8%	2%	0%	3%	1%	1%	3%	0%	1%	3%	9%	3%	0%	5%	5%	3%		0%		
4:15 PM - 5:15 PM	articulated Truc	1	0	0	1	0	0	0	0	0	3	3	0	0	3	1	4	W	0	0	
	%	3%	0%	0%	0%	0%	0%	0%	0%	0%	1%	9%	0%	0%	4%	1%	1%		0%		
	Total	40	206	0	246	226	187	34	0	221	240	34	39	0	73	74	540		0	0	
	PHF	0.71	0.82	0	0.89	0.66	0.65	0.5	0	0.62	0.85	0.65	0.7	0	0.83	0.8	0.75				
	Approach %				46%	42%				41%	44%				14%	14%					

Signal Code: 047098						
Intersection: RR47 (LYON'S CREEK RD.) & RR98 (MONTROSE RD.)						
Municipality: niagarafalls						
Owner: Region						
Last Modified: 4/28/2020 3:39:40 PM						
Timing Parameters	EBD & WBD LYON'S CREEK RD.	NBD & SBD MONTROSE RD.	n/a	n/a	n/a	n/a
Min Green	10	10	0	0	0	0
Walk	8	10	0	0	0	0
Ped Clearance	12	15	0	0	0	0
Vehicle Ext.	6	6	0	0	0	0
Max Green	40	45	0	0	0	0
Yellow	4.1	4.1	0	0	0	0
All Red	2.2	2.2	0	0	0	0

		Offset
Minimum Cycle	32.6	0
Pedestrian Cycle	57.6	
Maximum Cycle	97.6	0
Operation	FA	

Installed On:

2/12/2009

Count Date:

8/26/2015

FA = Fully Actuated

SA = Semi Actuated

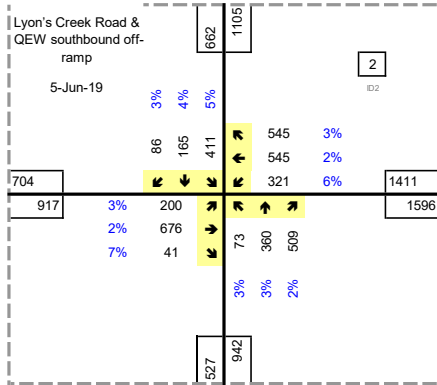
FT = Fixed Time

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

Copyright 2001 © Regional Niagara

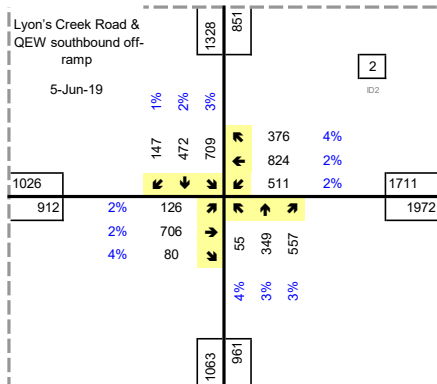
HEAVY VEHICLE PERCENTAGE CALCULATION (Montrose Road & Biggar Road/Lyons Creek Road)

AM



		1	2	3	4	5	6	7	8	9	10	11	12	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	2022 Volume
Existing 2022	Total Veh	4	172	412	48	66	15	31	114	3	244	115	83	
	Heavy %	34%	4%	2%	32%	9%	8%	7%	3%	100%	7%	4%	11%	
	Heavy #	1	7	8	15	6	1	2	3	3	17	5	9	
Corridor Growth 2041		2	34	81	10	13	3	6	22	0	47	22	16	
BGD 2041	Total Veh	48	143	16	142	68	39	136	68	15	30	221	403	
	Heavy %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
	Heavy #	1	3	0	3	1	1	3	1	0	1	4	8	
Site 2041	Total Veh	19	11	0	211	18	29	27	472	23	0	187	43	
	Heavy %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
	Heavy #	0	0	0	4	0	1	1	9	0	0	4	1	
FB 2041	Total Veh	54	349	509	200	147	57	173	204	18	321	358	502	
	Heavy #	2	10	8	18	7	2	5	4	3	18	9	17	
	Heavy %	4%	3%	2%	9%	5%	4%	3%	2%	17%	6%	3%	3%	
FT 2041	Total Veh	73	360	509	411	165	86	200	676	41	321	545	545	
	Heavy #	2	10	8	22	7	3	6	13	3	18	13	18	
	Heavy %	3%	3%	2%	5%	4%	3%	3%	2%	7%	6%	2%	3%	

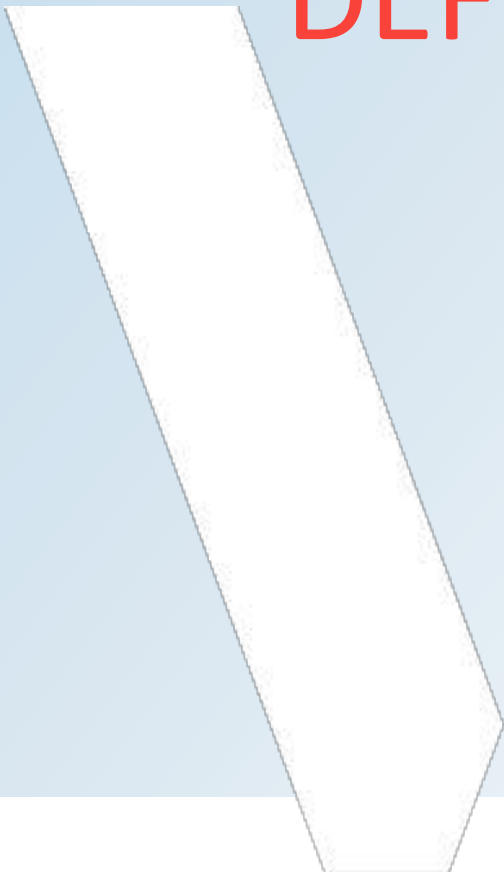
PM



		1	2	3	4	5	6	7	8	9	10	11	12	
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	2022 Volume
Existing 2022	Total Veh	5	155	363	124	198	40	14	107	4	346	183	57	
	Heavy %	25%	5%	4%	7%	3%	0%	0%	4%	34%	2%	3%	14%	
	Heavy #	1	8	15	9	6	0	0	4	1	7	5	8	
Corridor Growth 2041		2	61	141	48	77	15	6	42	2	135	71	22	
BGD 2041	Total Veh	19	113	53	385	171	56	72	185	42	30	88	177	
	Heavy %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
	Heavy #	0	2	1	8	3	1	1	4	1	1	2	4	
Site 2041	Total Veh	29	20	0	152	26	36	34	372	32	0	482	120	
	Heavy %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
	Heavy #	1	0	0	3	1	1	1	7	1	0	10	2	
FB 2041	Total Veh	26	329	557	557	446	111	92	334	48	511	342	256	
	Heavy #	1	10	16	17	9	1	1	8	2	8	7	12	
	Heavy %	4%	3%	3%	3%	2%	1%	1%	2%	4%	2%	2%	5%	
FT 2041	Total Veh	55	349	557	709	472	147	126	706	80	511	824	376	
	Heavy #	2	10	16	20	10	2	2	15	3	8	17	14	
	Heavy %	4%	3%	3%	3%	2%	1%	2%	2%	4%	2%	2%	4%	

APPENDIX

C LEVEL OF SERVICE 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⁾

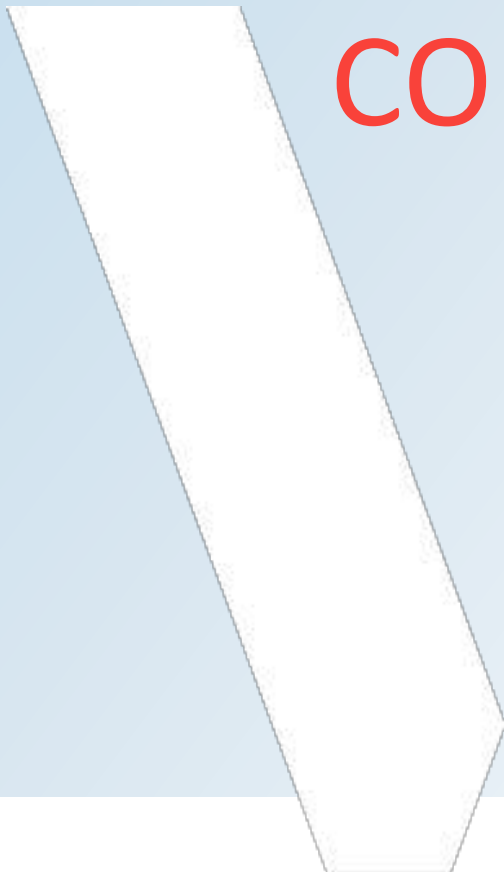
The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle 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

D EXISTING TRAFFIC CONDITIONS



Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Existing <AM>

09-28-2022



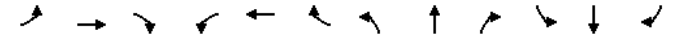
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	31	114	3	244	115	83	4	172	412	48	66	15
Future Volume (vph)	31	114	3	244	115	83	4	172	412	48	66	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. 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		0.997			0.975			0.905			0.985	
Flt Protected		0.990			0.973						0.982	
Satd. Flow (prot)	0	1635	0	0	1552	0	0	1541	0	0	1441	0
Flt Permitted		0.854			0.755			0.999			0.627	
Satd. Flow (perm)	0	1410	0	0	1204	0	0	1539	0	0	920	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			14			161			9	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1668.4			415.6			616.2			574.3	
Travel Time (s)		75.1			18.7			27.7			25.8	
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
Heavy Vehicles (%)	7%	3%	100%	7%	4%	11%	34%	4%	2%	32%	9%	8%
Adj. Flow (vph)	34	124	3	265	125	90	4	187	448	52	72	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	161	0	0	480	0	0	639	0	0	140	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	7.5		2.0	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-0.2		0.0	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	-0.2		0.0	-1.5	
Detector 1 Size(m)	2.0	0.0		2.0	0.0		2.0	7.7		2.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		0.0			0.0							
Detector 2 Size(m)		0.0			0.0							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Existing <AM>

09-28-2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.3	26.3		26.3	26.3		31.3	31.3		31.3	31.3	
Total Split (s)	46.3	46.3		46.3	46.3		51.3	51.3		51.3	51.3	
Total Split (%)	47.4%	47.4%		47.4%	47.4%		52.6%	52.6%		52.6%	52.6%	
Maximum Green (s)	40.0	40.0		40.0	40.0		45.0	45.0		45.0	45.0	
Yellow Time (s)	4.1	4.1		4.1	4.1		4.1	4.1		4.1	4.1	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.3			6.3			6.3			6.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		44.8			44.8			40.2			40.2	
Actuated g/C Ratio		0.46			0.46			0.41			0.41	
v/c Ratio		0.25			0.86			0.88			0.36	
Control Delay		19.0			42.0			33.5			20.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		19.0			42.0			33.5			20.2	
LOS		B			D			C			C	
Approach Delay		19.0			42.0			33.5			20.2	
Approach LOS		B			D			C			C	
Queue Length 50th (m)		19.9			85.2			84.6			16.5	
Queue Length 95th (m)		36.3			#156.7			#137.8			30.7	
Internal Link Dist (m)		1644.4			391.6			592.2			550.3	
Turn Bay Length (m)												
Base Capacity (vph)		647			560			796			429	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.25			0.86			0.80			0.33	

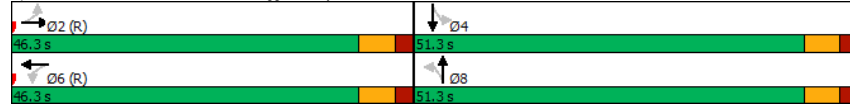
Intersection Summary

Area Type:	Other
Cycle Length:	97.6
Actuated Cycle Length:	97.6
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	33.4
Intersection Capacity Utilization:	89.6%
Intersection LOS:	C
ICU Level of Service:	E
Analysis Period (min):	15
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

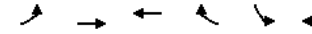
Existing <AM>
09-28-2022

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd



Lanes, Volumes, Timings
2: Lyons Creek Rd & QEW Southbound Off Ramp

Existing <AM>
09-28-2022

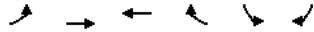


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (vph)	0	540	184	0	150	289
Future Volume (vph)	0	540	184	0	150	289
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	80.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor						
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3197	2995	0	1484	1430
Flt Permitted					0.950	
Satd. Flow (perm)	0	3197	2995	0	1484	1430
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	587	200	0	163	314
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	587	200	0	163	314
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary
 Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 32.0% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Lyons Creek Rd & QEW Southbound Off Ramp

Existing <AM>
09-28-2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (veh/h)	0	540	184	0	150	289
Future Volume (Veh/h)	0	540	184	0	150	289
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)	0	587	200	0	163	314
Pedestrians		1				
Lane Width (m)		3.6				
Walking Speed (m/s)		1.2				
Percent Blockage		0				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	200				494	101
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200				494	101
tC, single (s)	4.1				7.0	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	100				66	66
cM capacity (veh/h)	1370				481	928
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	294	294	100	100	163	314
Volume Left	0	0	0	0	163	0
Volume Right	0	0	0	0	0	314
cSH	1700	1700	1700	1700	481	928
Volume to Capacity	0.17	0.17	0.06	0.06	0.34	0.34
Queue Length 95th (m)	0.0	0.0	0.0	0.0	11.9	12.0
Control Delay (s)	0.0	0.0	0.0	0.0	16.3	10.9
Lane LOS					C	B
Approach Delay (s)	0.0		0.0		12.7	
Approach LOS					B	
Intersection Summary						
Average Delay			4.8			
Intersection Capacity Utilization			32.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Existing <AM>
09-28-2022



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↓	↓
Traffic Volume (vph)	336	0	0	152	56	38
Future Volume (vph)	336	0	0	152	56	38
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Fit Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Link Speed (k/h)	80			80	60	
Link Distance (m)	157.2			176.8	223.3	
Travel Time (s)	7.1			8.0	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	365	0	0	165	61	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	365	0	0	165	61	41
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Existing <AM>
09-28-2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	336	0	0	152	56	38
Future Volume (Veh/h)	336	0	0	152	56	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)	365	0	0	165	61	41
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			365		448	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			365		448	182
tC, single (s)			4.1		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		88	95
cM capacity (veh/h)			1190		518	826
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	182	182	82	82	61	41
Volume Left	0	0	0	0	61	0
Volume Right	0	0	0	0	0	41
cSH	1700	1700	1700	1700	518	826
Volume to Capacity	0.11	0.11	0.05	0.05	0.12	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	3.2	1.3
Control Delay (s)	0.0	0.0	0.0	0.0	12.9	9.6
Lane LOS					B	A
Approach Delay (s)	0.0		0.0		11.6	
Approach LOS					B	
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			20.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Existing <AM>
09-28-2022

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑		↑	↑	↑	↑
Traffic Volume (vph)	57	29	27	109	146	61
Future Volume (vph)	57	29	27	109	146	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	60.0			80.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		60.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.954					0.850
Fit Protected	0.968		0.950			
Satd. Flow (prot)	1387	0	1299	1683	1683	1153
Fit Permitted	0.968		0.950			
Satd. Flow (perm)	1387	0	1299	1683	1683	1153
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	62	32	29	118	159	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	94	0	29	118	159	66
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 27.0%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Existing <AM>
09-28-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↑	↑	↔
Traffic Volume (veh/h)	57	29	27	109	146	61
Future Volume (Veh/h)	57	29	27	109	146	61
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	32	29	118	159	66
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	335	159	225			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335	159	225			
tC, single (s)	6.6	6.2	4.4			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.5			
p0 queue free %	90	96	98			
cM capacity (veh/h)	601	892	1204			
Direction_Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	94	29	118	159	66	
Volume Left	62	29	0	0	0	
Volume Right	32	0	0	0	66	
cSH	676	1204	1700	1700	1700	
Volume to Capacity	0.14	0.02	0.07	0.09	0.04	
Queue Length 95th (m)	3.9	0.6	0.0	0.0	0.0	
Control Delay (s)	11.2	8.1	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	11.2	1.6		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			27.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Existing <AM>
09-28-2022

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Traffic Volume (vph)	51	9	149	95	19	159
Future Volume (vph)	51	9	149	95	19	159
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.979		0.948			
Fit Protected	0.959				0.995	
Satd. Flow (prot)	1476		0		1558	
Fit Permitted	0.959				0.995	
Satd. Flow (perm)	1476		0		1558	
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	55	10	162	103	21	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	0	265	0	0	194
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 36.7%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Existing <AM>
09-28-2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	51	9	149	95	19	159
Future Volume (Veh/h)	51	9	149	95	19	159
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)	55	10	162	103	21	173
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	428	214			265	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	214			265	
tC, single (s)	6.5	6.3			4.3	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.4	
p0 queue free %	90	99			98	
cM capacity (veh/h)	557	800			1212	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	65	265	194			
Volume Left	55	0	21			
Volume Right	10	103	0			
cSH	584	1700	1212			
Volume to Capacity	0.11	0.16	0.02			
Queue Length 95th (m)	3.0	0.0	0.4			
Control Delay (s)	11.9	0.0	1.0			
Lane LOS	B		A			
Approach Delay (s)	11.9	0.0	1.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		36.7%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Existing <AM>
09-28-2022

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	9	2	7	237	163	11
Future Volume (vph)	9	2	7	237	163	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	0.977				0.991	
Fit Protected	0.960			0.998		
Satd. Flow (prot)	1481	0	0	1666	1537	0
Fit Permitted	0.960			0.998		
Satd. Flow (perm)	1481	0	0	1666	1537	0
Link Speed (k/h)	40			70	70	
Link Distance (m)	644.9			627.8	493.4	
Travel Time (s)	58.0			32.3	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	10	2	8	258	177	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	0	266	189	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 29.7%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Existing <AM>
09-28-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	2	7	237	163	11
Future Volume (Veh/h)	9	2	7	237	163	11
Sign Control	Stop		Free			
Grade	0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	2	8	258	177	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	457	183	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	457	183	189			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	98	100	99			
cM capacity (veh/h)	539	865	1397			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	12	266	189			
Volume Left	10	8	0			
Volume Right	2	0	12			
cSH	575	1397	1700			
Volume to Capacity	0.02	0.01	0.11			
Queue Length 95th (m)	0.5	0.1	0.0			
Control Delay (s)	11.4	0.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.4	0.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			29.7%		ICU Level of Service A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
7: Montrose Rd & Reixinger Road

Existing <AM>
09-28-2022

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	2	286	2	2	129
Future Volume (vph)	2	2	286	2	2	129
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.932		0.999			
Fit Protected	0.976		0.999			
Satd. Flow (prot)	1592	0	1698	0	0	1666
Fit Permitted	0.976		0.999			
Satd. Flow (perm)	1592	0	1698	0	0	1666
Link Speed (k/h)	50		80		70	
Link Distance (m)	332.1		574.3		627.8	
Travel Time (s)	23.9		25.8		32.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	5%
Adj. Flow (vph)	2	2	311	2	2	140
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	313	0	0	142
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15	25		
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 26.5%			ICU Level of Service A			
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Reixinger Road

Existing <AM>
09-28-2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	2	2	286	2	2	129
Future Volume (Veh/h)	2	2	286	2	2	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)	2	2	311	2	2	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	456	312			313	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	456	312			313	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	565	733			1259	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	4	313	142			
Volume Left	2	0	2			
Volume Right	2	2	0			
cSH	638	1700	1259			
Volume to Capacity	0.01	0.18	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	10.7	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	10.7	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		26.5%		ICU Level of Service		A
Analysis Period (min)		15				

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Existing <AM>
09-28-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	2	143	0	6	132	0	2	0	12	0	0	3
Future Volume (vph)	2	143	0	6	132	0	2	0	12	0	0	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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
Friction								0.883				0.865
Fit Protected		0.999			0.998			0.993				
Satd. Flow (prot)	0	1650	0	0	1609	0	0	1412	0	0	1514	0
Fit Permitted		0.999			0.998			0.993				
Satd. Flow (perm)	0	1650	0	0	1609	0	0	1412	0	0	1514	0
Link Speed (k/h)		80			80			50				50
Link Distance (m)		451.8			1668.4			459.1				765.3
Travel Time (s)		20.3			75.1			33.1				55.1
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
Heavy Vehicles (%)	0%	6%	2%	40%	7%	0%	0%	2%	10%	100%	2%	0%
Adj. Flow (vph)	2	155	0	7	143	0	2	0	13	0	0	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	157	0	0	150	0	0	15	0	0	3	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop				Stop
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	21.3%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Existing <AM>
09-28-2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	2	143	0	6	132	0	2	0	12	0	0	3
Future Volume (Veh/h)	2	143	0	6	132	0	2	0	12	0	0	3
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	155	0	7	143	0	2	0	13	0	0	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	143			155			319	316	155	329	316	143
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	143			155			319	316	155	329	316	143
tC, single (s)	4.1			4.5			7.1	6.5	6.3	8.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.6			3.5	4.0	3.4	4.4	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1452			1224			632	596	870	464	596	910
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	157	150	15	3								
Volume Left	2	7	2	0								
Volume Right	0	0	13	3								
cSH	1452	1224	829	910								
Volume to Capacity	0.00	0.01	0.02	0.00								
Queue Length 95th (m)	0.0	0.1	0.4	0.1								
Control Delay (s)	0.1	0.4	9.4	9.0								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.1	0.4	9.4	9.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			21.3%	ICU Level of Service	A							
Analysis Period (min)			15									

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Existing <PM>

09-28-2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	14	107	4	346	183	57	5	155	363	124	198	40
Future Volume (vph)	14	107	4	346	183	57	5	155	363	124	198	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.996			0.987			0.906			0.985	
Flt Protected		0.994			0.971						0.983	
Satd. Flow (prot)	0	1659	0	0	1621	0	0	1518	0	0	1629	0
Flt Permitted		0.922			0.747			0.997			0.563	
Satd. Flow (perm)	0	1539	0	0	1247	0	0	1513	0	0	933	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			7			163			9	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1668.4			415.6			616.2			574.3	
Travel Time (s)		75.1			18.7			27.7			25.8	
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
Heavy Vehicles (%)	0%	4%	34%	2%	3%	14%	25%	5%	4%	7%	3%	0%
Adj. Flow (vph)	15	116	4	376	199	62	5	168	395	135	215	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	637	0	0	568	0	0	393	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	7.5		2.0	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-1.5		0.0	-0.2	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	-1.5		0.0	-0.2	
Detector 1 Size(m)	2.0	0.0		2.0	0.0		2.0	9.0		2.0	7.7	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		0.0			0.0							
Detector 2 Size(m)		0.0			0.0							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Existing <PM>

09-28-2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.3	26.3		26.3	26.3		31.3	31.3		31.3	31.3	
Total Split (s)	46.3	46.3		46.3	46.3		51.3	51.3		51.3	51.3	
Total Split (%)	47.4%	47.4%		47.4%	47.4%		52.6%	52.6%		52.6%	52.6%	
Maximum Green (s)	40.0	40.0		40.0	40.0		45.0	45.0		45.0	45.0	
Yellow Time (s)	4.1	4.1		4.1	4.1		4.1	4.1		4.1	4.1	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		-2.3			-2.3			-2.3			-2.3	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		45.4			45.4			44.2			44.2	
Actuated g/C Ratio		0.47			0.47			0.45			0.45	
v/c Ratio		0.19			1.09			0.73			0.92	
Control Delay		17.1			92.5			21.1			53.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		17.1			92.5			21.1			53.1	
LOS		B			F			C			D	
Approach Delay		17.1			92.5			21.1			53.1	
Approach LOS		B			F			C			D	
Queue Length 50th (m)		15.9			~151.8			60.4			65.2	
Queue Length 95th (m)		28.8			#221.1			102.2			#126.0	
Internal Link Dist (m)		1644.4			391.6			592.2			550.3	
Turn Bay Length (m)												
Base Capacity (vph)		717			584			817			456	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.19			1.09			0.70			0.86	

Intersection Summary

Area Type: Other
 Cycle Length: 97.6
 Actuated Cycle Length: 97.6
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 54.3 Intersection LOS: D
 Intersection Capacity Utilization 106.5% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.

Lanes, Volumes, Timings

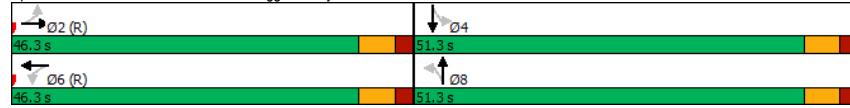
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Existing <PM>

09-28-2022

Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

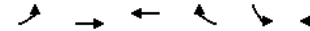


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Existing <PM>

09-28-2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (vph)	0	557	234	0	210	337
Future Volume (vph)	0	557	234	0	210	337
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	80.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor						
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3197	3197	0	1614	1458
Flt Permitted					0.950	
Satd. Flow (perm)	0	3197	3197	0	1614	1458
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	0%	3%	2%
Adj. Flow (vph)	0	605	254	0	228	366
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	605	254	0	228	366
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

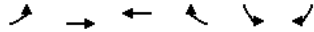
Intersection Capacity Utilization 36.5%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Lyons Creek Rd & QEW Southbound Off Ramp

Existing <PM>
09-28-2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (veh/h)	0	557	234	0	210	337
Future Volume (Veh/h)	0	557	234	0	210	337
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)	0	605	254	0	228	366
Pedestrians		1				
Lane Width (m)		3.6				
Walking Speed (m/s)		1.2				
Percent Blockage		0				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	254				556	128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	254				556	128
tC, single (s)	4.1				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				50	59
cM capacity (veh/h)	1308				458	897
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	302	302	127	127	228	366
Volume Left	0	0	0	0	228	0
Volume Right	0	0	0	0	0	366
cSH	1700	1700	1700	1700	458	897
Volume to Capacity	0.18	0.18	0.07	0.07	0.50	0.41
Queue Length 95th (m)	0.0	0.0	0.0	0.0	21.7	16.0
Control Delay (s)	0.0	0.0	0.0	0.0	20.4	11.7
Lane LOS					C	B
Approach Delay (s)	0.0		0.0		15.1	
Approach LOS					C	
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			36.5%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Existing <PM>
09-28-2022



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↓	↓
Traffic Volume (vph)	383	0	0	264	44	46
Future Volume (vph)	383	0	0	264	44	46
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1363	1352
Link Speed (k/h)	80			80	60	
Link Distance (m)	157.2			176.8	223.3	
Travel Time (s)	7.1			8.0	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	2%	1%	22%	10%
Adj. Flow (vph)	416	0	0	287	48	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	416	0	0	287	48	50
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	21.5%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Existing <PM>
09-28-2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	383	0	0	264	44	46
Future Volume (Veh/h)	383	0	0	264	44	46
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)	416	0	0	287	48	50
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			416		560	208
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			416		560	208
tC, single (s)			4.1		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			100		88	94
cM capacity (veh/h)			1139		413	774
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	208	208	144	144	48	50
Volume Left	0	0	0	0	48	0
Volume Right	0	0	0	0	0	50
cSH	1700	1700	1700	1700	413	774
Volume to Capacity	0.12	0.12	0.08	0.08	0.12	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	3.1	1.7
Control Delay (s)	0.0	0.0	0.0	0.0	14.9	10.0
Lane LOS					B	A
Approach Delay (s)	0.0		0.0		12.4	
Approach LOS					B	
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			21.5%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Existing <PM>
09-28-2022

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑		↑	↑	↑	↑
Traffic Volume (vph)	42	37	37	199	219	43
Future Volume (vph)	42	37	37	199	219	43
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	60.0			80.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		60.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.937					0.850
Fit Protected	0.974		0.950			
Satd. Flow (prot)	1452	0	1614	1716	1699	1352
Fit Permitted	0.974		0.950			
Satd. Flow (perm)	1452	0	1614	1716	1699	1352
Link Speed (k/h)	50			70	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			21.9	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	46	40	40	216	238	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	0	40	216	238	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.8%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Existing <PM>
09-28-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T	T	T	T	T	T
Traffic Volume (veh/h)	42	37	37	199	219	43
Future Volume (Veh/h)	42	37	37	199	219	43
Sign Control	Stop		Free			
Grade	0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	40	40	216	238	47
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	534	238	285			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	534	238	285			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.2			
p0 queue free %	91	95	97			
cM capacity (veh/h)	489	763	1271			
Direction_Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	86	40	216	238	47	
Volume Left	46	40	0	0	0	
Volume Right	40	0	0	0	47	
cSH	587	1271	1700	1700	1700	
Volume to Capacity	0.15	0.03	0.13	0.14	0.03	
Queue Length 95th (m)	4.1	0.8	0.0	0.0	0.0	
Control Delay (s)	12.2	7.9	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	12.2	1.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			30.8%		ICU Level of Service A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Existing <PM>
09-28-2022

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T	T	T	T	T	T
Traffic Volume (vph)	113	31	200	83	31	203
Future Volume (vph)	113	31	200	83	31	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.971		0.960			
Fit Protected	0.962				0.993	
Satd. Flow (prot)	1622		0		1614	
Fit Permitted	0.962				0.993	
Satd. Flow (perm)	1622		0		1614	
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	123	34	217	90	34	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	157	0	307	0	0	255
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 49.2%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Existing <PM>
09-28-2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (veh/h)	113	31	200	83	31	203
Future Volume (Veh/h)	113	31	200	83	31	203
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)	123	34	217	90	34	221
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	551	262			307	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551	262			307	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	96			97	
cM capacity (veh/h)	484	782			1265	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	157	307	255			
Volume Left	123	0	34			
Volume Right	34	90	0			
cSH	527	1700	1265			
Volume to Capacity	0.30	0.18	0.03			
Queue Length 95th (m)	9.9	0.0	0.7			
Control Delay (s)	14.7	0.0	1.3			
Lane LOS	B		A			
Approach Delay (s)	14.7	0.0	1.3			
Approach LOS	B		A			
Intersection Summary						
Average Delay			3.7			
Intersection Capacity Utilization			49.2%		ICU Level of Service A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Existing <PM>
09-28-2022

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	2	5	0	245	348	2
Future Volume (vph)	2	5	0	245	348	2
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.904				0.999	
Fit Protected	0.986					
Satd. Flow (prot)	1324	0	0	1651	1681	0
Fit Permitted	0.986					
Satd. Flow (perm)	1324	0	0	1651	1681	0
Link Speed (k/h)	40		70		70	
Link Distance (m)	644.9		627.8		493.4	
Travel Time (s)	58.0		32.3		25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	2	5	0	266	378	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	0	266	380	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.0%					ICU Level of Service A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Existing <PM>
09-28-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↕		
Traffic Volume (veh/h)	2	5	0	245	348	2
Future Volume (Veh/h)	2	5	0	245	348	2
Sign Control	Stop			Free		Free
Grade	0%			0%		0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	5	0	266	378	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None	None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	645	379	380			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	645	379	380			
tC, single (s)	6.4	6.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	440	620	1190			
Direction_Lane #	EB 1	NB 1	SB 1			
Volume Total	7	266	380			
Volume Left	2	0	0			
Volume Right	5	0	2			
cSH	555	1190	1700			
Volume to Capacity	0.01	0.00	0.22			
Queue Length 95th (m)	0.3	0.0	0.0			
Control Delay (s)	11.6	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.6	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	30.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: Montrose Rd & Reixinger Road

Existing <PM>
09-28-2022

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↕		↕	
Traffic Volume (vph)	2	2	225	2	2	360
Future Volume (vph)	2	2	225	2	2	360
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932		0.999			
Fit Protected	0.976					
Satd. Flow (prot)	1592	0	1698	0	0	1716
Fit Permitted	0.976					
Satd. Flow (perm)	1592	0	1698	0	0	1716
Link Speed (k/h)	50		80		70	
Link Distance (m)	332.1		574.3		627.8	
Travel Time (s)	23.9		25.8		32.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	0%	2%
Adj. Flow (vph)	2	2	245	2	2	391
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	247	0	0	393
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15	25		
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	32.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Reixinger Road

Existing <PM>
09-28-2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	2	2	225	2	2	360
Future Volume (Veh/h)	2	2	225	2	2	360
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	2	245	2	2	391
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	641	246			247	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	641	246			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 %	100	100			100	
cM capacity (veh/h)	442	798			1331	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	4	247	393			
Volume Left	2	0	2			
Volume Right	2	2	0			
cSH	568	1700	1331			
Volume to Capacity	0.01	0.15	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	11.4	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	11.4	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		32.3%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Existing <PM>
09-28-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	0	113	0	5	215	0	0	0	3	0	0	0
Future Volume (vph)	0	113	0	5	215	0	0	0	3	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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
Fit								0.865				
Fit Protected					0.999							
Satd. Flow (prot)	0	1683	0	0	1698	0	0	1514	0	0	1716	0
Fit Permitted					0.999							
Satd. Flow (perm)	0	1683	0	0	1698	0	0	1514	0	0	1716	0
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		451.8			1668.4			459.1			765.3	
Travel Time (s)		20.3			75.1			33.1			55.1	
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
Heavy Vehicles (%)	0%	4%	2%	0%	3%	0%	0%	2%	0%	0%	2%	0%
Adj. Flow (vph)	0	123	0	5	234	0	0	0	3	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	239	0	0	3	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	26.6%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 8: Crowland Avenue & Biggar Rd

Existing <PM>
 09-28-2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	0	113	0	5	215	0	0	0	3	0	0	0
Future Volume (Veh/h)	0	113	0	5	215	0	0	0	3	0	0	0
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)	0	123	0	5	234	0	0	0	3	0	0	0
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	234			123			367	367	123	370	367	234
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	234			123			367	367	123	370	367	234
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			100	100	100	100	100	100
cM capacity (veh/h)	1345			1477			591	560	933	587	560	810
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	123	239	3	0								
Volume Left	0	5	0	0								
Volume Right	0	0	3	0								
cSH	1345	1477	933	1700								
Volume to Capacity	0.00	0.00	0.00	0.00								
Queue Length 95th (m)	0.0	0.1	0.1	0.0								
Control Delay (s)	0.0	0.2	8.9	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	0.2	8.9	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization		26.6%	ICU Level of Service	A								
Analysis Period (min)			15									

APPENDIX

E MONTROSE/BIGG AR/LYON'S CREEK EA EXCERPTS

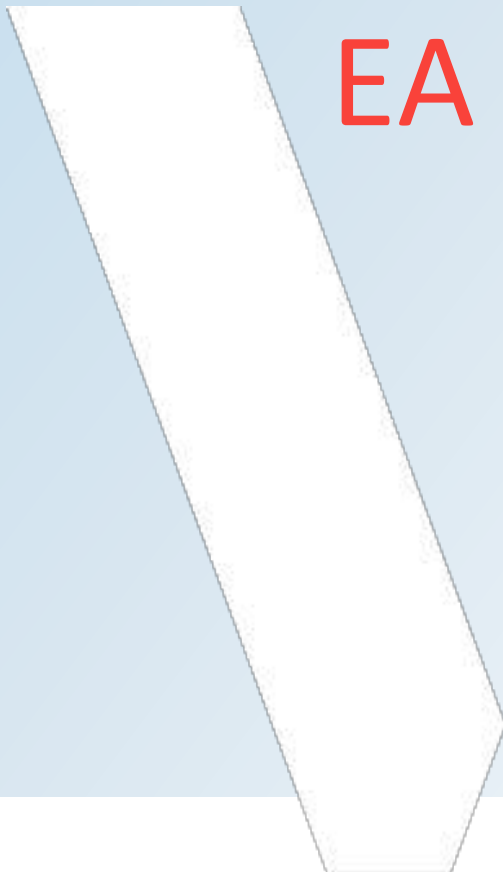
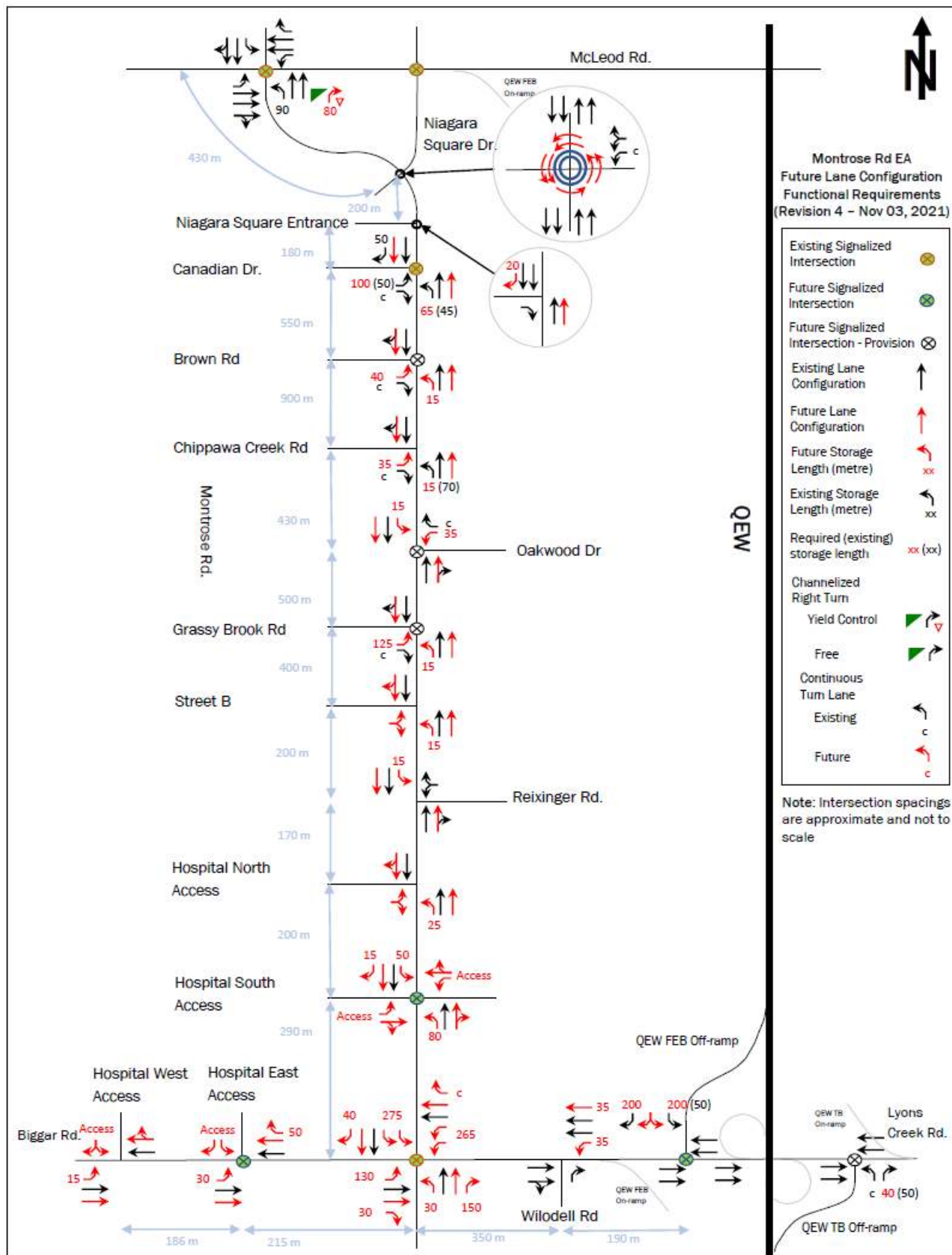


FIGURE 3-17: FUTURE LANE CONFIGURATION - REVISED FUNCTIONAL REQUIREMENTS



Queues

Future 2041 Conditions - With Improvements

1: Montrose & Biggar/Lyons Creek

AM Peak Hour - Version 4



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	264	339	343	540	695	60	351	544	267	179	162
Future Volume (vph)	264	339	343	540	695	60	351	544	267	179	162
Lane Group Flow (vph)	287	391	373	587	755	65	382	591	290	195	176
Turn Type	pm+pt	NA	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2	1	6			8		7	4	
Permitted Phases	2				Free	8		Free			4
Detector Phase	5	2	1	6		8	8		7	4	4
Switch Phase											
Minimum Initial (s)	4.0	10.0	4.0	10.0		10.0	10.0		4.0	10.0	10.0
Minimum Split (s)	8.0	26.3	9.5	26.3		31.3	31.3		9.5	31.3	31.3
Total Split (s)	13.0	27.7	16.0	30.7		31.3	31.3		15.0	46.3	46.3
Total Split (%)	14.4%	30.8%	17.8%	34.1%		34.8%	34.8%		16.7%	51.4%	51.4%
Yellow Time (s)	3.0	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Total Lost Time (s)	6.5	9.1	8.5	9.1		9.1	9.1		8.5	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	Max	Max	Max		Max	Max		Max	Max	Max
v/c Ratio	1.02	0.58	1.47	0.75	0.56	0.24	0.48	0.40	1.46	0.16	0.25
Control Delay	87.0	35.6	263.5	38.6	1.7	30.0	31.3	0.8	264.3	17.0	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	35.6	263.5	38.6	1.7	30.0	31.3	0.8	264.3	17.0	3.7
Queue Length 50th (m)	~35.4	31.7	~46.0	49.6	0.0	9.0	29.7	0.0	~35.6	10.8	0.0
Queue Length 95th (m)	#85.3	46.2	#73.0	68.0	0.0	19.9	43.2	0.0	#60.0	17.7	11.4
Internal Link Dist (m)		279.7		233.5			313.4			98.6	
Turn Bay Length (m)	30.0		30.0		30.0	30.0		30.0	30.0		30.0
Base Capacity (vph)	281	674	254	783	1343	274	797	1460	199	1229	717
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.58	1.47	0.75	0.56	0.24	0.48	0.40	1.46	0.16	0.25

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 90

Control Type: Semi Act-Uncoord

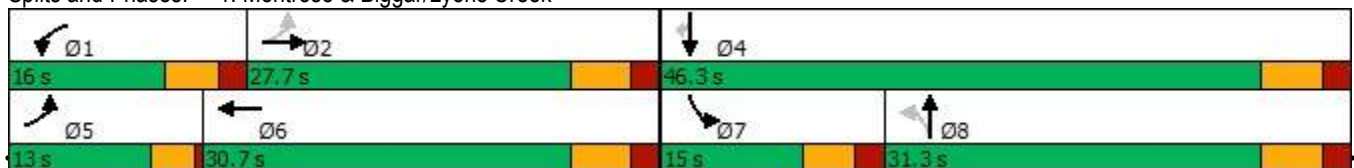
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose & Biggar/Lyons Creek



Queues
14: Lyons Creek & QEW FEB Off-Ramp

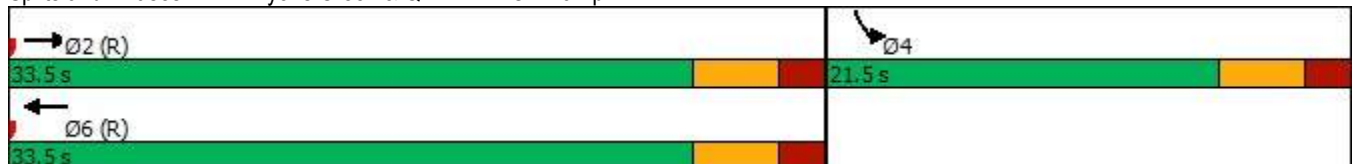


Lane Group	EBT	WBT	SBL	SBR
Lane Configurations	↑↑	↑↑	↘↘	↙
Traffic Volume (vph)	977	610	218	1029
Future Volume (vph)	977	610	218	1029
Lane Group Flow (vph)	1062	663	237	1118
Turn Type	NA	NA	Prot	Free
Protected Phases	2	6	4	
Permitted Phases				Free
Minimum Split (s)	21.5	21.5	21.5	
Total Split (s)	33.5	33.5	21.5	
Total Split (%)	60.9%	60.9%	39.1%	
Yellow Time (s)	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)	3.0	3.0	3.0	
Total Lost Time (s)	8.5	8.5	8.5	
Lead/Lag				
Lead-Lag Optimize?				
v/c Ratio	0.72	0.48	0.34	0.77
Control Delay	15.7	12.0	19.1	4.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.7	12.0	19.1	4.3
Queue Length 50th (m)	42.2	22.6	10.1	0.0
Queue Length 95th (m)	61.5	34.4	18.0	0.0
Internal Link Dist (m)	158.9	496.9	180.1	
Turn Bay Length (m)				
Base Capacity (vph)	1469	1376	694	1446
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.72	0.48	0.34	0.77

Intersection Summary

Cycle Length: 55
 Actuated Cycle Length: 55
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed

Splits and Phases: 14: Lyons Creek & QEW FEB Off-Ramp



Queues

Future 2041 Conditions - With Improvements

18: Montrose & Hospital South Access/Commercial Access

AM Peak Hour - Version 4



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↶	↷	↶	↷	↶	↷	↶	↷
Traffic Volume (vph)	6	0	14	0	455	753	43	450
Future Volume (vph)	6	0	14	0	455	753	43	450
Lane Group Flow (vph)	7	153	15	7	495	928	47	510
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		2		6	3	8	7	4
Permitted Phases	2		6		8		4	
Minimum Split (s)	21.5	21.5	21.5	21.5	8.0	21.5	8.0	21.5
Total Split (s)	21.5	21.5	21.5	21.5	22.0	35.5	8.0	21.5
Total Split (%)	33.1%	33.1%	33.1%	33.1%	33.8%	54.6%	12.3%	33.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	3.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
Total Lost Time (s)	8.5	8.5	9.5	8.5	6.5	8.5	6.5	8.5
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
v/c Ratio	0.03	0.21	0.07	0.01	0.88	0.68	0.29	0.77
Control Delay	21.3	0.6	23.0	0.0	30.5	18.2	16.1	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	0.6	23.0	0.0	30.5	18.2	16.1	34.0
Queue Length 50th (m)	0.7	0.0	1.5	0.0	33.0	44.6	2.3	30.4
Queue Length 95th (m)	3.5	0.0	5.9	0.0	#83.2	63.5	5.9	#51.0
Internal Link Dist (m)		64.2		77.5		85.9		236.0
Turn Bay Length (m)					30.0		30.0	
Base Capacity (vph)	261	734	211	475	562	1360	161	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.21	0.07	0.01	0.88	0.68	0.29	0.77

Intersection Summary

Cycle Length: 65

Actuated Cycle Length: 65

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

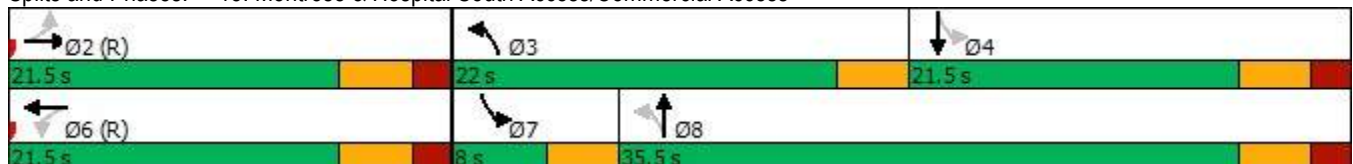
Natural Cycle: 65

Control Type: Pretimed

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 18: Montrose & Hospital South Access/Commercial Access



Queues
19: Biggar & Hospital East Access

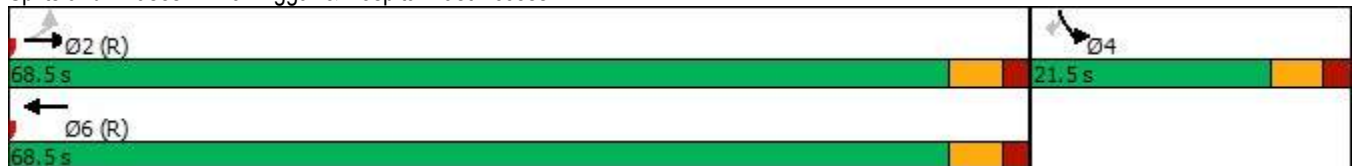


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations	↖	↕	↕	↖	↗
Traffic Volume (vph)	48	503	559	85	31
Future Volume (vph)	48	503	559	85	31
Lane Group Flow (vph)	52	547	840	92	34
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Minimum Split (s)	21.5	21.5	21.5	21.5	21.5
Total Split (s)	68.5	68.5	68.5	21.5	21.5
Total Split (%)	76.1%	76.1%	76.1%	23.9%	23.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	3.0	3.0	3.0	3.0	3.0
Total Lost Time (s)	8.5	8.5	8.5	8.5	8.5
Lead/Lag					
Lead-Lag Optimize?					
v/c Ratio	0.14	0.25	0.39	0.39	0.14
Control Delay	6.6	6.3	6.1	40.3	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	6.3	6.1	40.3	13.4
Queue Length 50th (m)	2.9	17.4	24.5	14.6	0.0
Queue Length 95th (m)	7.2	24.2	34.1	29.0	8.1
Internal Link Dist (m)		466.8	279.7	146.1	
Turn Bay Length (m)	30.0				
Base Capacity (vph)	380	2197	2151	238	242
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.14	0.25	0.39	0.39	0.14

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 45
 Control Type: Pretimed

Splits and Phases: 19: Biggar & Hospital East Access



Queues

Future 2041 Conditions - With Improvements

1: Montrose & Biggar/Lyons Creek

PM Peak Hour - Version 4



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↕	↙↕	↕↕	↙	↙	↕↕	↙	↙↕	↕↕	↙
Traffic Volume (vph)	210	490	706	516	344	31	289	493	694	499	259
Future Volume (vph)	210	490	706	516	344	31	289	493	694	499	259
Lane Group Flow (vph)	228	597	767	561	374	34	314	536	754	542	282
Turn Type	pm+pt	NA	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2	1	6			8		7	4	
Permitted Phases	2				Free	8		Free			4
Detector Phase	5	2	1	6		8	8		7	4	4
Switch Phase											
Minimum Initial (s)	4.0	10.0	8.0	10.0		10.0	10.0		8.0	10.0	10.0
Minimum Split (s)	8.0	26.3	13.5	26.3		31.3	31.3		13.5	31.3	31.3
Total Split (s)	27.0	34.7	41.0	48.7		31.3	31.3		38.0	69.3	69.3
Total Split (%)	18.6%	23.9%	28.3%	33.6%		21.6%	21.6%		26.2%	47.8%	47.8%
Yellow Time (s)	3.0	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.2	2.0	2.2		2.2	2.2		2.0	2.2	2.2
Lost Time Adjust (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Total Lost Time (s)	6.5	9.3	8.5	9.3		9.3	9.3		8.5	9.3	9.3
Lead/Lag	Lead	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	Max	Max	Max		Max	Max		Max	Max	Max
v/c Ratio	0.71	1.07	1.23	0.56	0.27	0.28	0.65	0.37	1.19	0.44	0.38
Control Delay	39.2	114.0	163.0	44.9	0.5	61.6	64.8	0.7	151.1	31.9	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	114.0	163.0	44.9	0.5	61.6	64.8	0.7	151.1	31.9	9.5
Queue Length 50th (m)	38.9	~99.1	~139.5	70.5	0.0	8.8	45.2	0.0	~134.4	58.1	13.2
Queue Length 95th (m)	57.6	#137.2	#178.8	95.5	0.0	20.2	61.6	0.0	#173.4	74.4	34.6
Internal Link Dist (m)		279.7		233.5			313.4			90.5	
Turn Bay Length (m)	30.0		30.0		30.0	30.0		30.0	30.0		30.0
Base Capacity (vph)	389	556	624	1002	1380	120	485	1446	631	1235	743
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	1.07	1.23	0.56	0.27	0.28	0.65	0.37	1.19	0.44	0.38

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Natural Cycle: 145

Control Type: Semi Act-Uncoord

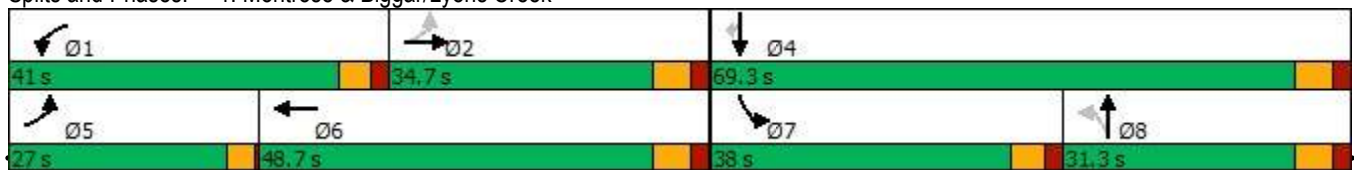
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose & Biggar/Lyons Creek



Queues
14: Lyons Creek & QEW FEB Off-Ramp

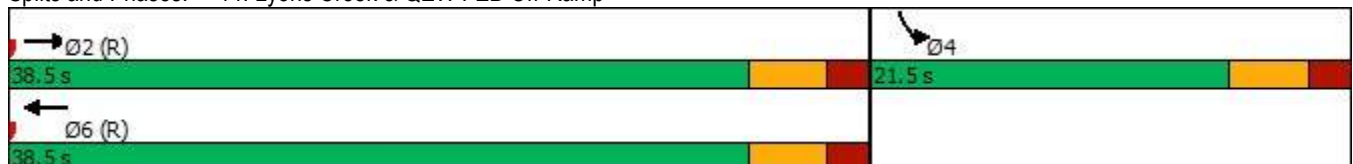


Lane Group	EBT	WBT	SBL	SBR
Lane Configurations	↑↑	↑↑	↘↘	↙
Traffic Volume (vph)	1346	605	494	1047
Future Volume (vph)	1346	605	494	1047
Lane Group Flow (vph)	1463	658	537	1138
Turn Type	NA	NA	Prot	Free
Protected Phases	2	6	4	
Permitted Phases				Free
Minimum Split (s)	21.5	21.5	21.5	
Total Split (s)	38.5	38.5	21.5	
Total Split (%)	64.2%	64.2%	35.8%	
Yellow Time (s)	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	
Lost Time Adjust (s)	3.0	3.0	3.0	
Total Lost Time (s)	8.5	8.5	8.5	
Lead/Lag				
Lead-Lag Optimize?				
v/c Ratio	0.90	0.42	0.79	0.77
Control Delay	23.1	10.6	32.8	4.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.1	10.6	32.8	4.0
Queue Length 50th (m)	70.7	22.2	28.9	0.0
Queue Length 95th (m)	#116.9	33.0	#49.9	0.0
Internal Link Dist (m)	158.9	496.9	180.1	
Turn Bay Length (m)			70.0	
Base Capacity (vph)	1632	1556	679	1475
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.42	0.79	0.77

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 14: Lyons Creek & QEW FEB Off-Ramp



Queues

Future 2041 Conditions - With Improvements

18: Montrose & Hospital South Access/Commercial Access

PM Peak Hour - Version 4

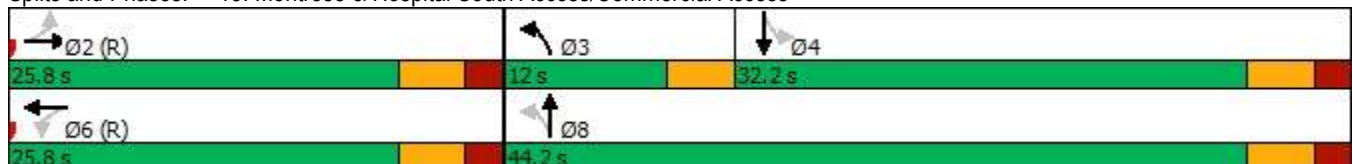


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↗	↘	↗	↘	↗	↕	↗	↕
Traffic Volume (vph)	17	0	91	0	180	646	8	982
Future Volume (vph)	17	0	91	0	180	646	8	982
Lane Group Flow (vph)	18	415	99	42	196	723	9	1075
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		2		6	3	8		4
Permitted Phases	2		6		8		4	
Minimum Split (s)	21.5	21.5	21.5	21.5	8.0	21.5	21.5	21.5
Total Split (s)	25.8	25.8	25.8	25.8	12.0	44.2	32.2	32.2
Total Split (%)	36.9%	36.9%	36.9%	36.9%	17.1%	63.1%	46.0%	46.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
Lost Time Adjust (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total Lost Time (s)	8.5	8.5	8.5	8.5	6.5	8.5	8.5	8.5
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
v/c Ratio	0.06	0.73	0.77	0.08	0.84	0.43	0.04	0.96
Control Delay	20.9	17.2	65.7	0.3	42.8	11.7	16.4	44.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	17.2	65.7	0.3	42.8	11.7	16.4	44.2
Queue Length 50th (m)	1.8	15.3	12.1	0.0	12.4	28.8	0.8	71.4
Queue Length 95th (m)	6.3	#54.4	#36.2	0.0	#43.1	40.7	3.6	#112.1
Internal Link Dist (m)		64.2		77.5		94.1		236.0
Turn Bay Length (m)			60.0		30.0		30.0	
Base Capacity (vph)	312	571	128	499	234	1677	221	1115
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.73	0.77	0.08	0.84	0.43	0.04	0.96

Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 18: Montrose & Hospital South Access/Commercial Access



Queues
19: Biggar & Hospital East Access

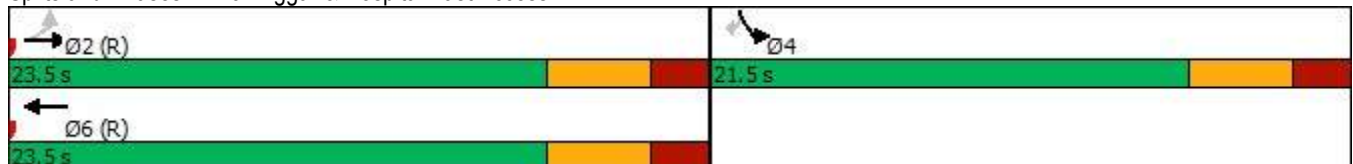


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations	↖	↕	↕	↖	↗
Traffic Volume (vph)	19	596	649	187	85
Future Volume (vph)	19	596	649	187	85
Lane Group Flow (vph)	21	648	796	203	92
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Minimum Split (s)	21.5	21.5	21.5	21.5	21.5
Total Split (s)	23.5	23.5	23.5	21.5	21.5
Total Split (%)	52.2%	52.2%	52.2%	47.8%	47.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	3.0	3.0	3.0	3.0	3.0
Total Lost Time (s)	8.5	8.5	8.5	8.5	8.5
Lead/Lag					
Lead-Lag Optimize?					
v/c Ratio	0.11	0.59	0.72	0.43	0.19
Control Delay	12.2	15.1	17.3	16.4	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	15.1	17.3	16.4	7.0
Queue Length 50th (m)	1.1	21.5	26.7	12.7	1.5
Queue Length 95th (m)	4.6	34.1	42.2	26.4	8.8
Internal Link Dist (m)		466.8	279.7	146.1	
Turn Bay Length (m)	30.0				
Base Capacity (vph)	195	1098	1102	476	472
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.59	0.72	0.43	0.19

Intersection Summary

Cycle Length: 45
 Actuated Cycle Length: 45
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 45
 Control Type: Pretimed

Splits and Phases: 19: Biggar & Hospital East Access

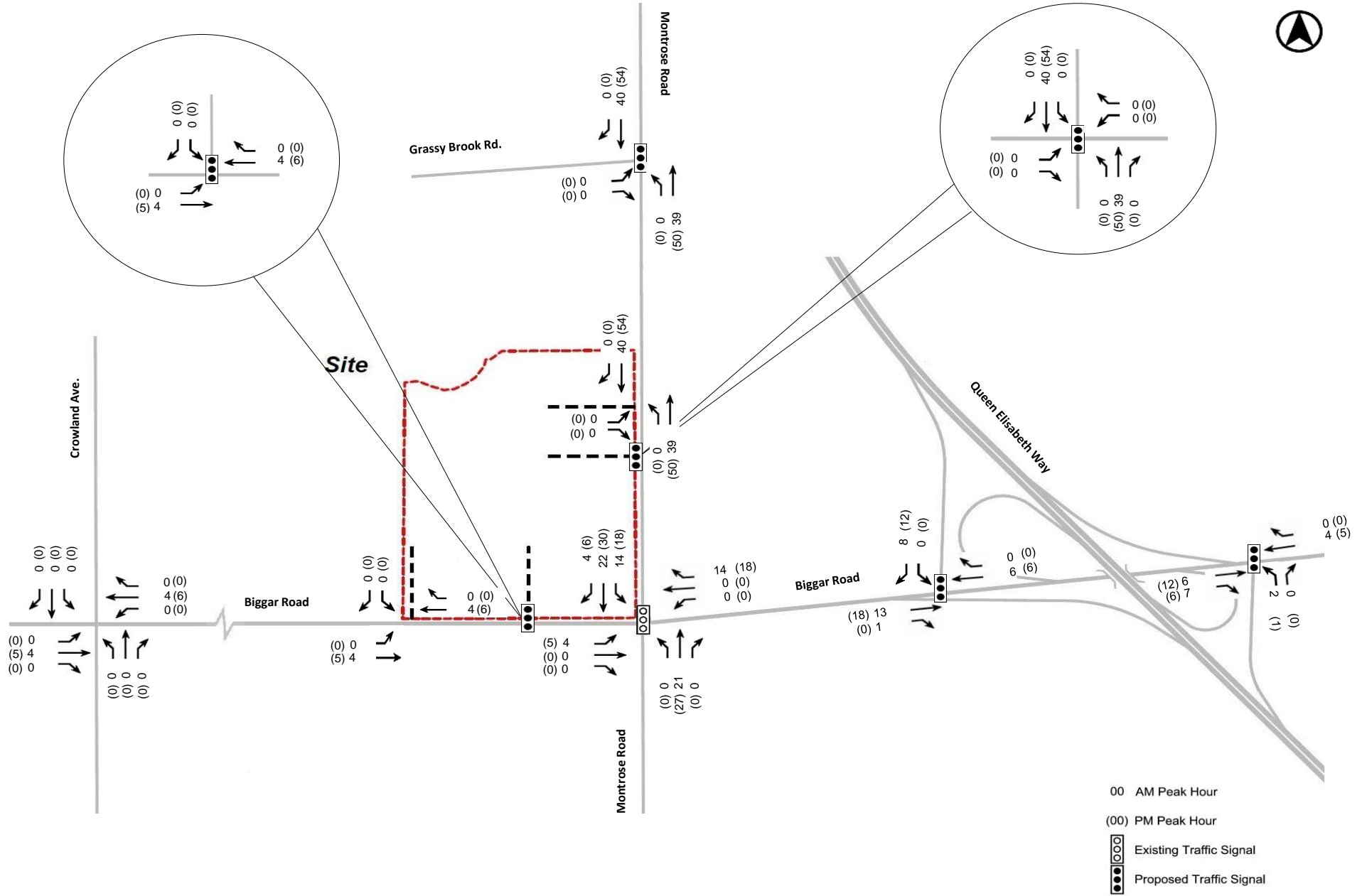


APPENDIX



F

BACKGROUND
DEVELOPMENT
DETAILS



Warren Woods Development

Date Plotted: 4/1/06 Filename: G:\01\ENR\BIBL\LA\TOD\B5\01 BA_Group\7018-10 Niagara Hospital\Graphics\Fig07-00-EX.dwg

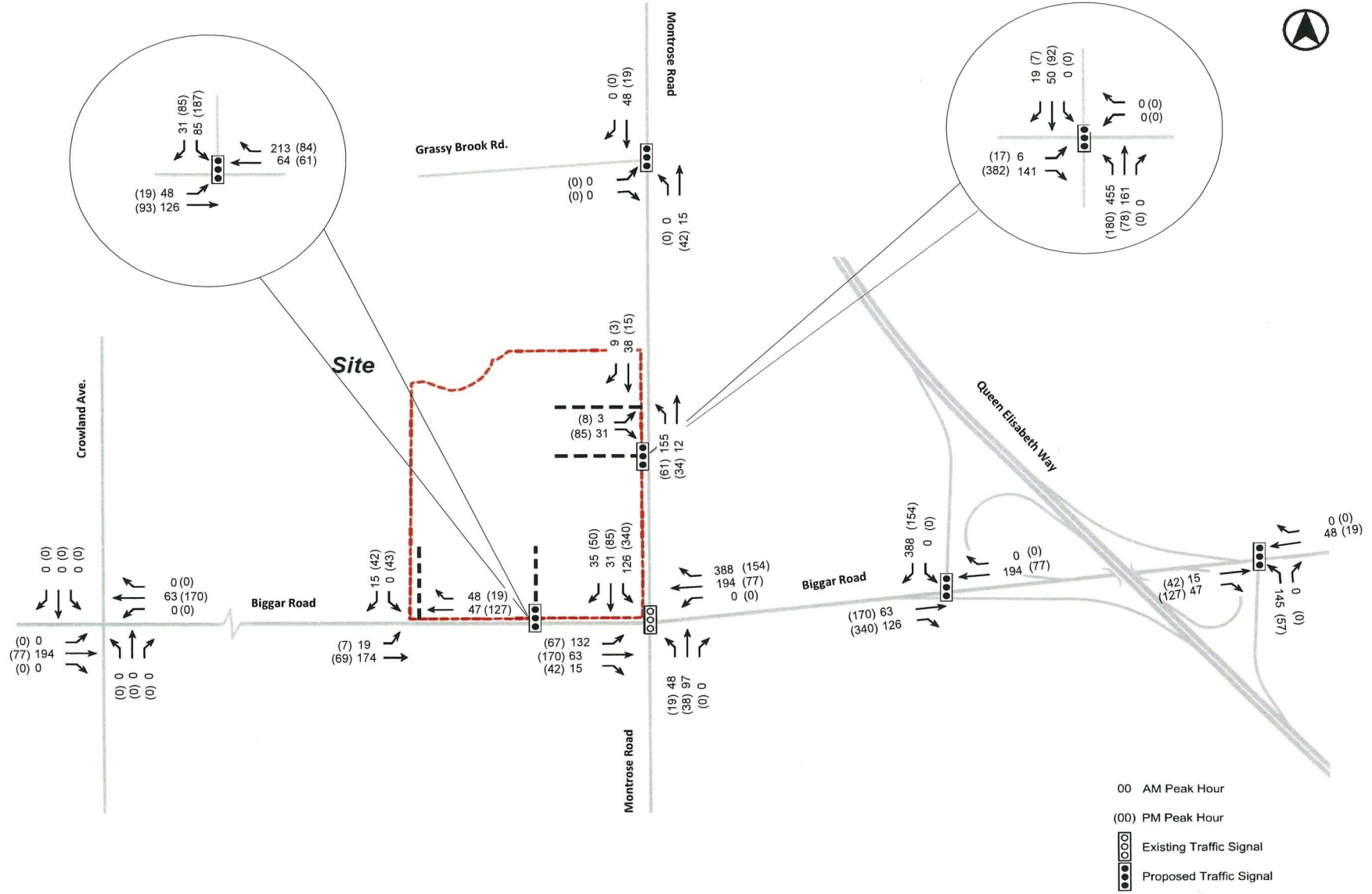
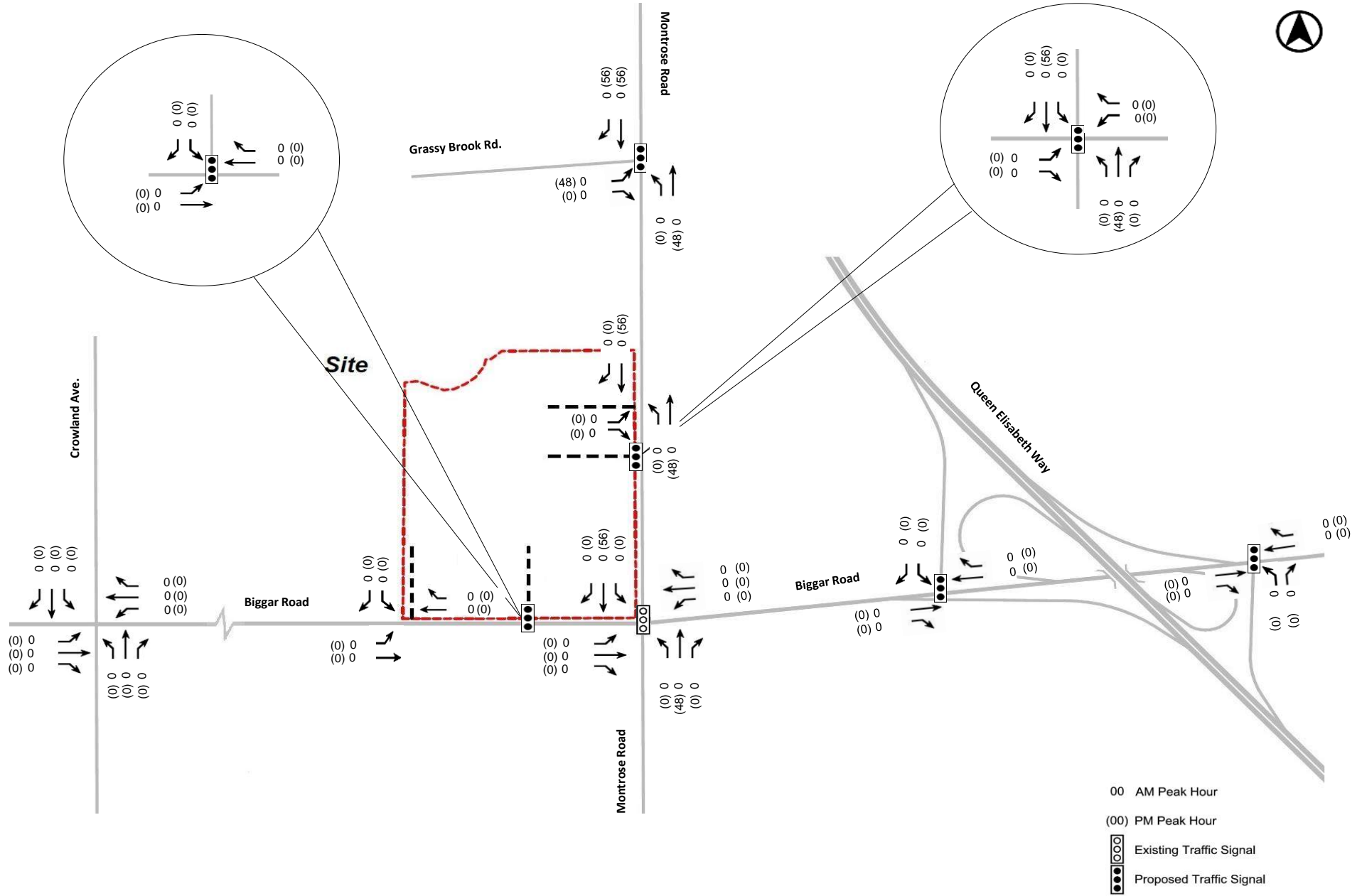
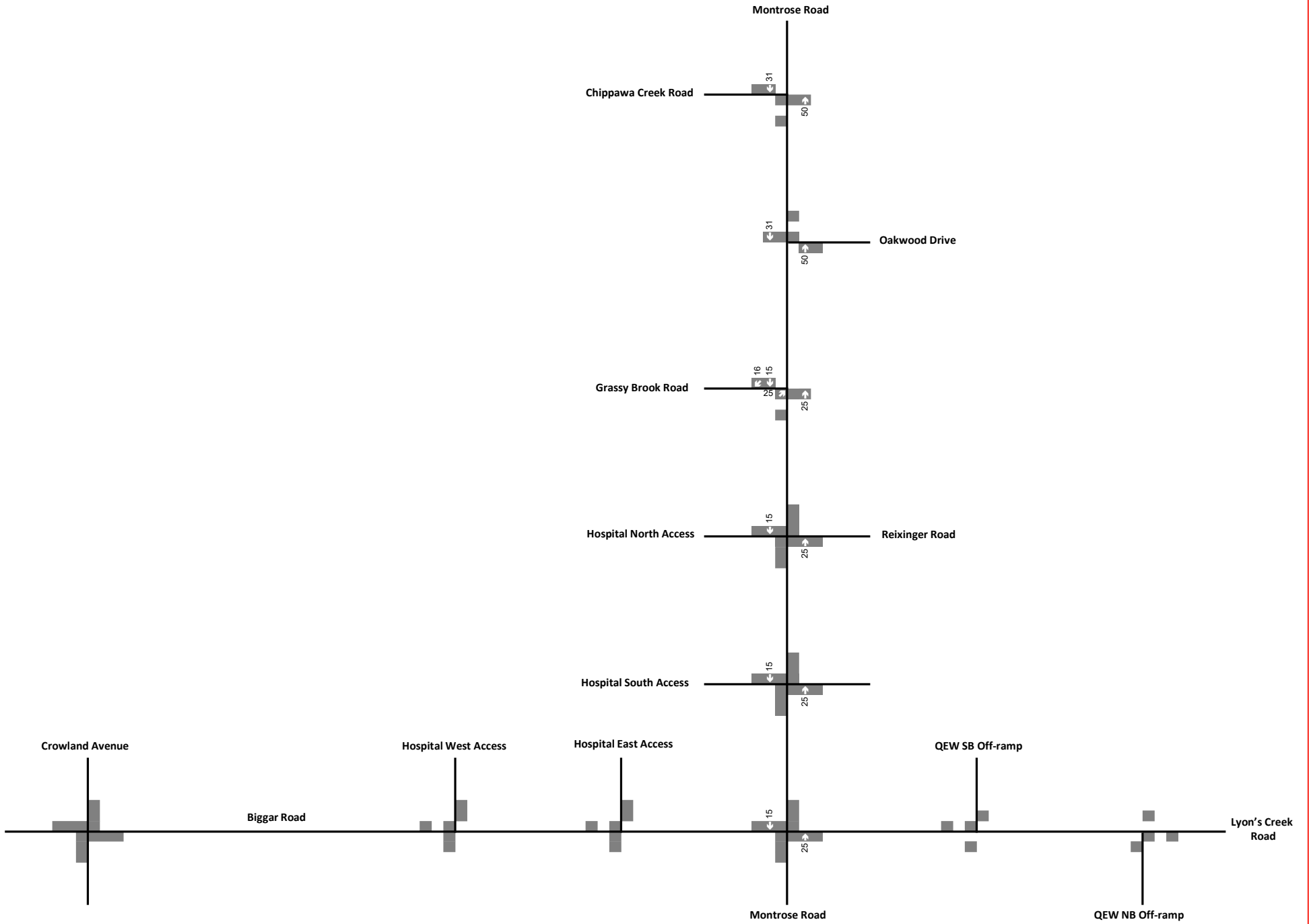


FIGURE VIII: SITE TRAFFIC VOLUMES





Legend
 xx A.M. Peak Hour Traffic Volumes
 ((xx)) P.M. Peak Hour Traffic Volumes

Figure X
 Niagara Square Site Impact
 (AM Peak)

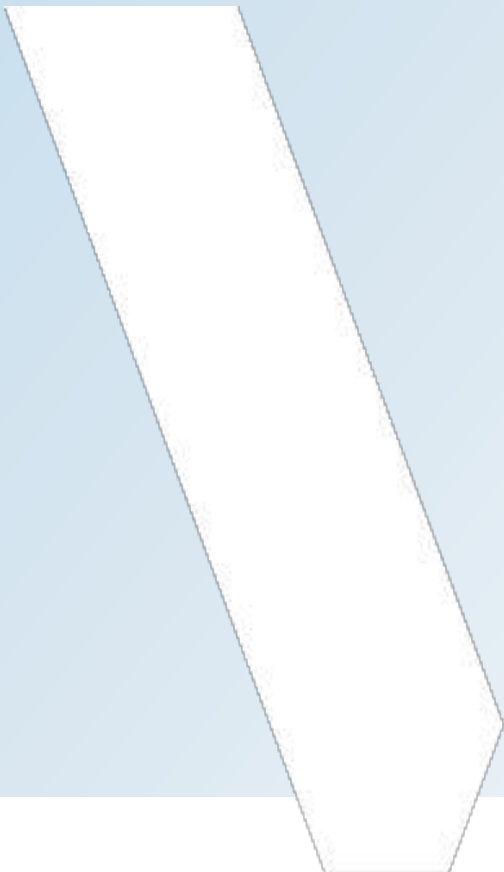
APPENDIX

G FUTURE BACKGROUND TRAFFIC CONDITIONS



APPENDIX

2031 HORIZON



Lanes, Volumes, Timings

Future Background_2031<AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	204	18	321	358	502	52	349	509	200	147	57
Future Volume (vph)	173	204	18	321	358	502	52	349	509	200	147	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1271	3043	3228	1444	1599	3228	1458	2959	3167	1430
Fit Permitted	0.522			0.950			0.651			0.950		
Satd. Flow (perm)	887	3260	1271	3043	3228	1444	1095	3228	1458	2959	3167	1430
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162			546			553			112
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	3%	2%	17%	6%	3%	3%	4%	3%	2%	9%	5%	4%
Adj. Flow (vph)	188	222	20	349	389	546	57	379	553	217	160	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	188	222	20	349	389	546	57	379	553	217	160	62
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0						0.0	
Detector 2 Size(m)		0.0			0.0						0.0	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

Future Background_2031<AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2							Free	8	8
Detector Phase	5	2	2	1	6					Free	7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	20.0	34.0	34.0	30.0	44.0		34.0	34.0			22.0	56.0
Total Split (%)	16.7%	28.3%	28.3%	25.0%	36.7%		28.3%	28.3%			18.3%	46.7%
Maximum Green (s)	16.5	27.7	27.7	24.5	37.7		27.7	27.7			16.5	49.7
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max			Max	Max
Walk Time (s)		8.0	8.0		8.0			10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0			15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effect Green (s)	46.3	30.6	30.6	17.9	37.7		116.4	27.7		27.7	116.4	49.7
Actuated g/C Ratio	0.40	0.26	0.26	0.15	0.32		1.00	0.24		0.24	1.00	0.14
v/c Ratio	0.44	0.26	0.04	0.75	0.37		0.38	0.22		0.49	0.38	0.52
Control Delay	21.2	35.7	0.2	57.2	31.9		0.8	39.4		41.3	0.8	51.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	21.2	35.7	0.2	57.2	31.9		0.8	39.4		41.3	0.8	51.7
LOS	C	D	A	E	C		A	D		D	A	D
Approach Delay		27.7			25.5			18.5				33.3
Approach LOS		C			C			B				C
Queue Length 50th (m)	25.3	22.2	0.0	41.8	37.7		0.0	11.1		41.6	0.0	25.2
Queue Length 95th (m)	40.5	35.3	0.0	56.9	54.0		0.0	24.2		59.5	0.0	39.3
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0			150.0	275.0	40.0
Base Capacity (vph)	483	858	453	640	1045		1444	768		1458	419	1352
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.39	0.26	0.04	0.55	0.37		0.38	0.22		0.49	0.38	0.52
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	116.4											
Natural Cycle:	90											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.75											
Intersection Signal Delay:	24.7						Intersection LOS: C					
Intersection Capacity Utilization:	56.9%						ICU Level of Service B					
Analysis Period (min)	15											

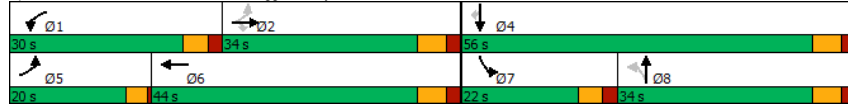
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2031<AM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

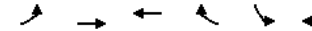


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2031<AM>

01-31-2023



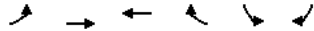
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↑
Traffic Volume (vph)	0	744	478	0	170	712
Future Volume (vph)	0	744	478	0	170	712
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.899	0.850
Flt Protected					0.984	
Satd. Flow (prot)	0	3197	2995	0	2776	1302
Flt Permitted					0.984	
Satd. Flow (perm)	0	3197	2995	0	2776	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					315	387
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	809	520	0	185	774
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	809	520	0	572	387
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2031<AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

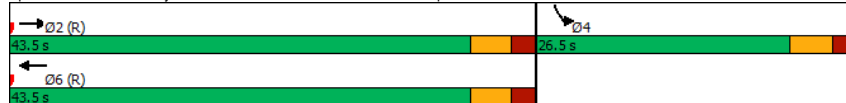


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.47	0.32			0.54	0.30
Control Delay	10.9	9.5			11.0	0.6
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	10.9	9.5			11.0	0.6
LOS	B	A			B	A
Approach Delay	10.9	9.5			6.8	
Approach LOS	B	A			A	
Queue Length 50th (m)	33.0	19.2			13.9	0.0
Queue Length 95th (m)	46.3	28.3			27.8	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			1053	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.47	0.32			0.54	0.30

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.54
 Intersection Signal Delay: 8.9 Intersection LOS: A
 Intersection Capacity Utilization 49.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2031<AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	451	0	0	302	208	51
Future Volume (vph)	451	0	0	302	208	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Fit Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	490	0	0	328	226	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	490	0	0	328	226	55
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 32.7% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2031<AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	451	0	0	302	208	51
Future Volume (Veh/h)	451	0	0	302	208	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)	490	0	0	328	226	55
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			490		655	245
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			490		655	245
tC, single (s)			4.1		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		41	93
cM capacity (veh/h)			1070		381	752
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	245	245	164	164	226	55
Volume Left	0	0	0	0	226	0
Volume Right	0	0	0	0	0	55
cSH	1700	1700	1700	1700	381	752
Volume to Capacity	0.14	0.14	0.10	0.10	0.59	0.07
Queue Length 95th (m)	0.0	0.0	0.0	0.0	29.4	1.9
Control Delay (s)	0.0	0.0	0.0	0.0	27.3	10.2
Lane LOS					D	B
Approach Delay (s)	0.0		0.0		24.0	
Approach LOS					C	
Intersection Summary						
Average Delay			6.1			
Intersection Capacity Utilization			32.7%		ICU Level of Service A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2031<AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	
Traffic Volume (vph)	68	35	32	235	295	73
Future Volume (vph)	68	35	32	235	295	73
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.970	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	2961	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	2961	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	74	38	35	255	321	79
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	38	35	255	400	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 28.8%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2031<AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	68	35	32	235	295	73	
Future Volume (Veh/h)	68	35	32	235	295	73	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	74	38	35	255	321	79	
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	558	200	400				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	558	200	400				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	81	95	96				
cM capacity (veh/h)	394	814	990				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	74	38	35	128	128	214	186
Volume Left	74	0	35	0	0	0	0
Volume Right	0	38	0	0	0	0	79
cSH	394	814	990	1700	1700	1700	1700
Volume to Capacity	0.19	0.05	0.04	0.07	0.07	0.13	0.11
Queue Length 95th (m)	5.5	1.2	0.9	0.0	0.0	0.0	0.0
Control Delay (s)	16.2	9.6	8.8	0.0	0.0	0.0	0.0
Lane LOS	C	A	A				
Approach Delay (s)	14.0	1.1		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay	2.3						
Intersection Capacity Utilization	28.8%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2031<AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↔	↔	↕↕
Traffic Volume (vph)	61	11	283	113	22	310
Future Volume (vph)	61	11	283	113	22	310
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1	0	1		
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.957			
Fit Protected	0.950			0.950		
Satd. Flow (prot)	1498	1316	2970	0	1409	2995
Fit Permitted	0.950					
Satd. Flow (perm)	1498	1316	2970	0	1409	2995
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	66	12	308	123	24	337
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	12	431	0	24	337
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15	25		
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 29.4%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2031<AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕	↔	↔	↕↕	
Traffic Volume (veh/h)	61	11	283	113	22	310	
Future Volume (Veh/h)	61	11	283	113	22	310	
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)	66	12	308	123	24	337	
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	586	216			431		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	586	216			431		
tC, single (s)	7.0	7.2			4.5		
tC, 2 stage (s)							
tF (s)	3.6	3.4			2.4		
p0 queue free %	84	98			98		
cM capacity (veh/h)	411	756			1019		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	66	12	205	226	24	168	168
Volume Left	66	0	0	0	24	0	0
Volume Right	0	12	0	123	0	0	0
cSH	411	756	1700	1700	1019	1700	1700
Volume to Capacity	0.16	0.02	0.12	0.13	0.02	0.10	0.10
Queue Length 95th (m)	4.5	0.4	0.0	0.0	0.6	0.0	0.0
Control Delay (s)	15.4	9.8	0.0	0.0	8.6	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	14.6		0.0		0.6		
Approach LOS	B						
Intersection Summary							
Average Delay			1.5				
Intersection Capacity Utilization			29.4%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2031<AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	36	2	8	363	300	29
Future Volume (vph)	36	2	8	363	300	29
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.987	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2911	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2911	0
Link Speed (k/h)	40		70	70		
Link Distance (m)	1651.3		627.8	493.4		
Travel Time (s)	148.6		32.3	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	39	2	9	395	326	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	2	9	395	358	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 20.9%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2031<AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	36	2	8	363	300	29	
Future Volume (Veh/h)	36	2	8	363	300	29	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	39	2	9	395	326	32	
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	558	179	358				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	558	179	358				
tC, single (s)	7.1	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.6	3.3	2.2				
p0 queue free %	91	100	99				
cM capacity (veh/h)	431	839	1212				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	39	2	9	198	198	217	141
Volume Left	39	0	9	0	0	0	0
Volume Right	0	2	0	0	0	0	32
cSH	431	839	1212	1700	1700	1700	1700
Volume to Capacity	0.09	0.00	0.01	0.12	0.12	0.13	0.08
Queue Length 95th (m)	2.4	0.1	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	14.2	9.3	8.0	0.0	0.0	0.0	0.0
Lane LOS	B	A	A				
Approach Delay (s)	13.9	0.2		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization			20.9%		ICU Level of Service A		
Analysis Period (min)			15				

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2031<AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	31	2	0	2	155	419	2	2	249	9
Future Volume (vph)	3	0	31	2	0	2	155	419	2	2	249	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.932			0.999			0.995	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	3	0	34	2	0	2	168	455	2	2	271	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	4	0	168	457	0	2	281	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 30.4%	ICU Level of Service A											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2031<AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔			↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	3	0	31	2	0	2	155	419	2	2	249	9
Future Volume (Veh/h)	3	0	31	2	0	2	155	419	2	2	249	9
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)	3	0	34	2	0	2	168	455	2	2	271	10
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	0.97	0.97		0.97	0.97	0.97				0.97		
vC, conflicting volume	846	1073	140	966	1077	228	281			457		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	783	1017	140	906	1021	148	281			383		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	99	100	96	99	100	100	87			100		
cM capacity (veh/h)	247	199	882	196	198	854	1278			1153		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	3	34	4	168	303	154	2	181	100			
Volume Left	3	0	2	168	0	0	2	0	0			
Volume Right	0	34	2	0	0	2	0	0	10			
cSH	247	882	319	1278	1700	1700	1153	1700	1700			
Volume to Capacity	0.01	0.04	0.01	0.13	0.18	0.09	0.00	0.11	0.06			
Queue Length 95th (m)	0.3	1.0	0.3	3.6	0.0	0.0	0.0	0.0	0.0			
Control Delay (s)	19.7	9.2	16.4	8.2	0.0	0.0	8.1	0.0	0.0			
Lane LOS	C	A	C	A	A			A				
Approach Delay (s)	10.1		16.4	2.2	0.1							
Approach LOS	B		C	A								
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			30.4%		ICU Level of Service			A				
Analysis Period (min)			15									

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2031<AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	373	0	7	252	2	14
Future Volume (vph)	373	0	7	252	2	14
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.881					
Fit Protected				0.999	0.994	
Satd. Flow (prot)	1651	0	0	1620	1408	0
Fit Permitted				0.999	0.994	
Satd. Flow (perm)	1651	0	0	1620	1408	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	405	0	8	274	2	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	405	0	0	282	17	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 31.3%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2031<AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	373	0	7	252	2	14
Future Volume (Veh/h)	373	0	7	252	2	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)	405	0	8	274	2	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			405		695	405
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			405		695	405
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			99		100	98
cM capacity (veh/h)			976		408	629
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	405	282	17			
Volume Left	0	8	2			
Volume Right	0	0	15			
cSH	1700	976	591			
Volume to Capacity	0.24	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.7			
Control Delay (s)	0.0	0.3	11.3			
Lane LOS	A		B			
Approach Delay (s)	0.0	0.3	11.3			
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			31.3%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Background_2031<AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Traffic Volume (vph)	6	0	141	0	0	0	455	568	0	0	261	19
Future Volume (vph)	6	0	141	0	0	0	455	568	0	0	261	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0		0.0		30.0		0.0		80.0	
Storage Lanes	1		0		1		0		1		0	
Taper Length (m)	7.5		7.5		7.5		15.0		15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit	0.850										0.850	
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.453					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	777	3228	0	1716	3167	1458
Right Turn on Red			Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	685										109	
Link Speed (k/h)	50				50		80				80	
Link Distance (m)	101.3				60.9		348.2				226.1	
Travel Time (s)	7.3				4.4		15.7				10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	5%	2%
Adj. Flow (vph)	7	0	153	0	0	0	495	617	0	0	284	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	617	0	0	284	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		7.2				7.2	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Turn Type	Perm		NA		Perm		pm+pt		NA		Perm	
Protected Phases	4		4		8		5		2		6	
Permitted Phases	4		8		8		2		6		6	
Minimum Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	13.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	27.0	52.5	25.5	25.5	25.5	25.5
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	33.8%	65.6%	31.9%	31.9%	31.9%	31.9%
Maximum Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	21.5	47.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag							Lead		Lag		Lag	
Lead-Lag Optimize?							Yes		Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effct Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	47.0	47.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.59	0.59	0.25	0.25	0.25	0.25

Lanes, Volumes, Timings

Future Background_2031<AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.17					0.72	0.33			0.36	0.05
Control Delay	21.5	0.4					16.9	9.0			26.3	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.4					16.9	9.0			26.3	0.2
LOS	C	A					B	A			C	A
Approach Delay		1.3						12.5			24.5	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					42.6	24.0			19.7	0.0
Queue Length 95th (m)	3.8	0.0					68.0	33.7			30.8	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	897					685	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.17					0.72	0.33			0.36	0.05

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 13.7

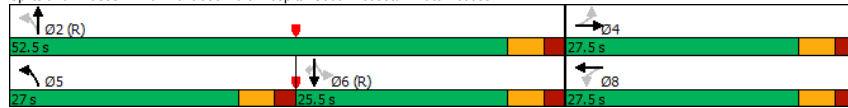
Intersection LOS: B

Intersection Capacity Utilization 58.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

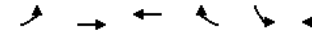


Lanes, Volumes, Timings

Future Background_2031<AM>

11: Biggar Rd & Hospital East Access

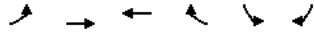
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↓	↓
Traffic Volume (vph)	48	311	254	213	85	31
Future Volume (vph)	48	311	254	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Fr				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3197	1458	1630	1458
Fit Permitted	0.582				0.950	
Satd. Flow (perm)	999	3228	3197	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	338	276	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	338	276	232	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	41.0	41.0	41.0	41.0	29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%	58.6%	41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2031<AM>
01-31-2023

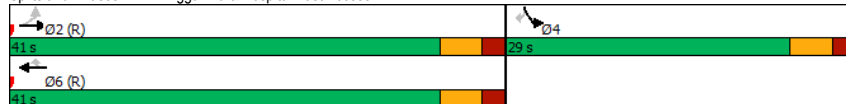


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.10	0.21	0.17	0.27	0.17	0.07
Control Delay	9.7	9.9	9.7	2.4	17.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	9.9	9.7	2.4	17.5	6.6
LOS	A	A	A	A	B	A
Approach Delay	9.9		6.3		14.5	
Approach LOS	A		A		B	
Queue Length 50th (m)	3.5	12.5	10.0	0.0	8.8	0.0
Queue Length 95th (m)	8.9	19.7	16.3	9.7	18.8	5.6
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	506	1637	1621	853	547	512
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.21	0.17	0.27	0.17	0.07

Intersection Summary

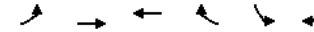
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.27
 Intersection Signal Delay: 8.7
 Intersection LOS: A
 Intersection Capacity Utilization 37.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2031<AM>
01-31-2023



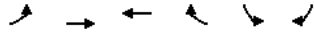
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	
Traffic Volume (vph)	19	359	237	48	0	15
Future Volume (vph)	19	359	237	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.975	0.865		
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3127	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3127	0	1484	0
Link Speed (k/h)	80		80	50		
Link Distance (m)	413.8		365.4	157.5		
Travel Time (s)	18.6		16.4	11.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	390	258	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	390	310	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6	3.6		
Link Offset(m)	0.0		0.0	0.0		
Crosswalk Width(m)	4.8		4.8	4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control	Free		Free	Stop		

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 25.4%
 ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
 12: Biggar Rd & Hospital West Access

Future Background_2031<AM>
 01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕		↕	
Traffic Volume (veh/h)	19	359	237	48	0	15
Future Volume (Veh/h)	19	359	237	48	0	15
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)	21	390	258	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			365			
pX, platoon unblocked						
vC, conflicting volume	310				521	155
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	310				521	155
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	98
cM capacity (veh/h)	1247				477	863
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	195	195	172	138	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1247	1700	1700	1700	1700	863
Volume to Capacity	0.02	0.11	0.11	0.10	0.08	0.02
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	7.9	0.0	0.0	0.0	0.0	9.2
Lane LOS	A					A
Approach Delay (s)	0.4			0.0		9.2
Approach LOS						A
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			25.4%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Background_2031 <PM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	312	46	444	307	245	25	299	487	533	407	103
Future Volume (vph)	89	312	46	444	307	245	25	299	487	533	407	103
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	3260	1430	3162	3260	1417	1599	3228	1444	3131	3260	1473
Fit Permitted	0.550			0.950			0.496			0.950		
Satd. Flow (perm)	953	3260	1430	3162	3260	1417	835	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			266			529			112
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	1%	2%	4%	2%	2%	5%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	97	339	50	483	334	266	27	325	529	579	442	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	339	50	483	334	266	27	325	529	579	442	112
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)												
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

Future Background_2031 <PM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	11.0	33.6	33.6	37.0	59.6		31.4	31.4			43.0	74.4
Total Split (%)	7.6%	23.2%	23.2%	25.5%	41.1%		21.7%	21.7%			29.7%	51.3%
Maximum Green (s)	7.5	27.3	27.3	31.5	53.3		25.1	25.1			37.5	68.1
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	42.3	32.2	32.2	26.4	53.3	144.8	25.1	25.1	144.8	37.5	68.1	68.1
Actuated g/C Ratio	0.29	0.22	0.22	0.18	0.37	1.00	0.17	0.17	1.00	0.26	0.47	0.47
v/c Ratio	0.31	0.47	0.12	0.84	0.28	0.19	0.19	0.58	0.37	0.71	0.29	0.15
Control Delay	28.5	52.3	0.6	70.3	33.1	0.3	55.2	59.8	0.7	54.6	24.2	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	52.3	0.6	70.3	33.1	0.3	55.2	59.8	0.7	54.6	24.2	4.1
LOS	C	D	A	E	C	A	E	E	A	D	C	A
Approach Delay		42.2			41.6			24.2				37.7
Approach LOS		D			D			C				D
Queue Length 50th (m)	16.5	47.3	0.0	73.2	37.2	0.0	7.1	48.1	0.0	82.6	42.4	0.0
Queue Length 95th (m)	28.3	66.6	0.0	90.6	50.4	0.0	17.3	65.4	0.0	104.4	55.2	11.1
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0	150.0		275.0		40.0
Base Capacity (vph)	315	724	422	687	1199	1417	144	559	1444	810	1533	752
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.47	0.12	0.70	0.28	0.19	0.19	0.58	0.37	0.71	0.29	0.15
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	144.8											
Natural Cycle:	110											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.84											
Intersection Signal Delay:	36.2						Intersection LOS: D					
Intersection Capacity Utilization:	68.3%						ICU Level of Service C					
Analysis Period (min)	15											

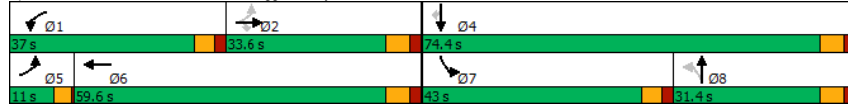
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2031 <PM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd



Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2031 <PM>

01-31-2023

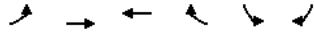
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↓↓
Traffic Volume (vph)	0	948	409	0	279	535
Future Volume (vph)	0	948	409	0	279	535
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.927	0.850
Flt Protected					0.975	
Satd. Flow (prot)	0	3197	3197	0	2962	1327
Flt Permitted					0.975	
Satd. Flow (perm)	0	3197	3197	0	2962	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					291	291
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1030	445	0	303	582
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1030	445	0	594	291
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2031 <PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

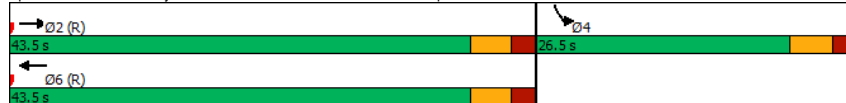


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.59	0.26			0.54	0.22
Control Delay	12.6	9.0			12.2	0.4
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	12.6	9.0			12.2	0.4
LOS	B	A			B	A
Approach Delay	12.6	9.0			8.3	
Approach LOS	B	A			A	
Queue Length 50th (m)	46.3	15.7			16.6	0.0
Queue Length 95th (m)	64.0	23.6			31.0	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			1092	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.59	0.26			0.54	0.22

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 10.3 Intersection LOS: B
 Intersection Capacity Utilization 55.1% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2031 <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	656	0	0	386	106	60
Future Volume (vph)	656	0	0	386	106	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1363	1352
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	713	0	0	420	115	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	713	0	0	420	115	65
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 32.7% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2031 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	656	0	0	386	106	60
Future Volume (Veh/h)	656	0	0	386	106	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)	713	0	0	420	115	65
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			713		924	356
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			713		924	356
tC, single (s)			4.1		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			100		51	89
cM capacity (veh/h)			883		234	617
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	356	356	210	210	115	65
Volume Left	0	0	0	0	115	0
Volume Right	0	0	0	0	0	65
cSH	1700	1700	1700	1700	234	617
Volume to Capacity	0.21	0.21	0.12	0.12	0.49	0.11
Queue Length 95th (m)	0.0	0.0	0.0	0.0	19.9	2.8
Control Delay (s)	0.0	0.0	0.0	0.0	34.4	11.5
Lane LOS					D	B
Approach Delay (s)	0.0		0.0		26.1	
Approach LOS					D	
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			32.7%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2031 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	50	44	44	431	474	51
Future Volume (vph)	50	44	44	431	474	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.986	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3162	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3162	0
Link Speed (k/h)	50		50	60		
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	54	48	48	468	515	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	48	48	468	570	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 32.7%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2031 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	50	44	44	431	474	51	
Future Volume (Veh/h)	50	44	44	431	474	51	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	54	48	48	468	515	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	872	285	570				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	872	285	570				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	80	93	95				
cM capacity (veh/h)	274	666	992				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	54	48	48	234	234	343	227
Volume Left	54	0	48	0	0	0	0
Volume Right	0	48	0	0	0	0	55
cSH	274	666	992	1700	1700	1700	1700
Volume to Capacity	0.20	0.07	0.05	0.14	0.14	0.20	0.13
Queue Length 95th (m)	5.7	1.9	1.2	0.0	0.0	0.0	0.0
Control Delay (s)	21.3	10.8	8.8	0.0	0.0	0.0	0.0
Lane LOS	C	B	A				
Approach Delay (s)	16.4	0.8		0.0			
Approach LOS	C						
Intersection Summary							
Average Delay			1.8				
Intersection Capacity Utilization			32.7%	ICU Level of Service		A	
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2031 <PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	135	37	432	99	37	455
Future Volume (vph)	135	37	432	99	37	455
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.972			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3095	0	1662	3197
Fit Permitted	0.950					
Satd. Flow (perm)	1646	1488	3095	0	1662	3197
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	147	40	470	108	40	495
Shared Lane Traffic (%)						
Lane Group Flow (vph)	147	40	578	0	40	495
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 37.8%					ICU Level of Service A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2031 <PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	135	37	432	99	37	455	
Future Volume (Veh/h)	135	37	432	99	37	455	
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)	147	40	470	108	40	495	
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	852	289			578		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	852	289			578		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	49	94			96		
cM capacity (veh/h)	289	714			1006		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	147	40	313	265	40	248	248
Volume Left	147	0	0	0	40	0	0
Volume Right	0	40	0	108	0	0	0
cSH	289	714	1700	1700	1006	1700	1700
Volume to Capacity	0.51	0.06	0.18	0.16	0.04	0.15	0.15
Queue Length 95th (m)	21.6	1.4	0.0	0.0	1.0	0.0	0.0
Control Delay (s)	29.7	10.3	0.0	0.0	8.7	0.0	0.0
Lane LOS	D	B			A		
Approach Delay (s)	25.6		0.0		0.7		
Approach LOS	D						
Intersection Summary							
Average Delay			3.9				
Intersection Capacity Utilization			37.8%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2031 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	6	0	437	571	58
Future Volume (vph)	50	6	0	437	571	58
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.986	
Fit Protected	0.950					
Satd. Flow (prot)	1662	1190	1750	3137	3164	0
Fit Permitted	0.950					
Satd. Flow (perm)	1662	1190	1750	3137	3164	0
Link Speed (k/h)	40			70	70	
Link Distance (m)	1651.3			627.8	493.4	
Travel Time (s)	148.6			32.3	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	54	7	0	475	621	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	7	0	475	684	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 29.1%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2031 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	50	6	0	437	571	58	
Future Volume (Veh/h)	50	6	0	437	571	58	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	54	7	0	475	621	63	
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	890	342	684				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	890	342	684				
tC, single (s)	6.8	7.4	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	81	99	100				
cM capacity (veh/h)	286	591	919				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	54	7	0	238	238	414	270
Volume Left	54	0	0	0	0	0	0
Volume Right	0	7	0	0	0	0	63
cSH	286	591	1700	1700	1700	1700	1700
Volume to Capacity	0.19	0.01	0.00	0.14	0.14	0.24	0.16
Queue Length 95th (m)	5.5	0.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	20.5	11.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B					
Approach Delay (s)	19.4		0.0			0.0	
Approach LOS	C						
Intersection Summary							
Average Delay			1.0				
Intersection Capacity Utilization			29.1%		ICU Level of Service		A
Analysis Period (min)	15						

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2031 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	8	0	85	2	0	2	61	406	2	2	582	3
Future Volume (vph)	8	0	85	2	0	2	61	406	2	2	582	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.932			0.999			0.999	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3257	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3257	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	9	0	92	2	0	2	66	441	2	2	633	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	92	0	0	4	0	66	443	0	2	636	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 37.0%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2031 <PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	8	0	85	2	0	2	61	406	2	2	582	3
Future Volume (Veh/h)	8	0	85	2	0	2	61	406	2	2	582	3
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)	9	0	92	2	0	2	66	441	2	2	633	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)	226											
pX, platoon unblocked	0.97	0.97		0.97	0.97	0.97				0.97		
vC, conflicting volume	993	1214	318	986	1214	222	636			443		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	923	1151	318	916	1152	125	636			354		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	96	100	86	99	100	100	93			100		
cM capacity (veh/h)	205	176	678	182	176	878	943			1175		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	9	92	4	66	294	149	2	422	214			
Volume Left	9	0	2	66	0	0	2	0	0			
Volume Right	0	92	2	0	0	2	0	0	3			
cSH	205	678	301	943	1700	1700	1175	1700	1700			
Volume to Capacity	0.04	0.14	0.01	0.07	0.17	0.09	0.00	0.25	0.13			
Queue Length 95th (m)	1.1	3.7	0.3	1.8	0.0	0.0	0.0	0.0	0.0			
Control Delay (s)	23.4	11.1	17.1	9.1	0.0	0.0	8.1	0.0	0.0			
Lane LOS	C	B	C	A	A			A				
Approach Delay (s)	12.2		17.1	1.2	0.0							
Approach LOS	B		C									
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			37.0%		ICU Level of Service			A				
Analysis Period (min)			15									

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2031 <PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	232	0	6	444	0	3
Future Volume (vph)	232	0	6	444	0	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Fit Protected	0.999					
Satd. Flow (prot)	1683	0	0	1698	1514	0
Fit Permitted	0.999					
Satd. Flow (perm)	1683	0	0	1698	1514	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%
Adj. Flow (vph)	252	0	7	483	0	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	252	0	0	490	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 40.6%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2031 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	232	0	6	444	0	3
Future Volume (Veh/h)	232	0	6	444	0	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)	252	0	7	483	0	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			252	749	252	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			252	749	252	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			99	100	100	
cM capacity (veh/h)			1325	380	792	
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	252	490	3			
Volume Left	0	7	0			
Volume Right	0	0	3			
cSH	1700	1325	792			
Volume to Capacity	0.15	0.01	0.00			
Queue Length 95th (m)	0.0	0.1	0.1			
Control Delay (s)	0.0	0.2	9.6			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		40.6%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Background_2031 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	17	0	382	0	0	0	180	450	0	0	659	7
Future Volume (vph)	17	0	382	0	0	0	180	450	0	0	659	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.250					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	429	3228	0	1716	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		330										109
Link Speed (k/h)		50			50			80				80
Link Distance (m)		101.3			58.5			348.2				226.1
Travel Time (s)		7.3			4.2			15.7				10.2
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	489	0	0	716	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	489	0	0	716	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		15.1	52.5		37.4	37.4	37.4
Total Split (%)	34.4%	34.4%		34.4%	34.4%		18.9%	65.6%		46.8%	46.8%	46.8%
Maximum Green (s)	22.0	22.0		22.0	22.0		9.6	47.0		31.9	31.9	31.9
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0		7.0			7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0			12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0			0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0			31.9	31.9
Actuated g/C Ratio	0.28	0.28					0.59	0.59			0.40	0.40

Lanes, Volumes, Timings

Future Background_2031 <PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.65					0.49	0.26			0.55	0.01
Control Delay	21.9	11.4					12.3	8.5			20.5	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	11.4					12.3	8.5			20.5	0.0
LOS	C	B					B	A			C	A
Approach Delay		11.8						9.6			20.3	
Approach LOS		B						A			C	
Queue Length 50th (m)	2.1	10.4					13.4	18.2			45.2	0.0
Queue Length 95th (m)	7.2	39.7					23.5	26.2			62.2	0.0
Internal Link Dist (m)		77.3			34.5			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)		357	640				396	1896			1299	646
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.05	0.65					0.49	0.26			0.55	0.01

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 14.3

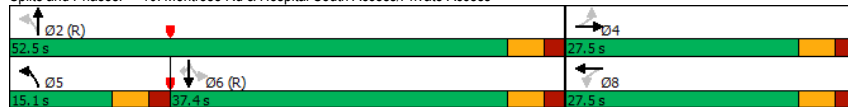
Intersection LOS: B

Intersection Capacity Utilization 70.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

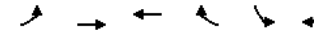


Lanes, Volumes, Timings

Future Background_2031 <PM>

11: Biggar Rd & Hospital East Access

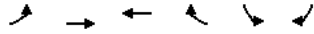
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↑	↑
Traffic Volume (vph)	19	261	349	84	187	85
Future Volume (vph)	19	261	349	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3228	1458	1630	1458
Fit Permitted	0.527				0.950	
Satd. Flow (perm)	904	3197	3228	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				91		92
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	284	379	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	284	379	91	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	42.0	42.0	42.0	42.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2031 <PM>
01-31-2023

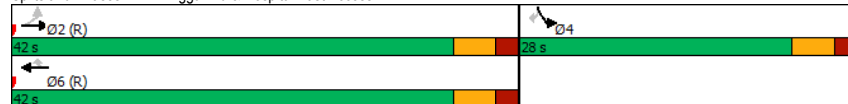


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.04	0.17	0.23	0.11	0.39	0.17
Control Delay	8.6	9.1	9.5	2.6	21.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.1	9.5	2.6	21.1	5.3
LOS	A	A	A	A	C	A
Approach Delay	9.1		8.2		16.2	
Approach LOS	A		A		B	
Queue Length 50th (m)	1.3	10.0	13.8	0.0	21.4	0.0
Queue Length 95th (m)	4.5	16.2	21.2	6.1	38.8	9.2
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	471	1667	1683	803	523	531
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.17	0.23	0.11	0.39	0.17

Intersection Summary

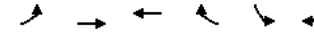
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.39
 Intersection Signal Delay: 10.7
 Intersection LOS: B
 Intersection Capacity Utilization 37.6%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2031 <PM>
01-31-2023



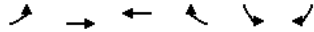
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	↓
Traffic Volume (vph)	7	237	415	19	43	42
Future Volume (vph)	7	237	415	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fit	0.993			0.933		
Fit Protected	0.950			0.975		
Satd. Flow (prot)	1630	3197	3207	0	1561	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3197	3207	0	1561	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	413.8		365.4		157.5	
Travel Time (s)	18.6		16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	258	451	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	258	472	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15		15
Sign Control	Free		Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 25.2%
 ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
 12: Biggar Rd & Hospital West Access

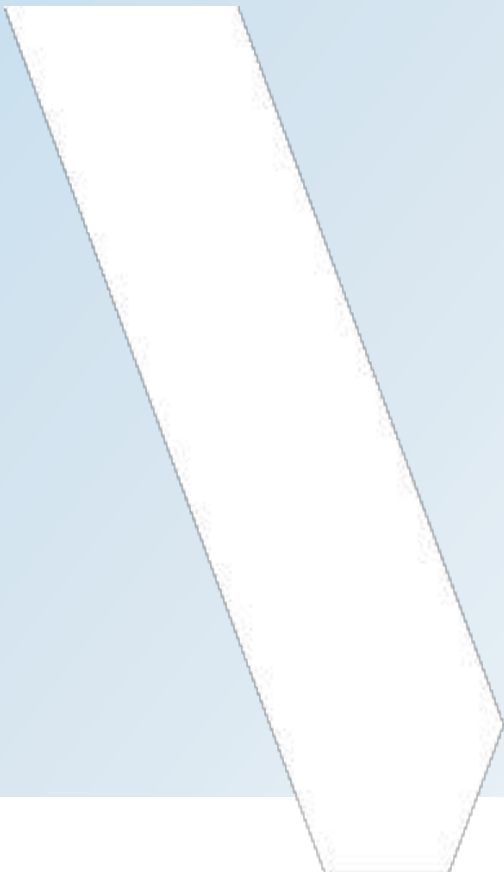
Future Background_2031 <PM>
 01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↕		↵	
Traffic Volume (veh/h)	7	237	415	19	43	42
Future Volume (Veh/h)	7	237	415	19	43	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)	8	258	451	21	47	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)			365			
pX, platoon unblocked						
vC, conflicting volume	472				606	236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	472				606	236
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				89	94
cM capacity (veh/h)	1086				425	766
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	129	129	301	171	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	1086	1700	1700	1700	1700	545
Volume to Capacity	0.01	0.08	0.08	0.18	0.10	0.17
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	4.9
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	13.0
Lane LOS	A					B
Approach Delay (s)	0.3			0.0		13.0
Approach LOS						B
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			25.2%		ICU Level of Service	A
Analysis Period (min)			15			

APPENDIX

2036
HORIZON



Lanes, Volumes, Timings

Future Background_2036 <AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	177	218	18	351	373	513	53	370	560	206	155	59
Future Volume (vph)	177	218	18	351	373	513	53	370	560	206	155	59
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1271	3043	3228	1444	1599	3228	1458	2959	3167	1430
Fit Permitted	0.514			0.950			0.646			0.950		
Satd. Flow (perm)	873	3260	1271	3043	3228	1444	1087	3228	1458	2959	3167	1430
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162			558			609			112
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	3%	2%	17%	6%	3%	3%	4%	3%	2%	9%	5%	4%
Adj. Flow (vph)	192	237	20	382	405	558	58	402	609	224	168	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	237	20	382	405	558	58	402	609	224	168	64
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)												
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

Future Background_2036 <AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		8	Free		4
Detector Phase	5	2	2	1	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0		8.0	10.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3		13.5	31.3	31.3
Total Split (%)	19.0	34.0	34.0	31.0	46.0		33.0	33.0		22.0	55.0	55.0
Total Split (%)	15.8%	28.3%	28.3%	25.8%	38.3%		27.5%	27.5%		18.3%	45.8%	45.8%
Maximum Green (s)	15.5	27.7	27.7	25.5	39.7		26.7	26.7		16.5	48.7	48.7
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2		2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0		3.0	6.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max		Max	Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	0
Act Effect Green (s)	46.8	31.2	31.2	19.3	39.7		117.3	26.7	26.7	117.3	16.5	48.7
Actuated g/C Ratio	0.40	0.27	0.27	0.16	0.34		1.00	0.23	0.23	1.00	0.14	0.42
v/c Ratio	0.45	0.27	0.04	0.77	0.37		0.39	0.23	0.55	0.42	0.54	0.13
Control Delay	21.0	36.0	0.2	57.3	30.9		0.8	40.9	43.6	0.9	52.7	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	36.0	0.2	57.3	30.9		0.8	40.9	43.6	0.9	52.7	22.0
LOS	C	D	A	E	C		A	D	D	A	D	C
Approach Delay		28.0			25.9			19.1				34.1
Approach LOS		C			C			B				C
Queue Length 50th (m)	25.4	23.9	0.0	46.2	39.0		0.0	11.6	45.6	0.0	26.4	13.1
Queue Length 95th (m)	40.4	37.8	0.0	61.3	54.7		0.0	24.7	64.0	0.0	40.5	21.3
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0		150.0	275.0		40.0
Base Capacity (vph)	466	866	457	661	1092		1444	735	1458	416	1315	659
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.27	0.04	0.58	0.37		0.39	0.23	0.55	0.42	0.54	0.13
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	117.3											
Natural Cycle:	90											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.77											
Intersection Signal Delay:	25.1						Intersection LOS: C					
Intersection Capacity Utilization:	58.0%						ICU Level of Service B					
Analysis Period (min):	15											

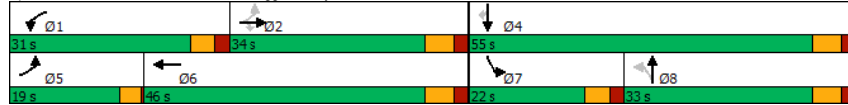
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2036 <AM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

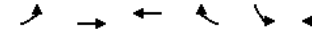


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2036 <AM>

01-31-2023



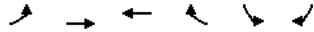
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↓↓
Traffic Volume (vph)	0	811	501	0	178	728
Future Volume (vph)	0	811	501	0	178	728
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.899	0.850
Flt Protected					0.984	
Satd. Flow (prot)	0	3197	2995	0	2776	1302
Flt Permitted					0.984	
Satd. Flow (perm)	0	3197	2995	0	2776	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					296	395
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	882	545	0	193	791
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	882	545	0	589	395
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2036 <AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

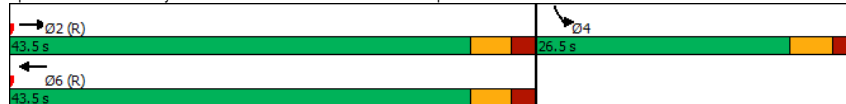


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.51	0.34			0.57	0.31
Control Delay	11.4	9.7			12.3	0.6
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	11.4	9.7			12.3	0.6
LOS	B	A			B	A
Approach Delay	11.4	9.7			7.6	
Approach LOS	B	A			A	
Queue Length 50th (m)	37.1	20.3			16.1	0.0
Queue Length 95th (m)	51.6	29.8			31.0	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			1040	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.51	0.34			0.57	0.31

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 9.5 Intersection LOS: A
 Intersection Capacity Utilization 51.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2036 <AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	493	0	0	321	211	53
Future Volume (vph)	493	0	0	321	211	53
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Fit Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	536	0	0	349	229	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	536	0	0	349	229	58
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 34.2% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2036 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	493	0	0	321	211	53
Future Volume (Veh/h)	493	0	0	321	211	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)	536	0	0	349	229	58
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			536		712	268
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			536		712	268
tC, single (s)			4.1		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		35	92
cM capacity (veh/h)			1028		350	727
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	268	268	174	174	229	58
Volume Left	0	0	0	0	229	0
Volume Right	0	0	0	0	0	58
cSH	1700	1700	1700	1700	350	727
Volume to Capacity	0.16	0.16	0.10	0.10	0.65	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	35.2	2.1
Control Delay (s)	0.0	0.0	0.0	0.0	32.8	10.4
Lane LOS					D	B
Approach Delay (s)	0.0		0.0		28.2	
Approach LOS					D	
Intersection Summary						
Average Delay			6.9			
Intersection Capacity Utilization			34.2%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2036 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↓	↑	↓	↑↑	↑↓	
Traffic Volume (vph)	75	38	36	248	313	80
Future Volume (vph)	75	38	36	248	313	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.969	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	2953	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	2953	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	82	41	39	270	340	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	41	39	270	427	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.0%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2036 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	75	38	36	248	313	80	
Future Volume (Veh/h)	75	38	36	248	313	80	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	82	41	39	270	340	87	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None	None			
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	596	214	427				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	596	214	427				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	78	95	96				
cM capacity (veh/h)	369	798	964				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	82	41	39	135	135	227	200
Volume Left	82	0	39	0	0	0	0
Volume Right	0	41	0	0	0	0	87
cSH	369	798	964	1700	1700	1700	1700
Volume to Capacity	0.22	0.05	0.04	0.08	0.08	0.13	0.12
Queue Length 95th (m)	6.7	1.3	1.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.5	9.8	8.9	0.0	0.0	0.0	0.0
Lane LOS	C	A	A				
Approach Delay (s)	14.9	1.1		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			2.5				
Intersection Capacity Utilization			30.0%		ICU Level of Service		A
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	68	12	302	125	24	330
Future Volume (vph)	68	12	302	125	24	330
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.956			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2969	0	1409	2995
Fit Permitted	0.950					
Satd. Flow (perm)	1498	1316	2969	0	1409	2995
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	74	13	328	136	26	359
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	13	464	0	26	359
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.8%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2036 <AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕		↕	↕↕	
Traffic Volume (veh/h)	68	12	302	125	24	330	
Future Volume (Veh/h)	68	12	302	125	24	330	
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)	74	13	328	136	26	359	
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	628	232			464		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	628	232			464		
tC, single (s)	7.0	7.2			4.5		
tC, 2 stage (s)							
tF (s)	3.6	3.4			2.4		
p0 queue free %	81	98			97		
cM capacity (veh/h)	385	737			989		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	74	13	219	245	26	180	180
Volume Left	74	0	0	0	26	0	0
Volume Right	0	13	0	136	0	0	0
cSH	385	737	1700	1700	989	1700	1700
Volume to Capacity	0.19	0.02	0.13	0.14	0.03	0.11	0.11
Queue Length 95th (m)	5.6	0.4	0.0	0.0	0.6	0.0	0.0
Control Delay (s)	16.6	10.0	0.0	0.0	8.7	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	15.6		0.0		0.6		
Approach LOS	C						
Intersection Summary							
Average Delay			1.7				
Intersection Capacity Utilization			30.8%		ICU Level of Service A		
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2036 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↕	↕	↕	↕↕	↕↕	↕
Traffic Volume (vph)	37	2	9	393	320	31
Future Volume (vph)	37	2	9	393	320	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.987	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2911	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2911	0
Link Speed (k/h)	40		70	70		
Link Distance (m)	1651.3		627.8	493.4		
Travel Time (s)	148.6		32.3	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	40	2	10	427	348	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	40	2	10	427	382	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 21.8%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2036 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	37	2	9	393	320	31	
Future Volume (Veh/h)	37	2	9	393	320	31	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	40	2	10	427	348	34	
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	598	191	382				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	598	191	382				
tC, single (s)	7.1	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.6	3.3	2.2				
p0 queue free %	90	100	99				
cM capacity (veh/h)	405	825	1188				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	40	2	10	214	214	232	150
Volume Left	40	0	10	0	0	0	0
Volume Right	0	2	0	0	0	0	34
cSH	405	825	1188	1700	1700	1700	1700
Volume to Capacity	0.10	0.00	0.01	0.13	0.13	0.14	0.09
Queue Length 95th (m)	2.6	0.1	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	14.9	9.4	8.1	0.0	0.0	0.0	0.0
Lane LOS	B	A	A				
Approach Delay (s)	14.6	0.2		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization			21.8%	ICU Level of Service		A	
Analysis Period (min)			15				

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2036 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	3	0	31	2	0	2	155	454	2	2	265	9
Future Volume (vph)	3	0	31	2	0	2	155	454	2	2	265	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.932			0.999			0.995	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	3	0	34	2	0	2	168	493	2	2	288	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	4	0	168	495	0	2	298	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control	Stop		Stop				Free			Free		
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 30.9%							ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2036 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	3	0	31	2	0	2	155	454	2	2	265	9
Future Volume (Veh/h)	3	0	31	2	0	2	155	454	2	2	265	9
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)	3	0	34	2	0	2	168	493	2	2	288	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	882	1128	149	1012	1132	248	298			495		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	789	1046	149	925	1050	127	298			386		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	99	100	96	99	100	100	87			100		
cM capacity (veh/h)	241	188	871	187	187	868	1260			1134		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	3	34	4	168	329	166	2	192	106			
Volume Left	3	0	2	168	0	0	2	0	0			
Volume Right	0	34	2	0	0	2	0	0	10			
cSH	241	871	308	1260	1700	1700	1134	1700	1700			
Volume to Capacity	0.01	0.04	0.01	0.13	0.19	0.10	0.00	0.11	0.06			
Queue Length 95th (m)	0.3	1.0	0.3	3.7	0.0	0.0	0.0	0.0	0.0			
Control Delay (s)	20.1	9.3	16.8	8.3	0.0	0.0	8.2	0.0	0.0			
Lane LOS	C	A	C	A	A			A				
Approach Delay (s)	10.2		16.8	2.1	0.1							
Approach LOS	B		C									
Intersection Summary												
Average Delay			1.8									
Intersection Capacity Utilization			30.9%		ICU Level of Service			A				
Analysis Period (min)			15									

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2036 <AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	391	0	8	268	2	16
Future Volume (vph)	391	0	8	268	2	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.879					
Fit Protected			0.999		0.995	
Satd. Flow (prot)	1651	0	0	1619	1405	0
Fit Permitted			0.999		0.995	
Satd. Flow (perm)	1651	0	0	1619	1405	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	425	0	9	291	2	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	425	0	0	300	19	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 32.3%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2036 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	391	0	8	268	2	16
Future Volume (Veh/h)	391	0	8	268	2	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)	425	0	9	291	2	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			425		734	425
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			425		734	425
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			99		99	97
cM capacity (veh/h)			958		387	612
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	425	300	19			
Volume Left	0	9	2			
Volume Right	0	0	17			
cSH	1700	958	577			
Volume to Capacity	0.25	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.8			
Control Delay (s)	0.0	0.4	11.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		32.3%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings

Future Background_2036 <AM>
01-31-2023

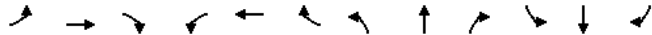
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	6	0	141	0	0	0	455	603	0	0	277	19
Future Volume (vph)	6	0	141	0	0	0	455	603	0	0	277	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.439					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	753	3228	0	1716	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		674										109
Link Speed (k/h)		50			50			80				80
Link Distance (m)		101.3			60.9			348.2				226.1
Travel Time (s)		7.3			4.4			15.7				10.2
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	5%
Adj. Flow (vph)	7	0	153	0	0	0	495	655	0	0	301	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	655	0	0	301	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5		24.5
Total Split (s)	27.5	27.5		27.5	27.5		27.0	52.5		25.5		25.5
Total Split (%)	34.4%	34.4%		34.4%	34.4%		33.8%	65.6%		31.9%		31.9%
Maximum Green (s)	22.0	22.0		22.0	22.0		21.5	47.0		20.0		20.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5		5.5
Lead/Lag							Lead			Lag		Lag
Lead-Lag Optimize?							Yes			Yes		Yes
Walk Time (s)	7.0	7.0		7.0	7.0		7.0			7.0		7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0			12.0		12.0
Pedestrian Calls (#/hr)	0	0		0	0		0			0		0
Act Effct Green (s)	22.0	22.0					47.0	47.0				20.0
Actuated g/C Ratio	0.28	0.28					0.59	0.59				0.25

Lanes, Volumes, Timings

Future Background_2036 <AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023

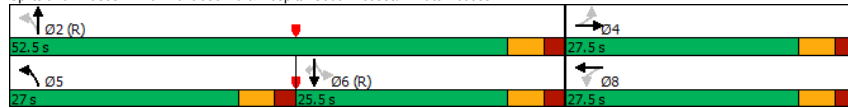


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.17					0.73	0.35			0.38	0.05
Control Delay	21.5	0.4					17.2	9.2			26.6	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.4					17.2	9.2			26.6	0.2
LOS	C	A					B	A			C	A
Approach Delay		1.3						12.6			24.9	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					42.6	26.0			21.0	0.0
Queue Length 95th (m)	3.8	0.0					68.0	36.0			32.5	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	889					678	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.17					0.73	0.35			0.38	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	80
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	75
Control Type:	Pretimed
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	13.9
Intersection LOS:	B
Intersection Capacity Utilization:	58.9%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

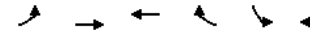


Lanes, Volumes, Timings

Future Background_2036 <AM>

11: Biggar Rd & Hospital East Access

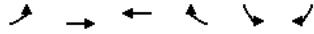
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↓	↓
Traffic Volume (vph)	48	329	271	213	85	31
Future Volume (vph)	48	329	271	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Fr				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3197	1458	1630	1458
Fit Permitted	0.572				0.950	
Satd. Flow (perm)	981	3228	3197	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	358	295	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	358	295	232	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	41.0	41.0	41.0	41.0	29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%	58.6%	41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2036 <AM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.10	0.22	0.18	0.27	0.17	0.07
Control Delay	9.8	10.0	9.7	2.4	17.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	10.0	9.7	2.4	17.5	6.6
LOS	A	B	A	A	B	A
Approach Delay	10.0		6.5		14.5	
Approach LOS	A		A		B	
Queue Length 50th (m)	3.5	13.4	10.8	0.0	8.8	0.0
Queue Length 95th (m)	8.9	20.8	17.3	9.7	18.8	5.6
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	497	1637	1621	853	547	512
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.22	0.18	0.27	0.17	0.07

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.27

Intersection Signal Delay: 8.8

Intersection LOS: A

Intersection Capacity Utilization 37.1%

ICU Level of Service A

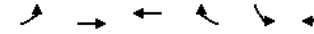
Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2036 <AM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	
Traffic Volume (vph)	19	377	254	48	0	15
Future Volume (vph)	19	377	254	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fr				0.976	0.865	
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3130	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3130	0	1484	0
Link Speed (k/h)	80		80	50		
Link Distance (m)	413.8		365.4	157.5		
Travel Time (s)	18.6		16.4	11.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	410	276	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	410	328	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6	3.6		
Link Offset(m)	0.0		0.0	0.0		
Crosswalk Width(m)	4.8		4.8	4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control	Free		Free	Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

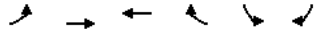
Intersection Capacity Utilization 26.0%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

Future Background_2036 <AM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕		↘	
Traffic Volume (veh/h)	19	377	254	48	0	15
Future Volume (Veh/h)	19	377	254	48	0	15
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)	21	410	276	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			365			
pX, platoon unblocked						
vC, conflicting volume	328			549	164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328			549	164	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	98	
cM capacity (veh/h)	1228			458	852	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	205	205	184	144	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1228	1700	1700	1700	1700	852
Volume to Capacity	0.02	0.12	0.12	0.11	0.08	0.02
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	8.0	0.0	0.0	0.0	0.0	9.3
Lane LOS	A					A
Approach Delay (s)	0.4			0.0		9.3
Approach LOS						A
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			26.0%		ICU Level of Service	A
Analysis Period (min)			15			

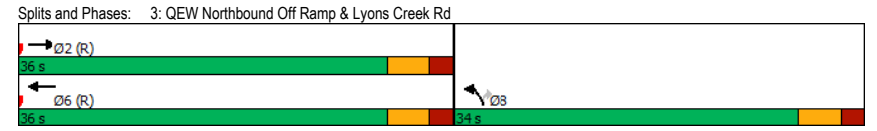
Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2036 Improved <AM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	493	0	0	321	211	53
Future Volume (vph)	493	0	0	321	211	53
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Flt Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1510	1444
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						58
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	536	0	0	349	229	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	536	0	0	349	229	58
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	36.0			36.0	34.0	34.0
Total Split (%)	51.4%			51.4%	48.6%	48.6%
Maximum Green (s)	30.5			30.5	28.5	28.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	30.5			30.5	28.5	28.5
Actuated g/C Ratio	0.44			0.44	0.41	0.41
v/c Ratio	0.41			0.26	0.37	0.09

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2036 Improved <AM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	14.8			13.3	16.7	4.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	14.8			13.3	16.7	4.5
LOS	B			B	B	A
Approach Delay	14.8			13.3	14.3	
Approach LOS	B			B	B	
Queue Length 50th (m)	25.6			15.4	21.3	0.0
Queue Length 95th (m)	37.6			24.1	38.3	6.3
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1304			1317	615	622
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.41			0.26	0.37	0.09

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	14.2
Intersection Capacity Utilization:	36.7%
Intersection LOS:	B
ICU Level of Service:	A
Analysis Period (min):	15



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 Improved <AM>
01-13-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↙	↓
Traffic Volume (vph)	68	12	302	125	24	330
Future Volume (vph)	68	12	302	125	24	330
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0			15.0		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.956			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2969	0	1409	2995
Fit Permitted	0.950				0.485	
Satd. Flow (perm)	1498	1316	2969	0	719	2995
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		13	136			
Link Speed (k/h)	60		70			70
Link Distance (m)	170.9		493.4			425.4
Travel Time (s)	10.3		25.4			21.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	74	13	328	136	26	359
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	13	464	0	26	359
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 Improved <AM>
01-13-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.16	0.03	0.28		0.07	0.23
Control Delay	18.5	9.3	6.8		8.8	9.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.5	9.3	6.8		8.8	9.3
LOS	B	A	A		A	A
Approach Delay	17.1		6.8			9.3
Approach LOS	B		A			A
Queue Length 50th (m)	7.3	0.0	11.6		1.6	12.8
Queue Length 95th (m)	16.5	3.6	19.4		5.2	20.1
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	470	422	1633		380	1583
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.03	0.28		0.07	0.23

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.28
Intersection Signal Delay:	8.8
Intersection Capacity Utilization:	37.5%
Analysis Period (min):	15
Intersection LOS:	A
ICU Level of Service:	A

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings

Future Background_2036 <PM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖↖	↖	↖	↖	↖↖	↖	↖↖	↖	↖
Traffic Volume (vph)	91	326	47	487	329	252	25	318	532	548	432	108
Future Volume (vph)	91	326	47	487	329	252	25	318	532	548	432	108
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	3260	1430	3162	3260	1417	1599	3228	1444	3131	3260	1473
Fit Permitted	0.538			0.950			0.483			0.950		
Satd. Flow (perm)	932	3260	1430	3162	3260	1417	813	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			274			541			117
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	1%	2%	4%	2%	2%	5%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	99	354	51	529	358	274	27	346	578	596	470	117
Shared Lane Traffic (%)												
Lane Group Flow (vph)	99	354	51	529	358	274	27	346	578	596	470	117
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)		0.0			0.0							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

Future Background_2036 <PM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	12.2	32.7	32.7	39.0	59.5		31.3	31.3			42.0	73.3
Total Split (%)	8.4%	22.6%	22.6%	26.9%	41.0%		21.6%	21.6%			29.0%	50.6%
Maximum Green (s)	8.7	26.4	26.4	33.5	53.2		25.0	25.0			36.5	67.0
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	42.2	31.1	31.1	28.4	53.2	144.6	25.0	25.0	144.6	36.5	67.0	67.0
Actuated g/C Ratio	0.29	0.22	0.22	0.20	0.37	1.00	0.17	0.17	1.00	0.25	0.46	0.46
v/c Ratio	0.32	0.51	0.12	0.85	0.30	0.19	0.19	0.62	0.40	0.75	0.31	0.16
Control Delay	27.6	53.8	0.6	69.6	33.4	0.3	55.5	61.0	0.8	57.0	25.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	53.8	0.6	69.6	33.4	0.3	55.5	61.0	0.8	57.0	25.1	4.1
LOS	C	D	A	E	C	A	E	E	A	E	C	A
Approach Delay		43.3			42.1			24.3				39.1
Approach LOS		D			D			C				D
Queue Length 50th (m)	16.6	50.1	0.0	80.1	40.3	0.0	7.1	51.6	0.0	86.4	46.2	0.0
Queue Length 95th (m)	28.5	70.0	0.0	98.1	54.0	0.0	17.3	69.3	0.0	108.9	59.7	11.4
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0	150.0		275.0		40.0
Base Capacity (vph)	317	700	412	732	1199	1417	140	558	1444	790	1510	745
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.51	0.12	0.72	0.30	0.19	0.19	0.62	0.40	0.75	0.31	0.16
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	144.6											
Natural Cycle:	110											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.85											
Intersection Signal Delay:	36.9						Intersection LOS: D					
Intersection Capacity Utilization:	71.1%						ICU Level of Service C					
Analysis Period (min)	15											

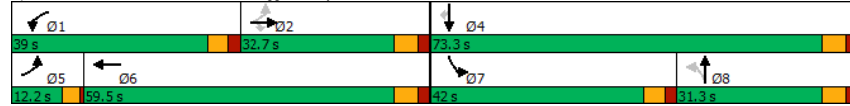
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2036 <PM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd



Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2036 <PM>

01-31-2023

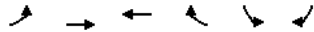
	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑↑	↑
Traffic Volume (vph)	0	1017	438	0	291	554
Future Volume (vph)	0	1017	438	0	291	554
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.927	0.850
Flt Protected					0.975	
Satd. Flow (prot)	0	3197	3197	0	2962	1327
Flt Permitted					0.975	
Satd. Flow (perm)	0	3197	3197	0	2962	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					301	301
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1105	476	0	316	602
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1105	476	0	617	301
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2036 <PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.64	0.27			0.56	0.23
Control Delay	13.3	9.1			12.4	0.4
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	13.3	9.1			12.4	0.4
LOS	B	A			B	A
Approach Delay	13.3	9.1			8.5	
Approach LOS	B	A			A	
Queue Length 50th (m)	51.5	17.0			17.4	0.0
Queue Length 95th (m)	70.8	25.3			32.4	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			1099	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.64	0.27			0.56	0.23

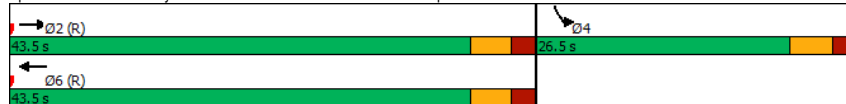
Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 10.7
 Intersection Capacity Utilization 57.2%
 Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service B

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2036 <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↓	↑
Traffic Volume (vph)	704	0	0	419	108	63
Future Volume (vph)	704	0	0	419	108	63
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1363	1352
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	765	0	0	455	117	68
Shared Lane Traffic (%)						
Lane Group Flow (vph)	765	0	0	455	117	68
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 34.3%
 Analysis Period (min) 15

ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2036 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	704	0	0	419	108	63
Future Volume (Veh/h)	704	0	0	419	108	63
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)	765	0	0	455	117	68
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			765		994	382
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			765		994	382
tC, single (s)			4.1		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			100		44	89
cM capacity (veh/h)			844		210	593
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	382	382	228	228	117	68
Volume Left	0	0	0	0	117	0
Volume Right	0	0	0	0	0	68
cSH	1700	1700	1700	1700	210	593
Volume to Capacity	0.23	0.23	0.13	0.13	0.56	0.11
Queue Length 95th (m)	0.0	0.0	0.0	0.0	24.0	3.1
Control Delay (s)	0.0	0.0	0.0	0.0	41.9	11.9
Lane LOS					E	B
Approach Delay (s)	0.0		0.0		30.8	
Approach LOS					D	
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			34.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2036 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↓	↑	↓	↑↑	↑↓	
Traffic Volume (vph)	55	48	48	455	501	57
Future Volume (vph)	55	48	48	455	501	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.985	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3158	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3158	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	60	52	52	495	545	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	52	52	495	607	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6		3.6	3.6		
Link Offset(m)	0.0		0.0	0.0		
Crosswalk Width(m)	4.8		4.8	4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 33.7%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2036 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕	↕	↔	
Traffic Volume (veh/h)	55	48	48	455	501	57	
Future Volume (Veh/h)	55	48	48	455	501	57	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	60	52	52	495	545	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	928	304	607				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	928	304	607				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	76	92	95				
cM capacity (veh/h)	251	647	960				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	60	52	52	248	248	363	244
Volume Left	60	0	52	0	0	0	0
Volume Right	0	52	0	0	0	0	62
cSH	251	647	960	1700	1700	1700	1700
Volume to Capacity	0.24	0.08	0.05	0.15	0.15	0.21	0.14
Queue Length 95th (m)	7.3	2.1	1.4	0.0	0.0	0.0	0.0
Control Delay (s)	23.8	11.0	9.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A				
Approach Delay (s)	17.9	0.9		0.0			
Approach LOS	C						
Intersection Summary							
Average Delay	2.0						
Intersection Capacity Utilization	33.7%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 <PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (vph)	149	41	457	110	41	480
Future Volume (vph)	149	41	457	110	41	480
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1	0	1		
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.971			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3092	0	1662	3197
Fit Permitted	0.950					
Satd. Flow (perm)	1646	1488	3092	0	1662	3197
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	162	45	497	120	45	522
Shared Lane Traffic (%)						
Lane Group Flow (vph)	162	45	617	0	45	522
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 39.8%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2036 <PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕		↕	↕↕	
Traffic Volume (veh/h)	149	41	457	110	41	480	
Future Volume (Veh/h)	149	41	457	110	41	480	
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)	162	45	497	120	45	522	
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	908	308			617		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	908	308			617		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	39	94			95		
cM capacity (veh/h)	264	693			973		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	162	45	331	286	45	261	261
Volume Left	162	0	0	0	45	0	0
Volume Right	0	45	0	120	0	0	0
cSH	264	693	1700	1700	973	1700	1700
Volume to Capacity	0.61	0.06	0.19	0.17	0.05	0.15	0.15
Queue Length 95th (m)	29.6	1.7	0.0	0.0	1.2	0.0	0.0
Control Delay (s)	38.1	10.6	0.0	0.0	8.9	0.0	0.0
Lane LOS	E	B			A		
Approach Delay (s)	32.1		0.0		0.7		
Approach LOS	D						
Intersection Summary							
Average Delay			5.1				
Intersection Capacity Utilization			39.8%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2036 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↕	↕	↕	↕↕	↕↕	↕
Traffic Volume (vph)	50	6	0	468	614	58
Future Volume (vph)	50	6	0	468	614	58
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.987	
Fit Protected	0.950					
Satd. Flow (prot)	1662	1190	1750	3137	3166	0
Fit Permitted	0.950					
Satd. Flow (perm)	1662	1190	1750	3137	3166	0
Link Speed (k/h)	40			70	70	
Link Distance (m)	1651.3			627.8	493.4	
Travel Time (s)	148.6			32.3	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	54	7	0	509	667	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	7	0	509	730	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	30.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2036 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	50	6	0	468	614	58	
Future Volume (Veh/h)	50	6	0	468	614	58	
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)	54	7	0	509	667	63	
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	953	365	730				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	953	365	730				
tC, single (s)	6.8	7.4	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	79	99	100				
cM capacity (veh/h)	261	570	883				
Direction_Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	54	7	0	254	254	445	285
Volume Left	54	0	0	0	0	0	0
Volume Right	0	7	0	0	0	0	63
cSH	261	570	1700	1700	1700	1700	1700
Volume to Capacity	0.21	0.01	0.00	0.15	0.15	0.26	0.17
Queue Length 95th (m)	6.1	0.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	22.4	11.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B					
Approach Delay (s)	21.1		0.0			0.0	
Approach LOS	C						
Intersection Summary							
Average Delay			1.0				
Intersection Capacity Utilization			30.4%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2036 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	8	0	85	2	0	2	61	434	2	2	627	3
Future Volume (vph)	8	0	85	2	0	2	61	434	2	2	627	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.932			0.999			0.999	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3257	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3257	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	9	0	92	2	0	2	66	472	2	2	682	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	92	0	0	4	0	66	474	0	2	685	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 38.3%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2036 <PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔			↔		↔	↔		↔	↔	
Traffic Volume (veh/h)	8	0	85	2	0	2	61	434	2	2	627	3
Future Volume (Veh/h)	8	0	85	2	0	2	61	434	2	2	627	3
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)	9	0	92	2	0	2	66	472	2	2	682	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	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	1058	1294	342	1042	1294	237	685			474		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	973	1219	342	957	1220	117	685			364		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	95	100	86	99	100	100	93			100		
cM capacity (veh/h)	186	159	653	167	159	881	904			1155		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	9	92	4	66	315	159	2	455	230			
Volume Left	9	0	2	66	0	0	2	0	0			
Volume Right	0	92	2	0	0	2	0	0	3			
cSH	186	653	281	904	1700	1700	1155	1700	1700			
Volume to Capacity	0.05	0.14	0.01	0.07	0.19	0.09	0.00	0.27	0.14			
Queue Length 95th (m)	1.2	3.9	0.3	1.9	0.0	0.0	0.0	0.0	0.0			
Control Delay (s)	25.3	11.4	18.0	9.3	0.0	0.0	8.1	0.0	0.0			
Lane LOS	D	B	C	A				A				
Approach Delay (s)	12.6		18.0	1.1				0.0				
Approach LOS	B		C									
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			38.3%		ICU Level of Service		A					
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2036 <PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (vph)	246	0	6	470	0	3
Future Volume (vph)	246	0	6	470	0	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Fit Protected	0.999					
Satd. Flow (prot)	1683	0	0	1698	1514	0
Fit Permitted	0.999					
Satd. Flow (perm)	1683	0	0	1698	1514	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%
Adj. Flow (vph)	267	0	7	511	0	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	267	0	0	518	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 42.1%	ICU Level of Service A					
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2036 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	246	0	6	470	0	3
Future Volume (Veh/h)	246	0	6	470	0	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)	267	0	7	511	0	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			267	792	267	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267	792	267	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			99	100	100	
cM capacity (veh/h)			1308	359	777	
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	267	518	3			
Volume Left	0	7	0			
Volume Right	0	0	3			
cSH	1700	1308	777			
Volume to Capacity	0.16	0.01	0.00			
Queue Length 95th (m)	0.0	0.1	0.1			
Control Delay (s)	0.0	0.2	9.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	9.7			
Approach LOS			A			
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		42.1%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings

Future Background_2036 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	17	0	382	0	0	0	180	478	0	0	704	7
Future Volume (vph)	17	0	382	0	0	0	180	478	0	0	704	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.228					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	391	3228	0	1716	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		318										109
Link Speed (k/h)		50			50			80				80
Link Distance (m)		101.3			58.5			348.2				226.1
Travel Time (s)		7.3			4.2			15.7				10.2
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	520	0	0	765	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	520	0	0	765	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5		24.5
Total Split (s)	27.5	27.5		27.5	27.5		15.1	52.5		37.4		37.4
Total Split (%)	34.4%	34.4%		34.4%	34.4%		18.9%	65.6%		46.8%		46.8%
Maximum Green (s)	22.0	22.0		22.0	22.0		9.6	47.0		31.9		31.9
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5		5.5
Lead/Lag							Lead			Lag		Lag
Lead-Lag Optimize?							Yes			Yes		Yes
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0		12.0		12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0		0
Act Effct Green (s)	22.0	22.0					47.0	47.0				31.9
Actuated g/C Ratio	0.28	0.28					0.59	0.59				0.40

Lanes, Volumes, Timings

Future Background_2036 <PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.66					0.52	0.27			0.59	0.01
Control Delay	21.9	12.3					13.0	8.6			21.2	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	12.3					13.0	8.6			21.2	0.0
LOS	C	B					B	A			C	A
Approach Delay		12.7						9.8			21.0	
Approach LOS		B						A			C	
Queue Length 50th (m)	2.1	12.0					13.4	19.6			49.2	0.0
Queue Length 95th (m)	7.2	42.3					23.5	28.0			67.3	0.0
Internal Link Dist (m)		77.3			34.5			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)		357	631				378	1896			1299	646
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.05	0.66					0.52	0.27			0.59	0.01

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 14.9

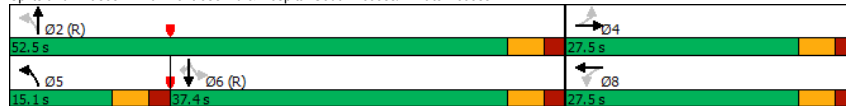
Intersection LOS: B

Intersection Capacity Utilization 71.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

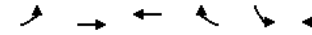


Lanes, Volumes, Timings

Future Background_2036 <PM>

11: Biggar Rd & Hospital East Access

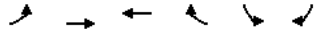
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔	↔	↔	↔
Traffic Volume (vph)	19	276	377	84	187	85
Future Volume (vph)	19	276	377	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3228	1458	1630	1458
Fit Permitted	0.511				0.950	
Satd. Flow (perm)	877	3197	3228	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				91		92
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	300	410	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	300	410	91	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	42.0	42.0	42.0	42.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2036 <PM>
01-31-2023

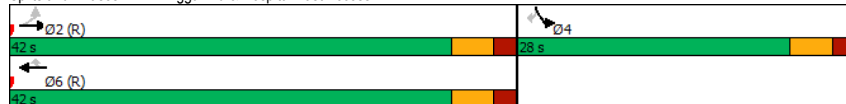


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.05	0.18	0.24	0.11	0.39	0.17
Control Delay	8.6	9.2	9.7	2.6	21.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.2	9.7	2.6	21.1	5.3
LOS	A	A	A	A	C	A
Approach Delay	9.2		8.4		16.2	
Approach LOS	A		A		B	
Queue Length 50th (m)	1.3	10.6	15.1	0.0	21.4	0.0
Queue Length 95th (m)	4.5	17.0	22.8	6.1	38.8	9.2
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	457	1667	1683	803	523	531
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.24	0.11	0.39	0.17

Intersection Summary

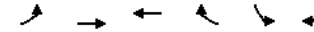
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.39
 Intersection Signal Delay: 10.7 Intersection LOS: B
 Intersection Capacity Utilization 37.6% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2036 <PM>
01-31-2023



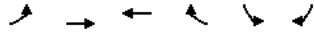
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	↓
Traffic Volume (vph)	7	252	443	19	43	42
Future Volume (vph)	7	252	443	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fit	0.994			0.933		
Fit Protected	0.950			0.975		
Satd. Flow (prot)	1630	3197	3210	0	1561	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3197	3210	0	1561	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	413.8		365.4		157.5	
Travel Time (s)	18.6		16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	274	482	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	274	503	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15		15
Sign Control	Free		Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 26.0% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

Future Background_2036 <PM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↕		↵	
Traffic Volume (veh/h)	7	252	443	19	43	42
Future Volume (Veh/h)	7	252	443	19	43	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)	8	274	482	21	47	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)			365			
pX, platoon unblocked	0.99				0.99	0.99
vC, conflicting volume	503				646	252
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	484				628	231
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				89	94
cM capacity (veh/h)	1067				409	766
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	137	137	321	182	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	1067	1700	1700	1700	1700	531
Volume to Capacity	0.01	0.08	0.08	0.19	0.11	0.18
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	5.0
Control Delay (s)	8.4	0.0	0.0	0.0	0.0	13.2
Lane LOS	A					B
Approach Delay (s)	0.2			0.0		13.2
Approach LOS						B
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			26.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2036 Improved <PM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	704	0	0	419	108	63
Future Volume (vph)	704	0	0	419	108	63
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Flt Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1361	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						68
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	765	0	0	455	117	68
Shared Lane Traffic (%)						
Lane Group Flow (vph)	765	0	0	455	117	68
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	41.0			41.0	29.0	29.0
Total Split (%)	58.6%			58.6%	41.4%	41.4%
Maximum Green (s)	35.5			35.5	23.5	23.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.5			35.5	23.5	23.5
Actuated g/C Ratio	0.51			0.51	0.34	0.34
v/c Ratio	0.47			0.27	0.26	0.14

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2036 Improved <PM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	12.4			10.4	18.8	5.6
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	12.4			10.4	18.8	5.6
LOS	B			B	B	A
Approach Delay	12.4			10.4	13.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	33.5			17.5	11.5	0.0
Queue Length 95th (m)	47.2			26.3	23.8	7.8
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1621			1669	457	499
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.47			0.27	0.26	0.14

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	12.0
Intersection Capacity Utilization 35.8%	Intersection LOS: B
	ICU Level of Service A
Analysis Period (min)	15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 Improved <PM>
01-13-2023

	←		↑		→	
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (vph)	149	41	457	110	41	480
Future Volume (vph)	149	41	457	110	41	480
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0			15.0		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.971			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3092	0	1662	3197
Fit Permitted	0.950				0.398	
Satd. Flow (perm)	1646	1488	3092	0	696	3197
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		45	64			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	162	45	497	120	45	522
Shared Lane Traffic (%)						
Lane Group Flow (vph)	162	45	617	0	45	522
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2036 Improved <PM>
01-13-2023

	←		↑		→	
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.31	0.09	0.37		0.12	0.31
Control Delay	20.4	6.5	9.3		9.4	9.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.4	6.5	9.3		9.4	9.9
LOS	C	A	A		A	A
Approach Delay	17.3		9.3			9.9
Approach LOS	B		A			A
Queue Length 50th (m)	16.8	0.0	21.2		2.9	19.6
Queue Length 95th (m)	31.6	6.6	31.8		8.0	29.0
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	517	498	1664		367	1689
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.31	0.09	0.37		0.12	0.31

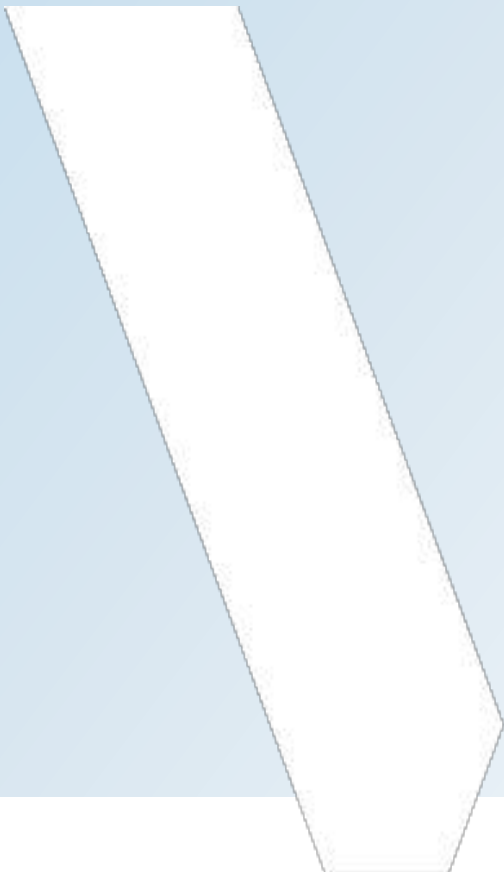
Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.37
Intersection Signal Delay:	10.8
Intersection Capacity Utilization:	48.6%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	A

Splits and Phases: 5: Montrose Rd & Oakwood Dr



APPENDIX

2041 HORIZON



Lanes, Volumes, Timings

Future Background_2041 <AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	226	19	368	381	519	54	382	588	210	160	61
Future Volume (vph)	180	226	19	368	381	519	54	382	588	210	160	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Fit			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1271	3043	3228	1444	1599	3228	1458	2959	3167	1430
Fit Permitted	0.509			0.950			0.642			0.950		
Satd. Flow (perm)	865	3260	1271	3043	3228	1444	1080	3228	1458	2959	3167	1430
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162			563			639			112
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	3%	2%	17%	6%	3%	3%	4%	3%	2%	9%	5%	4%
Adj. Flow (vph)	196	246	21	400	414	564	59	415	639	228	174	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	196	246	21	400	414	564	59	415	639	228	174	66
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)												
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

Future Background_2041 <AM>

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

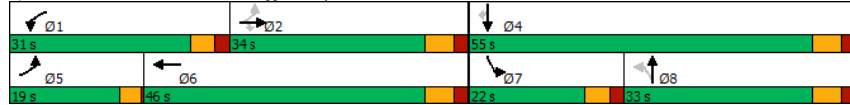
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	19.0	34.0	34.0	31.0	46.0		33.0	33.0			22.0	55.0
Total Split (%)	15.8%	28.3%	28.3%	25.8%	38.3%		27.5%	27.5%			18.3%	45.8%
Maximum Green (s)	15.5	27.7	27.7	25.5	39.7		26.7	26.7			16.5	48.7
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	46.3	30.6	30.6	19.9	39.7		117.4	26.7	26.7	117.4	16.5	48.7
Actuated g/C Ratio	0.39	0.26	0.26	0.17	0.34		1.00	0.23	0.23	1.00	0.14	0.41
v/c Ratio	0.46	0.29	0.05	0.78	0.38		0.39	0.24	0.57	0.44	0.55	0.13
Control Delay	21.4	36.7	0.2	57.2	31.1		0.8	41.1	44.1	1.0	53.0	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	36.7	0.2	57.2	31.1		0.8	41.1	44.1	1.0	53.0	22.1
LOS	C	D	A	E	C		A	D	D	A	D	C
Approach Delay		28.5			26.3			19.2				34.1
Approach LOS		C			C			B				C
Queue Length 50th (m)	26.0	25.1	0.0	48.4	40.0		0.0	11.8	47.4	0.0	26.9	13.6
Queue Length 95th (m)	41.3	39.3	0.0	63.9	56.0		0.0	25.0	66.1	0.0	41.2	22.0
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0		150.0	275.0		40.0
Base Capacity (vph)	459	850	451	661	1091		1444	734	1458	415	1314	658
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.29	0.05	0.61	0.38		0.39	0.24	0.57	0.44	0.55	0.13
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	117.4											
Natural Cycle:	90											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.78											
Intersection Signal Delay:	25.3						Intersection LOS: C					
Intersection Capacity Utilization:	58.8%						ICU Level of Service B					
Analysis Period (min)	15											

Lanes, Volumes, Timings
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2041 <AM>
01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd



Lanes, Volumes, Timings
2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2041 <AM>
01-31-2023

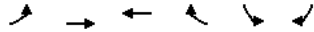
	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↓↓
Traffic Volume (vph)	0	848	514	0	187	745
Future Volume (vph)	0	848	514	0	187	745
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.900	0.850
Flt Protected					0.984	
Satd. Flow (prot)	0	3197	2995	0	2778	1302
Flt Permitted					0.984	
Satd. Flow (perm)	0	3197	2995	0	2778	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					286	405
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	922	559	0	203	810
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	922	559	0	608	405
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2041 <AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

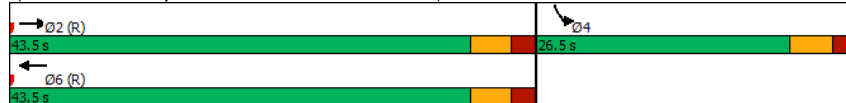


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.53	0.34			0.59	0.31
Control Delay	11.7	9.7			13.3	0.6
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	11.7	9.7			13.3	0.6
LOS	B	A			B	A
Approach Delay	11.7	9.7			8.2	
Approach LOS	B	A			A	
Queue Length 50th (m)	39.4	20.8			17.9	0.0
Queue Length 95th (m)	54.8	30.6			33.6	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			1033	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.53	0.34			0.59	0.31

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 9.9 Intersection LOS: A
 Intersection Capacity Utilization 52.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2041 <AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	516	0	0	332	215	56
Future Volume (vph)	516	0	0	332	215	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Fit Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	561	0	0	361	234	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	561	0	0	361	234	61
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 35.1% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2041 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	516	0	0	332	215	56
Future Volume (Veh/h)	516	0	0	332	215	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)	561	0	0	361	234	61
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			561		742	280
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			561		742	280
tC, single (s)			4.1		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		30	91
cM capacity (veh/h)			1006		334	714
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	280	280	180	180	234	61
Volume Left	0	0	0	0	234	0
Volume Right	0	0	0	0	0	61
cSH	1700	1700	1700	1700	334	714
Volume to Capacity	0.17	0.17	0.11	0.11	0.70	0.09
Queue Length 95th (m)	0.0	0.0	0.0	0.0	40.1	2.2
Control Delay (s)	0.0	0.0	0.0	0.0	37.5	10.5
Lane LOS					E	B
Approach Delay (s)	0.0		0.0		31.9	
Approach LOS					D	
Intersection Summary						
Average Delay			7.7			
Intersection Capacity Utilization			35.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2041 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	79	40	38	256	323	85
Future Volume (vph)	79	40	38	256	323	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.969	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	2951	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	2951	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	86	43	41	278	351	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	43	41	278	443	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.7%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2041 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	79	40	38	256	323	85	
Future Volume (Veh/h)	79	40	38	256	323	85	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	86	43	41	278	351	92	
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	618	222	443				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	618	222	443				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	76	95	96				
cM capacity (veh/h)	356	788	949				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	86	43	41	139	139	234	209
Volume Left	86	0	41	0	0	0	0
Volume Right	0	43	0	0	0	0	92
cSH	356	788	949	1700	1700	1700	1700
Volume to Capacity	0.24	0.05	0.04	0.08	0.08	0.14	0.12
Queue Length 95th (m)	7.4	1.4	1.1	0.0	0.0	0.0	0.0
Control Delay (s)	18.3	9.8	9.0	0.0	0.0	0.0	0.0
Lane LOS	C	A	A				
Approach Delay (s)	15.5	1.2		0.0			
Approach LOS	C						
Intersection Summary							
Average Delay	2.7						
Intersection Capacity Utilization	30.7%		ICU Level of Service			A	
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	72	13	313	132	26	341
Future Volume (vph)	72	13	313	132	26	341
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1	0	1		
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.956			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2970	0	1409	2995
Fit Permitted	0.950					0.950
Satd. Flow (perm)	1498	1316	2970	0	1409	2995
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	78	14	340	143	28	371
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	14	483	0	28	371
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15	25		
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 31.6%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2041 <AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↖	↗	↕	↔	↖	↗	
Traffic Volume (veh/h)	72	13	313	132	26	341	
Future Volume (Veh/h)	72	13	313	132	26	341	
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)	78	14	340	143	28	371	
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	653	242			483		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	653	242			483		
tC, single (s)	7.0	7.2			4.5		
tC, 2 stage (s)							
tF (s)	3.6	3.4			2.4		
p0 queue free %	79	98			97		
cM capacity (veh/h)	369	727			971		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	78	14	227	256	28	186	186
Volume Left	78	0	0	0	28	0	0
Volume Right	0	14	0	143	0	0	0
cSH	369	727	1700	1700	971	1700	1700
Volume to Capacity	0.21	0.02	0.13	0.15	0.03	0.11	0.11
Queue Length 95th (m)	6.3	0.5	0.0	0.0	0.7	0.0	0.0
Control Delay (s)	17.3	10.1	0.0	0.0	8.8	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	16.2		0.0		0.6		
Approach LOS	C						
Intersection Summary							
Average Delay			1.8				
Intersection Capacity Utilization			31.6%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2041 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↕	↕	↗
Traffic Volume (vph)	38	3	10	409	331	32
Future Volume (vph)	38	3	10	409	331	32
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.987	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2911	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2911	0
Link Speed (k/h)	40		70	70		
Link Distance (m)	1651.3		627.8	493.4		
Travel Time (s)	148.6		32.3	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	41	3	11	445	360	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	3	11	445	395	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 22.3%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2041 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	38	3	10	409	331	32	
Future Volume (Veh/h)	38	3	10	409	331	32	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	41	3	11	445	360	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	622	198	395				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	622	198	395				
tC, single (s)	7.1	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.6	3.3	2.2				
p0 queue free %	90	100	99				
cM capacity (veh/h)	391	817	1175				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	41	3	11	222	222	240	155
Volume Left	41	0	11	0	0	0	0
Volume Right	0	3	0	0	0	0	35
cSH	391	817	1175	1700	1700	1700	1700
Volume to Capacity	0.10	0.00	0.01	0.13	0.13	0.14	0.09
Queue Length 95th (m)	2.8	0.1	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	15.3	9.4	8.1	0.0	0.0	0.0	0.0
Lane LOS	C	A	A				
Approach Delay (s)	14.9	0.2		0.0			
Approach LOS	B						
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization			22.3%	ICU Level of Service		A	
Analysis Period (min)			15				

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2041 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	3	0	31	3	0	3	155	474	3	3	274	9
Future Volume (vph)	3	0	31	3	0	3	155	474	3	3	274	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.932			0.999			0.995	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3154	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	3	0	34	3	0	3	168	515	3	3	298	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	6	0	168	518	0	3	308	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control	Stop		Stop				Free				Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 31.2%							ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2041 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (veh/h)	3	0	31	3	0	3	155	474	3	3	274	9
Future Volume (Veh/h)	3	0	31	3	0	3	155	474	3	3	274	9
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)	3	0	34	3	0	3	168	515	3	3	298	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	906	1163	154	1042	1166	259	308			518		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	796	1067	154	940	1071	116	308			389		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	99	100	96	98	100	100	87			100		
cM capacity (veh/h)	235	181	864	181	180	875	1249			1122		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	3	34	6	168	343	175	3	199	109			
Volume Left	3	0	3	168	0	0	3	0	0			
Volume Right	0	34	3	0	0	3	0	0	10			
cSH	235	864	300	1249	1700	1700	1122	1700	1700			
Volume to Capacity	0.01	0.04	0.02	0.13	0.20	0.10	0.00	0.12	0.06			
Queue Length 95th (m)	0.3	1.0	0.5	3.7	0.0	0.0	0.1	0.0	0.0			
Control Delay (s)	20.5	9.3	17.2	8.3	0.0	0.0	8.2	0.0	0.0			
Lane LOS	C	A	C	A	A			A				
Approach Delay (s)	10.2		17.2	2.0	0.1							
Approach LOS	B		C									
Intersection Summary												
Average Delay			1.8									
Intersection Capacity Utilization			31.2%		ICU Level of Service			A				
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2041 <AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	
Traffic Volume (vph)	401	0	9	277	3	17
Future Volume (vph)	401	0	9	277	3	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected			0.998		0.993	
Satd. Flow (prot)	1651	0	0	1616	1415	0
Fit Permitted			0.998		0.993	
Satd. Flow (perm)	1651	0	0	1616	1415	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	436	0	10	301	3	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	436	0	0	311	21	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 33.7%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2041 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	401	0	9	277	3	17
Future Volume (Veh/h)	401	0	9	277	3	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)	436	0	10	301	3	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			436		757	436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			436		757	436
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			99		99	97
cM capacity (veh/h)			948		374	604
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	436	311	21			
Volume Left	0	10	3			
Volume Right	0	0	18			
cSH	1700	948	555			
Volume to Capacity	0.26	0.01	0.04			
Queue Length 95th (m)	0.0	0.3	0.9			
Control Delay (s)	0.0	0.4	11.7			
Lane LOS	A		B			
Approach Delay (s)	0.0	0.4	11.7			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			33.7%		ICU Level of Service A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

10: Montrose Rd & Hospital South Access/Private Access

Future Background_2041 <AM>
01-31-2023

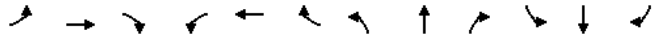
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Traffic Volume (vph)	6	0	141	0	0	0	455	623	0	0	286	19
Future Volume (vph)	6	0	141	0	0	0	455	623	0	0	286	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0		0.0		30.0		0.0		80.0	
Storage Lanes	1		0		1		0		1		1	
Taper Length (m)	7.5		7.5		7.5		15.0		15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit	0.850										0.850	
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.430					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	738	3228	0	1716	3167	1458
Right Turn on Red			Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	668											
Link Speed (k/h)	50				50		80				80	
Link Distance (m)	101.3				60.9		348.2				226.1	
Travel Time (s)	7.3				4.4		15.7				10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	5%	2%
Adj. Flow (vph)	7	0	153	0	0	0	495	677	0	0	311	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	677	0	0	311	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		7.2				7.2	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Turn Type	Perm	NA	Perm	Perm	pm+pt	NA	Perm	NA	Perm	NA	Perm	Perm
Protected Phases	4		8		8		5		2		6	
Permitted Phases	4		8		8		5		2		6	
Minimum Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	13.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	27.0	52.5	25.5	25.5	25.5	25.5
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	33.8%	65.6%	31.9%	31.9%	31.9%	31.9%
Maximum Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	21.5	47.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag							Lead		Lag		Lag	
Lead-Lag Optimize?							Yes		Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effct Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	47.0	47.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.59	0.59	0.25	0.25	0.25	0.25

Lanes, Volumes, Timings

Future Background_2041 <AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.17					0.74	0.36			0.39	0.05
Control Delay	21.5	0.4					17.5	9.3			26.7	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.4					17.5	9.3			26.7	0.2
LOS	C	A					B	A			C	A
Approach Delay		1.3						12.8			25.1	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					42.6	27.0			21.7	0.0
Queue Length 95th (m)	3.8	0.0					68.0	37.5			33.5	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	885					673	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.17					0.74	0.36			0.39	0.05

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 14.1

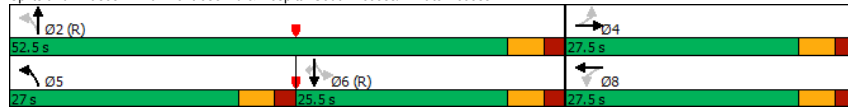
Intersection LOS: B

Intersection Capacity Utilization 59.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

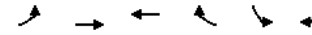


Lanes, Volumes, Timings

Future Background_2041 <AM>

11: Biggar Rd & Hospital East Access

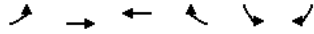
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↑	↑
Traffic Volume (vph)	48	339	280	213	85	31
Future Volume (vph)	48	339	280	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Fr				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3197	1458	1630	1458
Fit Permitted	0.567				0.950	
Satd. Flow (perm)	973	3228	3197	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	368	304	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	368	304	232	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	41.0	41.0	41.0	41.0	29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%	58.6%	41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2041 <AM>
01-31-2023

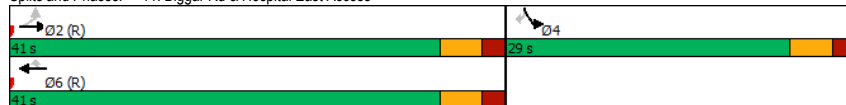


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.11	0.22	0.19	0.27	0.17	0.07
Control Delay	9.8	10.0	9.8	2.4	17.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	10.0	9.8	2.4	17.5	6.6
LOS	A	B	A	A	B	A
Approach Delay		10.0	6.6		14.5	
Approach LOS		B	A		B	
Queue Length 50th (m)	3.5	13.8	11.2	0.0	8.8	0.0
Queue Length 95th (m)	8.9	21.3	17.8	9.7	18.8	5.6
Internal Link Dist (m)		341.4	302.3		168.4	
Turn Bay Length (m)	30.0			50.0		
Base Capacity (vph)	493	1637	1621	853	547	512
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.22	0.19	0.27	0.17	0.07

Intersection Summary

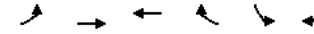
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.27
 Intersection Signal Delay: 8.8
 Intersection LOS: A
 Intersection Capacity Utilization 37.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2041 <AM>
01-31-2023



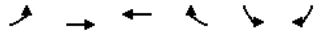
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	387	263	48	0	15
Future Volume (vph)	19	387	263	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fr			0.977		0.865	
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3133	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3133	0	1484	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		413.8	365.4		157.5	
Travel Time (s)		18.6	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	421	286	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	421	338	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 26.2%
 ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
 12: Biggar Rd & Hospital West Access

Future Background_2041 <AM>
 01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↕	
Traffic Volume (veh/h)	19	387	263	48	0	15
Future Volume (Veh/h)	19	387	263	48	0	15
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)	21	421	286	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			365			
pX, platoon unblocked						
vC, conflicting volume	338				564	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	338				564	169
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	98
cM capacity (veh/h)	1218				447	845
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	210	210	191	147	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1218	1700	1700	1700	1700	845
Volume to Capacity	0.02	0.12	0.12	0.11	0.09	0.02
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	8.0	0.0	0.0	0.0	0.0	9.3
Lane LOS	A					A
Approach Delay (s)	0.4			0.0		9.3
Approach LOS						A
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			26.2%		ICU Level of Service	A
Analysis Period (min)			15			

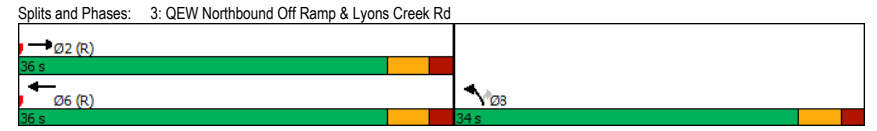
Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2041 Improved <AM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	516	0	0	332	215	56
Future Volume (vph)	516	0	0	332	215	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Flt Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1510	1444
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						61
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	561	0	0	361	234	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	561	0	0	361	234	61
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	36.0			36.0	34.0	34.0
Total Split (%)	51.4%			51.4%	48.6%	48.6%
Maximum Green (s)	30.5			30.5	28.5	28.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	30.5			30.5	28.5	28.5
Actuated g/C Ratio	0.44			0.44	0.41	0.41
v/c Ratio	0.43			0.27	0.38	0.10

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2041 Improved <AM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	15.0			13.4	16.9	4.4
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	15.0			13.4	16.9	4.4
LOS	B			B	B	A
Approach Delay	15.0			13.4	14.3	
Approach LOS	B			B	B	
Queue Length 50th (m)	27.0			16.0	21.9	0.0
Queue Length 95th (m)	39.6			25.0	39.1	6.4
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1304			1317	615	624
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.43			0.27	0.38	0.10

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	14.4
Intersection Capacity Utilization:	37.6%
Intersection LOS:	B
ICU Level of Service:	A
Analysis Period (min):	15



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 Improved <AM>
01-13-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↙	↓
Traffic Volume (vph)	72	13	313	132	26	341
Future Volume (vph)	72	13	313	132	26	341
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0			15.0		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.956			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2970	0	1409	2995
Fit Permitted	0.950				0.476	
Satd. Flow (perm)	1498	1316	2970	0	706	2995
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		14	141			
Link Speed (k/h)	60		70			70
Link Distance (m)	170.9		493.4			425.4
Travel Time (s)	10.3		25.4			21.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	78	14	340	143	28	371
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	14	483	0	28	371
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 Improved <AM>
01-13-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.17	0.03	0.30		0.08	0.23
Control Delay	18.6	9.1	6.9		8.8	9.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.6	9.1	6.9		8.8	9.4
LOS	B	A	A		A	A
Approach Delay	17.1		6.9			9.3
Approach LOS	B		A			A
Queue Length 50th (m)	7.7	0.0	12.2		1.8	13.3
Queue Length 95th (m)	17.2	3.7	20.2		5.5	20.7
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	470	423	1636		373	1583
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.17	0.03	0.30		0.08	0.23

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.30
Intersection Signal Delay:	8.9
Intersection Capacity Utilization:	39.3%
Analysis Period (min):	15
Intersection LOS:	A
ICU Level of Service:	A

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2041 <PM>

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	92	334	48	511	342	256	26	329	557	557	446	111
Future Volume (vph)	92	334	48	511	342	256	26	329	557	557	446	111
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	3260	1430	3162	3260	1417	1599	3228	1444	3131	3260	1473
Fit Permitted	0.531			0.950			0.476			0.950		
Satd. Flow (perm)	920	3260	1430	3162	3260	1417	801	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			278			539			121
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	1%	2%	4%	2%	2%	5%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	100	363	52	555	372	278	28	358	605	605	485	121
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	363	52	555	372	278	28	358	605	605	485	121
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0			0.0			0.0	
Detector 2 Size(m)		0.0			0.0			0.0			0.0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2041 <PM>

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (%)	12.2	32.7	32.7	39.0	59.5		31.3	31.3			42.0	73.3
Total Split (%)	8.4%	22.6%	22.6%	26.9%	41.0%		21.6%	21.6%			29.0%	50.6%
Maximum Green (s)	8.7	26.4	26.4	33.5	53.2		25.0	25.0			36.5	67.0
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	41.3	30.2	30.2	29.3	53.2	144.6	25.0	25.0	144.6	36.5	67.0	67.0
Actuated g/C Ratio	0.29	0.21	0.21	0.20	0.37	1.00	0.17	0.17	1.00	0.25	0.46	0.46
v/c Ratio	0.33	0.53	0.13	0.87	0.31	0.20	0.20	0.64	0.42	0.77	0.32	0.16
Control Delay	27.9	55.1	0.7	70.2	33.6	0.3	55.9	61.7	0.9	57.6	25.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	55.1	0.7	70.2	33.6	0.3	55.9	61.7	0.9	57.6	25.3	4.1
LOS	C	E	A	E	C	A	E	E	A	E	C	A
Approach Delay		44.3			42.8			24.4			39.3	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	16.8	52.2	0.0	83.9	42.1	0.0	7.4	53.6	0.0	88.0	48.0	0.0
Queue Length 95th (m)	28.7	71.7	0.0	103.3	56.1	0.0	17.6	71.8	0.0	110.9	61.8	11.6
Internal Link Dist (m)		302.3			313.6			592.2			324.2	
Turn Bay Length (m)	130.0		30.0	265.0			30.0	150.0		275.0		40.0
Base Capacity (vph)	309	680	404	732	1199	1417	138	557	1444	790	1510	747
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.53	0.13	0.76	0.31	0.20	0.20	0.64	0.42	0.77	0.32	0.16
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	144.6											
Natural Cycle:	110											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.87											
Intersection Signal Delay:	37.3						Intersection LOS: D					
Intersection Capacity Utilization:	72.6%						ICU Level of Service C					
Analysis Period (min):	15											

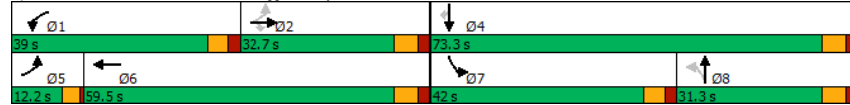
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Background_2041 <PM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd



Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Background_2041 <PM>

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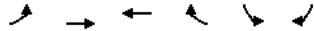
	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	↑
Traffic Volume (vph)	0	1055	454	0	304	574
Future Volume (vph)	0	1055	454	0	304	574
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.927	0.850
Flt Protected					0.975	
Satd. Flow (prot)	0	3197	3197	0	2962	1327
Flt Permitted					0.975	
Satd. Flow (perm)	0	3197	3197	0	2962	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					312	312
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1147	493	0	330	624
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1147	493	0	642	312
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Background_2041 <PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

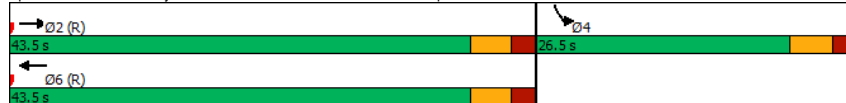


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.66	0.28			0.58	0.24
Control Delay	13.7	9.2			12.7	0.4
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	13.7	9.2			12.7	0.4
LOS	B	A			B	A
Approach Delay	13.7	9.2			8.7	
Approach LOS	B	A			A	
Queue Length 50th (m)	54.5	17.7			18.2	0.0
Queue Length 95th (m)	75.0	26.3			33.8	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			1107	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.66	0.28			0.58	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 11.0 Intersection LOS: B
 Intersection Capacity Utilization 58.3% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Background_2041 <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	730	0	0	437	111	66
Future Volume (vph)	730	0	0	437	111	66
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1363	1352
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	793	0	0	475	121	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	793	0	0	475	121	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 35.1% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Background_2041 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	730	0	0	437	111	66
Future Volume (Veh/h)	730	0	0	437	111	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)	793	0	0	475	121	72
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			793		1032	396
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			793		1032	396
tC, single (s)			4.1		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			100		39	88
cM capacity (veh/h)			824		197	581
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	396	396	238	238	121	72
Volume Left	0	0	0	0	121	0
Volume Right	0	0	0	0	0	72
cSH	1700	1700	1700	1700	197	581
Volume to Capacity	0.23	0.23	0.14	0.14	0.61	0.12
Queue Length 95th (m)	0.0	0.0	0.0	0.0	27.8	3.4
Control Delay (s)	0.0	0.0	0.0	0.0	48.4	12.1
Lane LOS					E	B
Approach Delay (s)	0.0		0.0		34.9	
Approach LOS					D	
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization			35.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Background_2041 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	58	51	51	469	516	60
Future Volume (vph)	58	51	51	469	516	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.984	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3154	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3154	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	63	55	55	510	561	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	55	55	510	626	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	34.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Background_2041 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	58	51	51	469	516	60	
Future Volume (Veh/h)	58	51	51	469	516	60	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	63	55	55	510	561	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	958	313	626				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	958	313	626				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	74	91	94				
cM capacity (veh/h)	238	638	945				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	63	55	55	255	255	374	252
Volume Left	63	0	55	0	0	0	0
Volume Right	0	55	0	0	0	0	65
cSH	238	638	945	1700	1700	1700	1700
Volume to Capacity	0.26	0.09	0.06	0.15	0.15	0.22	0.15
Queue Length 95th (m)	8.2	2.3	1.5	0.0	0.0	0.0	0.0
Control Delay (s)	25.4	11.2	9.0	0.0	0.0	0.0	0.0
Lane LOS	D	B	A				
Approach Delay (s)	18.8	0.9		0.0			
Approach LOS	C						
Intersection Summary							
Average Delay	2.1						
Intersection Capacity Utilization	34.4%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 <PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↕↕	↔	↕↕
Traffic Volume (vph)	157	44	471	116	44	494
Future Volume (vph)	157	44	471	116	44	494
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.970			
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1646	1488	3089	0	1662	3197
Fit Permitted	0.950					
Satd. Flow (perm)	1646	1488	3089	0	1662	3197
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	171	48	512	126	48	537
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	48	638	0	48	537
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 40.9%					ICU Level of Service A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Background_2041 <PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕	↔	↔	↕↕	
Traffic Volume (veh/h)	157	44	471	116	44	494	
Future Volume (Veh/h)	157	44	471	116	44	494	
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)	171	48	512	126	48	537	
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	940	319			638		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	940	319			638		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	32	93			95		
cM capacity (veh/h)	251	683			956		
Direction_Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	171	48	341	297	48	268	268
Volume Left	171	0	0	0	48	0	0
Volume Right	0	48	0	126	0	0	0
cSH	251	683	1700	1700	956	1700	1700
Volume to Capacity	0.68	0.07	0.20	0.17	0.05	0.16	0.16
Queue Length 95th (m)	35.6	1.8	0.0	0.0	1.3	0.0	0.0
Control Delay (s)	45.3	10.7	0.0	0.0	9.0	0.0	0.0
Lane LOS	E	B			A		
Approach Delay (s)	37.7		0.0		0.7		
Approach LOS	E						
Intersection Summary							
Average Delay			6.0				
Intersection Capacity Utilization			40.9%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Grassy Brook Rd

Future Background_2041 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	51	7	0	485	638	59
Future Volume (vph)	51	7	0	485	638	59
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.987	
Fit Protected	0.950					
Satd. Flow (prot)	1662	1190	1750	3137	3166	0
Fit Permitted	0.950					
Satd. Flow (perm)	1662	1190	1750	3137	3166	0
Link Speed (k/h)	40			70	70	
Link Distance (m)	1651.3			627.8	493.4	
Travel Time (s)	148.6			32.3	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	55	8	0	527	693	64
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	8	0	527	757	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 31.2%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Grassy Brook Rd

Future Background_2041 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	51	7	0	485	638	59	
Future Volume (Veh/h)	51	7	0	485	638	59	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	55	8	0	527	693	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	988	378	757				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	988	378	757				
tC, single (s)	6.8	7.4	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	78	99	100				
cM capacity (veh/h)	247	558	863				
Direction_Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	55	8	0	264	264	462	295
Volume Left	55	0	0	0	0	0	0
Volume Right	0	8	0	0	0	0	64
cSH	247	558	1700	1700	1700	1700	1700
Volume to Capacity	0.22	0.01	0.00	0.15	0.15	0.27	0.17
Queue Length 95th (m)	6.6	0.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	23.7	11.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B					
Approach Delay (s)	22.1		0.0			0.0	
Approach LOS	C						
Intersection Summary							
Average Delay			1.0				
Intersection Capacity Utilization			31.2%		ICU Level of Service		A
Analysis Period (min)	15						

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2041 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	85	3	0	3	61	450	3	3	652	3
Future Volume (vph)	8	0	85	3	0	3	61	450	3	3	652	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850				0.932		0.999			0.999	
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3226	0	1662	3257	0
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3226	0	1662	3257	0
Link Speed (k/h)		50			50			80			70	
Link Distance (m)		118.9			332.1			226.1			627.8	
Travel Time (s)		8.6			23.9			10.2			32.3	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	9	0	92	3	0	3	66	489	3	3	709	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	92	0	0	6	0	66	492	0	3	712	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 39.1%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Background_2041 <PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (veh/h)	8	0	85	3	0	3	61	450	3	3	652	3
Future Volume (Veh/h)	8	0	85	3	0	3	61	450	3	3	652	3
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)	9	0	92	3	0	3	66	489	3	3	709	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)	226											
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	1096	1340	356	1075	1340	246	712			492		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1004	1260	356	982	1260	113	712			371		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	95	100	86	98	100	100	93			100		
cM capacity (veh/h)	175	149	640	159	149	882	884			1144		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3			
Volume Total	9	92	6	66	326	166	3	473	239			
Volume Left	9	0	3	66	0	0	3	0	0			
Volume Right	0	92	3	0	0	3	0	0	3			
cSH	175	640	269	884	1700	1700	1144	1700	1700			
Volume to Capacity	0.05	0.14	0.02	0.07	0.19	0.10	0.00	0.28	0.14			
Queue Length 95th (m)	1.3	4.0	0.5	1.9	0.0	0.0	0.1	0.0	0.0			
Control Delay (s)	26.6	11.6	18.7	9.4	0.0	0.0	8.2	0.0	0.0			
Lane LOS	D	B	C	A	A			A				
Approach Delay (s)	12.9		18.7	1.1	0.0							
Approach LOS	B		C	A								
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			39.1%		ICU Level of Service			A				
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Background_2041 <PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	
Traffic Volume (vph)	254	0	7	485	0	4
Future Volume (vph)	254	0	7	485	0	4
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Fit Protected	0.999					
Satd. Flow (prot)	1683	0	0	1698	1514	0
Fit Permitted	0.999					
Satd. Flow (perm)	1683	0	0	1698	1514	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%
Adj. Flow (vph)	276	0	8	527	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	276	0	0	535	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 43.8%	ICU Level of Service A					
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Background_2041 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	254	0	7	485	0	4
Future Volume (Veh/h)	254	0	7	485	0	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)	276	0	8	527	0	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			276		819	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			276		819	276
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1299		346	768
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	276	535	4			
Volume Left	0	8	0			
Volume Right	0	0	4			
cSH	1700	1299	768			
Volume to Capacity	0.16	0.01	0.01			
Queue Length 95th (m)	0.0	0.1	0.1			
Control Delay (s)	0.0	0.2	9.7			
Lane LOS	A		A			
Approach Delay (s)	0.0	0.2	9.7			
Approach LOS	A		A			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			43.8%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Background_2041 <PM>
01-31-2023

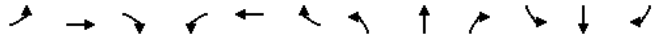
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Traffic Volume (vph)	17	0	382	0	0	0	180	494	0	0	729	7
Future Volume (vph)	17	0	382	0	0	0	180	494	0	0	729	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0		0.0		30.0		0.0		80.0	
Storage Lanes	1		0		1		0		1		1	
Taper Length (m)	7.5		7.5		7.5		15.0		15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit	0.850										0.850	
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.216					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	371	3228	0	1716	3260	1458
Right Turn on Red			Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	312										109	
Link Speed (k/h)	50				50		80				80	
Link Distance (m)	101.3				58.5		348.2				226.1	
Travel Time (s)	7.3				4.2		15.7				10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	537	0	0	792	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	537	0	0	792	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		7.2				7.2	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Turn Type	Perm	NA	Perm	Perm	pm+pt	NA	Perm	NA	Perm	NA	Perm	Perm
Protected Phases	4		8		8		5		2		6	
Permitted Phases	4		8		8		5		2		6	
Minimum Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	13.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	15.1	52.5	37.4	37.4	37.4	37.4
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	18.9%	65.6%	46.8%	46.8%	46.8%	46.8%
Maximum Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	9.6	47.0	31.9	31.9	31.9	31.9
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag							Lead		Lag		Lag	
Lead-Lag Optimize?							Yes		Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effct Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	47.0	47.0	31.9	31.9	31.9	31.9
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.59	0.59	0.40	0.40	0.40	0.40

Lanes, Volumes, Timings

Future Background_2041 <PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023

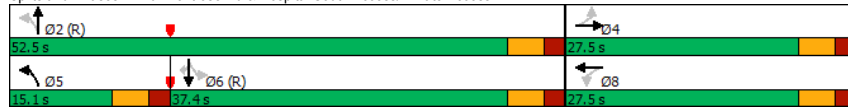


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.66					0.53	0.28			0.61	0.01
Control Delay	21.9	12.7					13.3	8.7			21.6	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	12.7					13.3	8.7			21.6	0.0
LOS	C	B					B	A			C	A
Approach Delay		13.1						9.9			21.4	
Approach LOS		B						A			C	
Queue Length 50th (m)	2.1	12.8					13.4	20.3			51.5	0.0
Queue Length 95th (m)	7.2	43.6					23.5	28.9			70.3	0.0
Internal Link Dist (m)		77.3			34.5			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)		357	627				369	1896			1299	646
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.05	0.66					0.53	0.28			0.61	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 15.3
 Intersection LOS: B
 Intersection Capacity Utilization 72.1%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

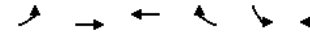


Lanes, Volumes, Timings

Future Background_2041 <PM>

11: Biggar Rd & Hospital East Access

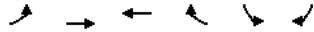
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↑	↑
Traffic Volume (vph)	19	285	393	84	187	85
Future Volume (vph)	19	285	393	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3228	1458	1630	1458
Fit Permitted	0.503				0.950	
Satd. Flow (perm)	863	3197	3228	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				91		92
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	310	427	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	310	427	91	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	42.0	42.0	42.0	42.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Background_2041 <PM>
01-31-2023

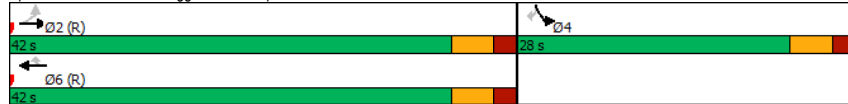


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.05	0.19	0.25	0.11	0.39	0.17
Control Delay	8.6	9.2	9.7	2.6	21.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.2	9.7	2.6	21.1	5.3
LOS	A	A	A	A	C	A
Approach Delay	9.2		8.5		16.2	
Approach LOS	A		A		B	
Queue Length 50th (m)	1.3	11.0	15.8	0.0	21.4	0.0
Queue Length 95th (m)	4.5	17.5	23.9	6.1	38.8	9.2
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	449	1667	1683	803	523	531
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19	0.25	0.11	0.39	0.17

Intersection Summary

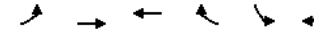
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.39
 Intersection Signal Delay: 10.7 Intersection LOS: B
 Intersection Capacity Utilization 37.6% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Background_2041 <PM>
01-31-2023



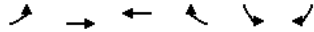
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	↓
Traffic Volume (vph)	7	261	459	19	43	42
Future Volume (vph)	7	261	459	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt	0.994			0.933		
Fit Protected	0.950			0.975		
Satd. Flow (prot)	1630	3197	3210	0	1561	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3197	3210	0	1561	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	413.8		365.4		157.5	
Travel Time (s)	18.6		16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	284	499	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	284	520	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15		25
Sign Control	Free		Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 26.5% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

Future Background_2041 <PM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕	↕	↕	↘
Traffic Volume (veh/h)	7	261	459	19	43	42
Future Volume (Veh/h)	7	261	459	19	43	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)	8	284	499	21	47	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)			365			
pX, platoon unblocked	0.99				0.99	0.99
vC, conflicting volume	520				668	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	487				637	224
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				88	94
cM capacity (veh/h)	1058				401	769
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	142	142	333	187	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	1058	1700	1700	1700	1700	526
Volume to Capacity	0.01	0.08	0.08	0.20	0.11	0.18
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	5.1
Control Delay (s)	8.4	0.0	0.0	0.0	0.0	13.3
Lane LOS	A					B
Approach Delay (s)	0.2			0.0		13.3
Approach LOS						B
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			26.5%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2041 Improved <PM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	730	0	0	437	111	66
Future Volume (vph)	730	0	0	437	111	66
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Flt Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1361	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						72
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	793	0	0	475	121	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	793	0	0	475	121	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	41.0			41.0	29.0	29.0
Total Split (%)	58.6%			58.6%	41.4%	41.4%
Maximum Green (s)	35.5			35.5	23.5	23.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.5			35.5	23.5	23.5
Actuated g/C Ratio	0.51			0.51	0.34	0.34
v/c Ratio	0.49			0.28	0.26	0.14

Lanes, Volumes, Timings
 3: QEW Northbound Off Ramp & Lyons Creek Rd
 Future Background_2041 Improved <PM>
 01-13-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	12.6			10.5	18.9	5.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	12.6			10.5	18.9	5.5
LOS	B			B	B	A
Approach Delay	12.6			10.5	13.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	35.2			18.5	12.0	0.0
Queue Length 95th (m)	49.4			27.4	24.4	8.0
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1621			1669	457	501
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.49			0.28	0.26	0.14

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.49
Intersection Signal Delay:	12.1
Intersection Capacity Utilization:	36.4%
Intersection LOS:	B
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 Improved <PM>
01-13-2023

	←		↑		→	
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (vph)	157	44	471	116	44	494
Future Volume (vph)	157	44	471	116	44	494
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.970			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3089	0	1662	3197
Fit Permitted	0.950				0.387	
Satd. Flow (perm)	1646	1488	3089	0	677	3197
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		48	65			
Link Speed (k/h)	60		70			70
Link Distance (m)	170.9		493.4			425.4
Travel Time (s)	10.3		25.4			21.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	171	48	512	126	48	537
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	48	638	0	48	537
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Background_2041 Improved <PM>
01-13-2023

	←		↑		→	
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.33	0.10	0.38		0.13	0.32
Control Delay	20.6	6.4	9.5		9.6	10.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.6	6.4	9.5		9.6	10.0
LOS	C	A	A		A	B
Approach Delay	17.5		9.5			10.0
Approach LOS	B		A			A
Queue Length 50th (m)	17.8	0.0	22.2		3.1	20.3
Queue Length 95th (m)	33.2	6.8	33.2		8.5	29.8
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	517	500	1663		357	1689
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.33	0.10	0.38		0.13	0.32

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.38

Intersection Signal Delay: 10.9

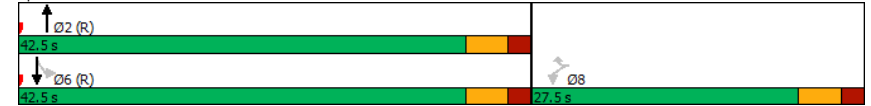
Intersection LOS: B

Intersection Capacity Utilization 49.7%

ICU Level of Service A

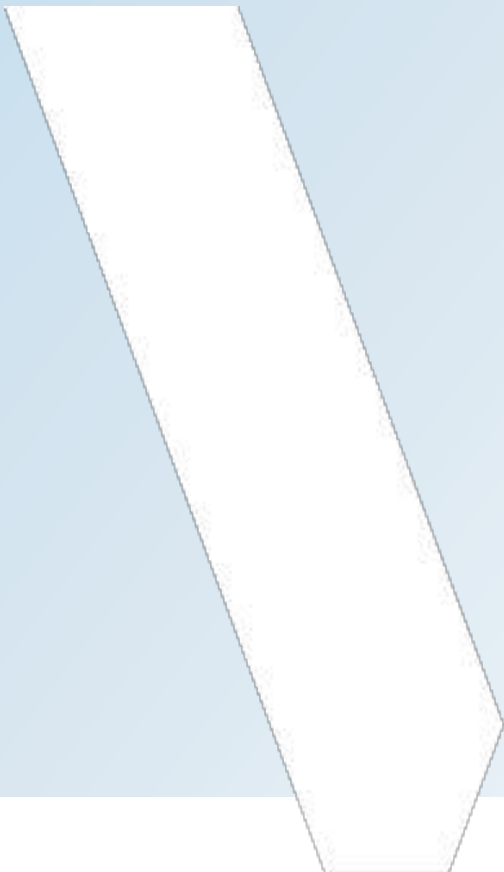
Analysis Period (min) 15

Splits and Phases: 5: Montrose Rd & Oakwood Dr



APPENDIX

H WARRANT ANALYSIS



TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FB	East-West Street	Oakwood Drive
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Montrose Road
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	Yes ▼	Approach lanes per direction	2 ▼ 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	313	132	26	341	0	812	0	0	0	72	0	13	85	10	10	
PM Peak Hour	0	471	116	44	494	0	1125	0	0	0	157	0	44	201	10	10	
Total	0	784	248	70	835	0	1937	0	0	0	229	0	57	286	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	897	1326	556
Vehicle volume, along minor street	85	201	72
Vehicle volume, along major street	812	1125	484
Combined vehicle and pedestrian volume crossing from minor streets	82	167	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.	72	157
b.	0	0
c.	0	0
1.	No	No
2.	No	No
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FB	East-West Street	Oakwood Drive
Flow Conditions	Restricted flow (urban)	North-South Street	#REF!
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	2 Major Street
Additional Comments		Approach lanes per direction	1 Minor Street

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				900	556	41%	41%	No
B. Vehicle volume, along minor streets				170	72	28%	28%	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				900	484	36%	36%	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 2041 FB**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FB	East-West Street	Lyon's Creek Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	QEW NB off-ramp
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	2 ▼ Major Street
		Approach lanes per direction	2 ▼ Minor Street
Additional Comments			

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	0	516	0	0	332	0	848	215	0	56	0	0	0	271	10	10	
PM Peak Hour	0	730	0	0	437	0	1167	111	0	66	0	0	0	177	10	10	
Total	0	1246	0	0	769	0	2015	326	0	122	0	0	0	448	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1119	1344	616
Vehicle volume, along minor street	271	177	112
Vehicle volume, along major street	848	1167	504
Combined vehicle and pedestrian volume crossing from minor streets	225	121	87

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.	215	111
b.	0	0
c.	0	0
1.	No	No
2.	No	Yes
d.	10	10

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		Grand Niagara TIS						
Analyst	Kian	Jurisdiction	Grand Niagara					
Agency or Company	WSP Canada Inc.	Date	August 31, 2022					
Analysis Period	2041 FB	East-West Street	Lyon's Creek Road					
Flow Conditions	Restricted flow (urban)	North-South Street	QEW NB off-ramp					
'T' Intersection	Yes	Major Street	East-West					
Existing Intersection	Yes	Approach lanes per direction	2	Major Street				
		Approach lanes per direction	2	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				900	616	46%	46%	No
B. Vehicle volume, along minor streets				170	112	44%	44%	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				900	504	37%	37%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	87	77%	77%	No
CONCLUSION								
<p>The results of the calculations show that justifications are not met.</p> <p>Therefore traffic control signal is not justified at this intersection for the horizon year 2041 FB</p>								

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Street HH/Reixinger Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Montrose Road
'T' Intersection	No ▼	Major Street	North-South ▼
Existing Intersection	No ▼	Approach lanes per direction	2 ▼ 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	171	539	3	3	494	85	1295	165	0	68	3	0	3	239	10	10	
PM Peak Hour	104	579	3	3	834	249	1772	116	0	117	3	0	3	239	10	10	
Total	275	1118	6	6	1328	334	3067	281	0	185	6	0	6	478	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1534	2011	886
Vehicle volume, along minor street	239	239	120
Vehicle volume, along major street	1295	1772	767
Combined vehicle and pedestrian volume crossing from minor streets	178	129	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.	168	119
b.	0	0
c.	0	0
1.	Yes	No
2.	No	Yes
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Street HH/Reixinger
Flow Conditions	Restricted flow (urban)	North-South Street	Montrose Road
'T' Intersection	No	Major Street	North-South
Existing Intersection	No	Approach lanes per direction	2 Major Street
		Approach lanes per direction	1 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				900	886	98%	98%	No
B. Vehicle volume, along minor streets				170	120	70%	70%	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				900	767	85%	85%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	77	102%	102%	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 2041 FT**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Grassy Brook Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Montrose Road
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	Yes ▼	Approach lanes per direction	2 ▼ 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					
	LT	TH	RT	LT	TH	RT	LT		TH	RT	LT	TH	RT	Total			
AM Peak Hour	44	654	0	0	444	158	1300	299	0	184	0	0	0	483	10	10	
PM Peak Hour	89	646	0	0	977	495	2207	224	0	146	0	0	0	370	10	10	
Total	133	1300	0	0	1421	653	3507	523	0	330	0	0	0	853	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1783	2577	1090
Vehicle volume, along minor street	483	370	213
Vehicle volume, along major street	1300	2207	877
Combined vehicle and pedestrian volume crossing from minor streets	309	234	136

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.	299	224
b.	0	0
c.	0	0
1.	No	No
2.	No	Yes
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Grassy Brook Road
Flow Conditions	Restricted flow (urban)	North-South Street	Montrose Road
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	2
		Approach lanes per direction	1
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				900	1090	81%	81%	No
B. Vehicle volume, along minor streets				170	213	84%	84%	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				900	877	65%	65%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	136	121%	121%	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 2041 FT**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Oakwood Drive
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Montrose Road
'T' Intersection	Yes ▼	Major Street	North-South ▼
Existing Intersection	Yes ▼	Approach lanes per direction	2 ▼ 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	819	132	26	580	0	1557	0	0	0	72	0	13	85	10	10	
PM Peak Hour	0	805	116	44	1268	0	2233	0	0	0	157	0	44	201	10	10	
Total	0	1624	248	70	1848	0	3790	0	0	0	229	0	57	286	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1642	2434	1019
Vehicle volume, along minor street	85	201	72
Vehicle volume, along major street	1557	2233	948
Combined vehicle and pedestrian volume crossing from minor streets	82	167	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.	72	157
b.	0	0
c.	0	0
1.	No	No
2.	Yes	Yes
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Oakwood Drive
Flow Conditions	Restricted flow (urban)	North-South Street	Montrose Road
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	2 Major Street
Additional Comments		Approach lanes per direction	1 Minor Street

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				900	1019	75%	75%	No
B. Vehicle volume, along minor streets				170	72	28%	28%	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				900	948	70%	70%	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 2041 FT**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Chippawa Creek Road
		North-South Street	Montrose Road
Flow Conditions	Restricted flow (urban) ▼	Major Street	North-South ▼
'T' Intersection	Yes ▼	Approach lanes per direction	2 ▼ 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	38	762	0	0	562	85	1447	79	0	40	0	0	0	119	10	10	
PM Peak Hour	51	803	0	0	1290	60	2204	58	0	51	0	0	0	109	10	10	
Total	89	1565	0	0	1852	145	3651	137	0	91	0	0	0	228	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1566	2313	970
Vehicle volume, along minor street	119	109	57
Vehicle volume, along major street	1447	2204	913
Combined vehicle and pedestrian volume crossing from minor streets	89	68	39

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.	79	58
b.	0	0
c.	0	0
1.	No	No
2.	No	Yes
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Chippawa Creek Road
Flow Conditions	Restricted flow (urban)	North-South Street	Montrose Road
'T' Intersection	Yes	Major Street	North-South
Existing Intersection	Yes	Approach lanes per direction	2 Major Street
Additional Comments		Approach lanes per direction	1 Minor Street

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				900	970	72%	72%	No
B. Vehicle volume, along minor streets				170	57	22%	22%	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				900	913	68%	68%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	39	35%	35%	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 2041 FT**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Biggar Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	Street A
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	No ▼	Approach lanes per direction	2 ▼ 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	68	414	0	0	294	223	999	0	0	0	526	0	137	663	10	10	
PM Peak Hour	179	285	0	0	511	570	1545	0	0	0	450	0	117	567	10	10	
Total	247	699	0	0	805	793	2544	0	0	0	976	0	254	1230	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1662	2112	944
Vehicle volume, along minor street	663	567	308
Vehicle volume, along major street	999	1545	636
Combined vehicle and pedestrian volume crossing from minor streets	536	460	249

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.	526	450
b.	0	0
c.	0	0
1.	No	Yes
2.	No	No
d.	10	10

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Biggar Road
		North-South Street	Street A
Flow Conditions	Restricted flow (urban)	Major Street	East-West
'T' Intersection	Yes	Approach lanes per direction	2
Existing Intersection	No	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				900	944	70%	70%	No
B. Vehicle volume, along minor streets				170	308	121%	121%	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				900	636	47%	47%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	249	221%	221%	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 2041 FT**

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

Grand Niagara TIS

Analyst	Kian	Jurisdiction	Grand Niagara
Agency or Company	WSP Canada Inc.	Date	August 31, 2022
Analysis Period	2041 FT	East-West Street	Lyon's Creek Road
Flow Conditions	Restricted flow (urban) ▼	North-South Street	QEW NB off-ramp
'T' Intersection	Yes ▼	Major Street	East-West ▼
Existing Intersection	Yes ▼	Approach lanes per direction	2 ▼ Major Street
		Approach lanes per direction	2 ▼ Minor Street
Additional Comments			

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	0	706	0	0	415	0	1121	235	0	56	0	0	0	291	10	10	
PM Peak Hour	0	873	0	0	659	0	1532	166	0	66	0	0	0	232	10	10	
Total	0	1579	0	0	1074	0	2653	401	0	122	0	0	0	523	20	20	

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1412	1764	794
Vehicle volume, along minor street	291	232	131
Vehicle volume, along major street	1121	1532	663
Combined vehicle and pedestrian volume crossing from minor streets	245	176	105

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.	235	166
b.	0	0
c.	0	0
1.	No	No
2.	No	Yes
d.	10	10

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		Grand Niagara TIS						
Analyst	Kian	Jurisdiction	Grand Niagara					
Agency or Company	WSP Canada Inc.	Date	August 31, 2022					
Analysis Period	2041 FT	East-West Street	Lyon's Creek Road					
Flow Conditions	Restricted flow (urban)	North-South Street	QEW NB off-ramp					
'T' Intersection	Yes	Major Street	East-West					
Existing Intersection	Yes	Approach lanes per direction	2		Major Street			
		Approach lanes per direction	2		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				900	794	59%	59%	No
B. Vehicle volume, along minor streets				170	131	51%	51%	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				900	663	49%	49%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets				75	105	94%	94%	No
CONCLUSION								
<p>The results of the calculations show that justifications are not met.</p> <p>Therefore traffic control signal is not justified at this intersection for the horizon year 2041 FT</p>								

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.

**All-Way Stop Warrant
(Minor Roads)**

**2041 Future - AM Peak Hour
Grassy Brook Road (Street Q) & Street A**

of legs in the Intersection ("3" or "4"): 4

Peak Hour	Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
0:00	9	18	79	36	49	0	0	43	0	70	15	12

All way Stop Warrant (Minor Roads)

**2041 Future - AM Peak Hour
Grassy Brook Road (Street Q) & Street A**

Conditions	
1.	Vehicles > 350 on all intersection approaches
2.	Volume split 75/25 (3-way) or 65/35 (4-way)

Intersection:	
Date Taken:	

Peak Hour	Total Vehicles	Volume Split
0:00	331	42.30%
Met Conditions?	NO	YES

All-way Stop Justified?	NO
-------------------------	----

**All-Way Stop Warrant
(Minor Roads)**

**2041 Future - PM Peak Hour
Grassy Brook Road (Street Q) & Street A**

of legs in the Intersection ("3" or "4"): 4

Peak Hour	Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
0:00	29	59	98	24	37	0	0	27	0	112	53	42

All way Stop Warrant (Minor Roads)

**2041 Future - PM Peak Hour
Grassy Brook Road (Street Q) & Street A**

Conditions	
1.	Vehicles > 350 on all intersection approaches
2.	Volume split 75/25 (3-way) or 65/35 (4-way)

Intersection:	
Date Taken:	

Peak Hour	Total Vehicles	Volume Split
0:00	481	48.65%
Met Conditions?	YES	YES

All-way Stop Justified?	YES
-------------------------	-----

**All-Way Stop Warrant
(Minor Roads)**

**2041 Future - AM Peak Hour
Street A and Street HH**

of legs in the Intersection ("3" or "4"): 3

Peak Hour	Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
0:00	0	106	63	12	299	0	0	0	0	81	0	5

All way Stop Warrant (Minor Roads)

**2041 Future - AM Peak Hour
Street A and Street HH**

Conditions	
1.	Vehicles > 350 on all intersection approaches
2.	Volume split 75/25 (3-way) or 65/35 (4-way)

Intersection:	
Date Taken:	

Peak Hour	Total Vehicles	Volume Split
0:00	566	15.19%
Met Conditions?	YES	NO

All-way Stop Justified?	NO
-------------------------	----

**All-Way Stop Warrant
(Minor Roads)**

**2041 Future - PM Peak Hour
Street A and Street HH**

of legs in the Intersection ("3" or "4"): 3

Peak Hour	Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
0:00	0	331	84	7	220	0	0	0	0	132	0	28

All way Stop Warrant (Minor Roads)

**2041 Future - PM Peak Hour
Street A and Street HH**

Conditions	
1.	Vehicles > 350 on all intersection approaches
2.	Volume split 75/25 (3-way) or 65/35 (4-way)

Intersection:	
Date Taken:	

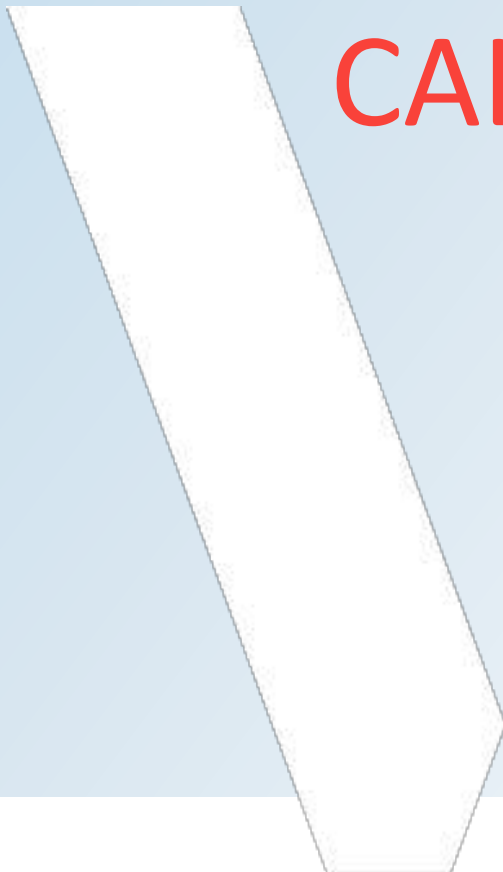
Peak Hour	Total Vehicles	Volume Split
0:00	802	19.95%
Met Conditions?	YES	NO

All-way Stop Justified?	NO
-------------------------	----

APPENDIX



TTS DATA & MULTI-USE CALCULATIONS



Supporting Data

Percentages from ITE Journal August 2010: "Improved Estimation of Internal Trip Capture for Mixed-Use Developments"

AM From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		29%	31%		2%	75%
Retail	28%		14%		1%	14%
Restaurant	63%	13%			20%	9%
Cinema/ Entertainment						
Residential	1%	14%	4%			0%
Hotel	0%	0%	3%		0%	

AM To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		4%	14%		3%	3%
Retail	32%		8%		17%	4%
Restaurant	23%	50%			20%	6%
Cinema/ Entertainment						
Residential	0%	2%	5%			0%
Hotel	0%	0%	4%		0%	

PM (Saturday) From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		2%	3%	2%	4%	0%
Retail	20%		41%	21%	42%	16%
Restaurant	4%	29%		31%	21%	68%
Cinema/ Entertainment	0%	4%	8%		0%	68%
Residential	2%	26%	18%	8%		0%
Hotel	0%	5%	7%	2%	3%	2%

PM (Saturday) To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		31%	30%	6%	57%	0%
Retail	8%		50%	4%	10%	2%
Restaurant	2%	29%		3%	14%	5%
Cinema/ Entertainment	1%	26%	32%		0%	0%
Residential	4%	46%	16%	4%		0%
Hotel	0%	17%	71%	1%	12%	

PM (Saturday) Only From-To Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

PM (Saturday) Only To-From Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

Red numbers for those land use pairs with proximity factors



TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

Group Attributes

Grouping file: No file chosen

Filter Selection +

- Filter survey records by selection criteria:
- 1 Select a data field
 - 2 Enter codes to be included in the extraction.
 - 3 Use '-' to specify a range and ',' to separate codes.
 - 4 Do not use '()' to separate codes.
 - 5 The default operator for selecting values in a specific filter is IN but the operator NOT IN is available to exclude values from the filter.
 - 6 The default operator for connecting multiple filters is AND but the OR operator is also available
 - 7 If a combination of ANDs and ORs is used the checkboxes can be used to act as brackets (see manual for more details) and the bracketed filters

Output

Comma-delimited table
 Column format
 Expansion Factor On

Mon Apr 04 2022 11:58:48 GMT-0400 (Eastern Daylight Time) - Run Time: 3800ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
 Column: Planning district of destination - pd_dest
 Table: Start time of trip - start_time

RowG: (54,55)(56,58)(59,60)(53,61,62)(46,45,51,52)(1-43)(57)
 ColG: (57)
 TblG: (600-899)

Filters:
No Filters

Trip 2016
Table: 1

,1
 1,4063
 2,2578
 3,1871
 4,648
 5,523
 6,836
 7,24912

Instructions

Group attributes on the output by:

- Entering the values of ea group

Example

- (1) (4-6,8) (9-14)
- Group 1: 1
- Group 2: 4,5,6,8
- Group 3: 9,10,11,12,13,14

[Open current page in new tab.](#)

Start Time of Trip

Code	Description
400 - 2800	Total range - 4:00 a.m. survey day to 3:39 a.m. next day



TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

Group Attributes

Grouping file: No file chosen

Filter Selection +

- Filter survey records by selection criteria:
- 1 Select a data field
 - 2 Enter codes to be included in the extraction.
 - 3 Use '-' to specify a range and ',' to separate codes.
 - 4 Do not use '()' to separate codes.
 - 5 The default operator for selecting values in a specific filter is IN but the operator NOT IN is available to exclude values from the filter.
 - 6 The default operator for connecting multiple filters is AND but the OR operator is also available
 - 7 If a combination of ANDs and ORs is used the checkboxes can be used to act as brackets (see manual for more details) and the bracketed filters

Output

Comma-delimited table
 Column format
 Expansion Factor On

Mon Apr 04 2022 11:45:13 GMT-0400 (Eastern Daylight Time) - Run Time: 4261ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
 Column: Planning district of destination - pd_dest
 Table: Start time of trip - start_time

RowG: (57)
 ColG: (54,55)(56,58)(59,60)(53,61,62)(46,45,51,52)(1-43)(57)
 TblG: (600-899)

Filters:
No Filters

Trip 2016
Table: 1

,1,2,3,4,5,6,7
1,6292,2516,972,198,442,971,24912

Instructions

Group attributes on the output by:

- Entering the values of ea group

Example

- (1) (4-6,8) (9-14)
- Group 1: 1
- Group 2: 4,5,6,8
- Group 3: 9,10,11,12,13,14

[Open current page in new tab.](#)

Start Time of Trip

Code	Description
400 - 2800	Total range - 4:00 a.m. survey day to 3:39 a.m. next day



TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

Group Attributes

Grouping file: No file chosen

Filter Selection +

- Filter survey records by selection criteria:
- 1 Select a data field
 - 2 Enter codes to be included in the extraction.
 - 3 Use '-' to specify a range and ',' to separate codes.
 - 4 Do not use '()' to separate codes.
 - 5 The default operator for selecting values in a specific filter is IN but the operator NOT IN is available to exclude values from the filter.
 - 6 The default operator for connecting multiple filters is AND but the OR operator is also available
 - 7 If a combination of ANDs and ORs is used the checkboxes can be used to act as brackets (see manual for more details) and the bracketed filters

Output

Comma-delimited table
 Column format
 Expansion Factor On

Mon Apr 04 2022 12:29:47 GMT-0400 (Eastern Daylight Time) - Run Time: 4921ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
 Column: Planning district of destination - pd_dest
 Table: Start time of trip - start_time

RowG: (54,55)(56,58)(59,60)(53,61,62)(46,45,51,52)(1-43)(57)
 ColG: (57)
 TblG: (1500-1799)

Filters:
No Filters

Trip 2016
Table: 1

,1
 1,8843
 2,3495
 3,1620
 4,312
 5,505
 6,1364
 7,32746

Instructions

Group attributes on the output by:

- Entering the values of ea group

Example

- (1) (4-6,8) (9-14)
- Group 1: 1
- Group 2: 4,5,6,8
- Group 3: 9,10,11,12,13,14

[Open current page in new tab.](#)

Start Time of Trip

Code	Description
400 - 2800	Total range - 4:00 a.m. survey day to 3:39 a.m. next day



TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

Group Attributes

Grouping file: No file chosen

Filter Selection +

- Filter survey records by selection criteria:
- 1 Select a data field
 - 2 Enter codes to be included in the extraction.
 - 3 Use '-' to specify a range and ',' to separate codes.
 - 4 Do not use '()' to separate codes.
 - 5 The default operator for selecting values in a specific filter is IN but the operator NOT IN is available to exclude values from the filter.
 - 6 The default operator for connecting multiple filters is AND but the OR operator is also available
 - 7 If a combination of ANDs and ORs is used the checkboxes can be used to act as brackets (see manual for more details) and the bracketed filters

Add Delete

Output

Comma-delimited table
 Column format
 Expansion Factor On

Execute Query Select All Save As

Mon Apr 04 2022 12:34:53 GMT-0400 (Eastern Daylight Time) - Run Time: 4420ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
 Column: Planning district of destination - pd_dest
 Table: Start time of trip - start_time

RowG: (57)
 ColG: (54,55)(56,58)(59,60)(53,61,62)(46,45,51,52)(1-43)(57)
 TblG: (1500-1799)

Filters:
No Filters

Trip 2016
Table: 1

,1,2,3,4,5,6,7
1,7079,3084,2482,750,626,1339,32746

Instructions

Group attributes on the output by:

- Entering the values of ea group

Example

- (1) (4-6,8) (9-14)
- Group 1: 1
- Group 2: 4,5,6,8
- Group 3: 9,10,11,12,13,14

[Open current page in new tab.](#)

Planning District of Trip Origin

Code	Description
1	PD 1 of Toronto
2	PD 2 of Toronto
3	PD 3 of Toronto
4	PD 4 of Toronto
5	PD 5 of Toronto
6	PD 6 of Toronto
7	PD 7 of Toronto
8	PD 8 of Toronto
9	PD 9 of Toronto
10	PD 10 of Toronto
11	PD 11 of Toronto
12	PD 12 of Toronto
13	PD 13 of Toronto
14	PD 14 of Toronto
15	PD 15 of Toronto
16	PD 16 of Toronto
17	Brock
18	Uxbridge
19	Scarborough

Mon Apr 04 2022 11:45:13 GMT-0400 (Eastern Daylight Time) - Run Time: 4261ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig

Column: Planning district of destination - pd_dest

Table: Start time of trip - start_time

RowG: (57)
ColG: (54,55) (56,58) (59,60) (53,61,62) (46,45,51,52) (1-43) (57)
TblG: (600-899)

Filters:
No Filters

Trip 2016
Table: 1

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	TOTAL
Group 1	6292	2516	972	198	442	971	24912	36303

Mon Apr 04 2022 11:53:44 GMT-0400 (Eastern Daylight Time) - Run Time: 4086ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig

Column: Planning district of destination - pd_dest

Table: Start time of trip - start_time

RowG: (57)

ColG: (54,55) (56,58) (59,60) (53,61,62) (46,45,51,52) (1-43) (57)

TblG: (1500-1799)

Filters:

No Filters

Trip 2016

Table: 1

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	TOTAL
Group 1	7079	3084	2482	750	626	1339	32746	48106

Mon Apr 04 2022 12:27:45 GMT-0400 (Eastern Daylight Time) - Run Time: 4243ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig

Column: Planning district of destination - pd_dest

Table: Start time of trip - start_time

RowG: (54,55) (56,58) (59,60) (53,61,62) (46,45,51,52 (1-43) (57)

ColG: (57)

TblG: (600-899)

Filters:

No Filters

Trip 2016

Table: 1

	1
1	4063
2	2578
3	1871
4	648
5	523
6	836
7	24912

Mon Apr 04 2022 12:29:47 GMT-0400 (Eastern Daylight Time) - Run Time: 4921ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig

Column: Planning district of destination - pd_dest

Table: Start time of trip - start_time

RowG: (54,55) (56,58) (59,60) (53,61,62) (46,45,51,52 (1-43) (57)

ColG: (57)

TblG: (1500-1799)

Filters:

No Filters

Trip 2016

Table: 1

	1
1	8843
2	3495
3	1620
4	312
5	505
6	1364
7	32746

Group 1 : Niagara-O-T-L	St Catharines			(54,55)	North
Group 2 : Thorold	Welland			(56,58)	Immidiate West
Group 3 : Port Colbourne	Fort Erie			(59,60)	South
Group 4 : Glanbrook	Pelham	West Lincoln	Wainfleet	(53,61,62)	West
Group 5 : Stoney Creek	Hamilton	Grimsby	Lincoln	(46,45,51,52)	North- West
Group 6 : PD 1 of Toronto-Ancaster				(1-43)	North- West
Group 7 : Niagara Falls				(57)	East

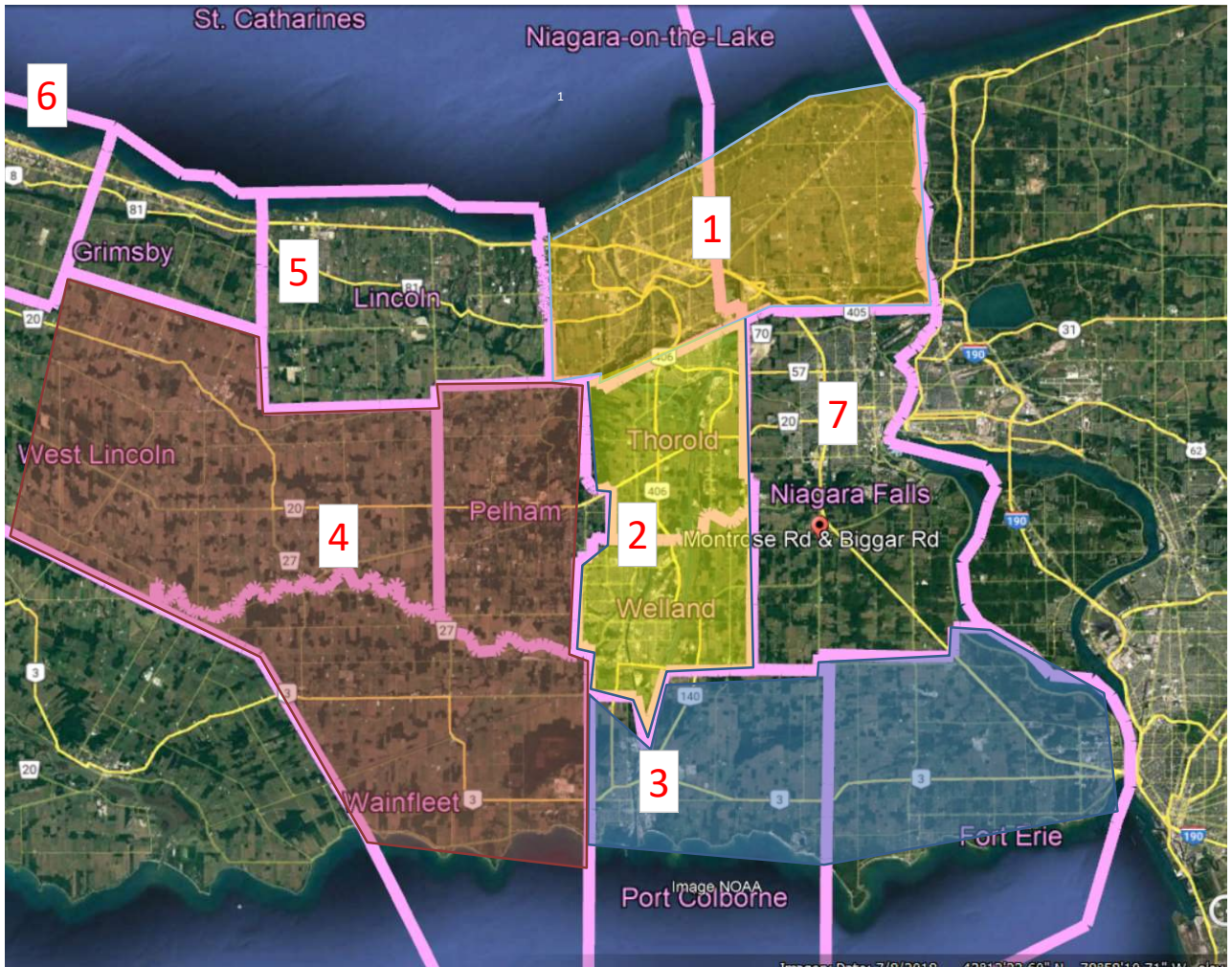


Table : TTS Trip Distribution Summary

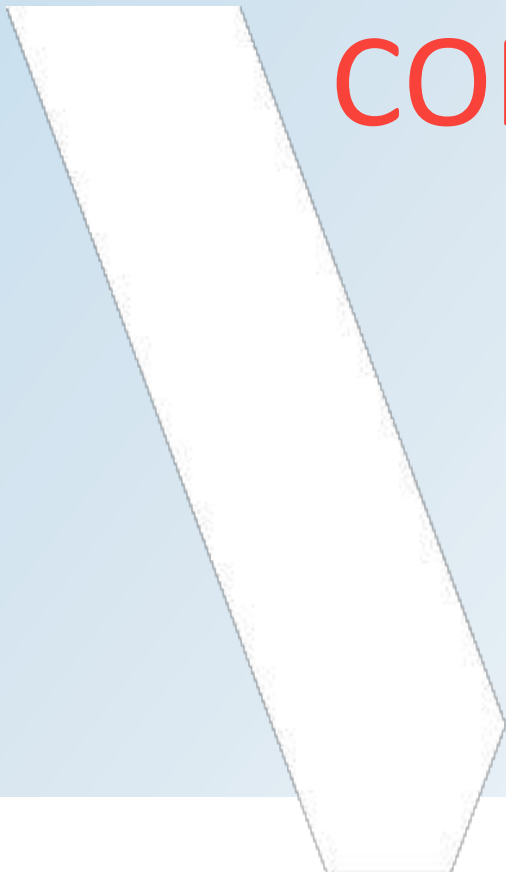
GROUP	A.M. Peak Hour		P.M. Peak Hour	
	Inbound	Outbound	Inbound	Outbound
1	4063	6292	8843	7079
2	2578	2516	3495	3084
3	1871	972	1620	2482
4	648	198	312	750
5	523	442	505	626
6	836	971	1364	1339
7	24912	24912	32746	32746
TOTAL	35431	36303	48885	48106

Direction	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
N	64%	69%	68%	66%
S	5%	3%	3%	5%
E	18%	17%	17%	17%
W	13%	11%	12%	12%

Total	100%	100%	100%	100%
--------------	-------------	-------------	-------------	-------------

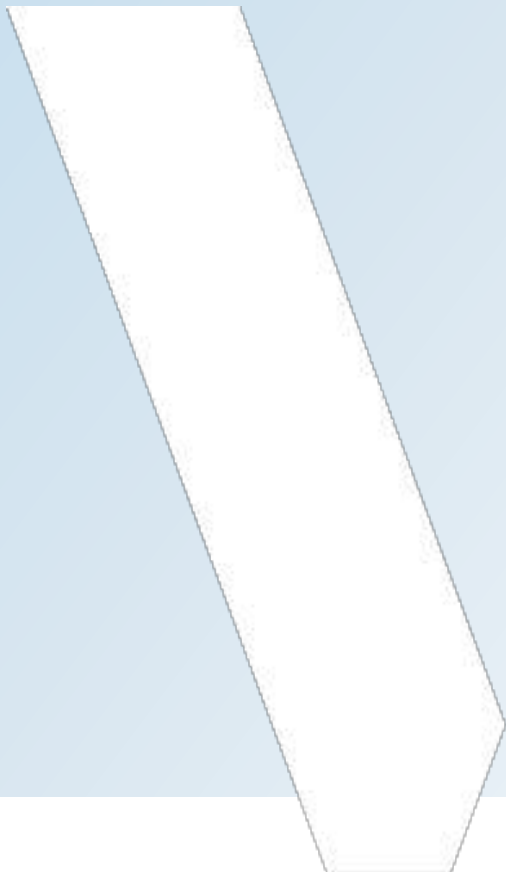
APPENDIX

J FUTURE TOTAL TRAFFIC CONDITIONS



APPENDIX

2031 HORIZON



Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031<AM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖↖	↖	↖	↖	↖↖	↖	↖↖	↖	↖
Traffic Volume (vph)	187	445	30	321	453	523	61	355	509	305	156	72
Future Volume (vph)	187	445	30	321	453	523	61	355	509	305	156	72
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1390	3043	3260	1444	1614	3228	1458	3072	3197	1444
Fit Permitted	0.469			0.950			0.644			0.950		
Satd. Flow (perm)	797	3260	1390	3043	3260	1444	1094	3228	1458	3072	3197	1444
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162			568			553			112
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	3%	2%	7%	6%	2%	3%	3%	2%	5%	4%	3%	3%
Adj. Flow (vph)	203	484	33	349	492	568	66	386	553	332	170	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	203	484	33	349	492	568	66	386	553	332	170	78
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0							
Detector 2 Size(m)		0.0			0.0							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031<AM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free			4
Detector Phase	5	2	2	1	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0		8.0	10.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3		13.5	31.3	31.3
Total Split (s)	18.0	35.0	35.0	27.0	44.0		32.0	32.0		26.0	58.0	58.0
Total Split (%)	15.0%	29.2%	29.2%	22.5%	36.7%		26.7%	26.7%		21.7%	48.3%	48.3%
Maximum Green (s)	14.5	28.7	28.7	21.5	37.7		25.7	25.7		20.5	51.7	51.7
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2		2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0		3.0	6.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max		Max	Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	0
Act Effect Green (s)	46.4	30.8	30.8	17.8	37.7		118.4	25.7		118.4	20.5	51.7
Actuated g/C Ratio	0.39	0.26	0.26	0.15	0.32		1.00	0.22		0.22	0.17	0.44
v/c Ratio	0.51	0.57	0.07	0.76	0.47		0.39	0.28		0.55	0.38	0.12
Control Delay	23.8	41.8	0.3	59.6	34.5		0.8	43.0		44.9	0.8	51.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	23.8	41.8	0.3	59.6	34.5		0.8	43.0		44.9	0.8	51.5
LOS	C	D	A	E	C		A	D		A	D	C
Approach Delay		34.8			27.1			20.5				35.7
Approach LOS		C			C			C				D
Queue Length 50th (m)	28.6	54.5	0.0	42.9	51.3		0.0	13.7		45.0	0.0	39.6
Queue Length 95th (m)	45.1	75.4	0.0	58.1	68.7		0.0	27.7		62.1	0.0	55.8
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0	150.0		275.0		40.0
Base Capacity (vph)	423	846	480	552	1038		1444	237		701	1458	1396
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.48	0.57	0.07	0.63	0.47		0.39	0.28		0.55	0.38	0.12
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	118.4											
Natural Cycle:	90											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.76											
Intersection Signal Delay:	28.2						Intersection LOS: C					
Intersection Capacity Utilization:	63.4%						ICU Level of Service B					
Analysis Period (min):	15											

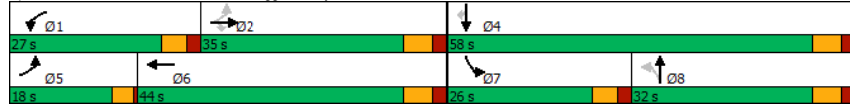
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031<AM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

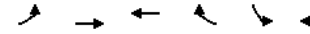


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2031<AM>

01-31-2023



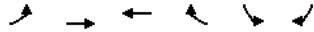
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↓↓
Traffic Volume (vph)	0	1066	530	0	170	777
Future Volume (vph)	0	1066	530	0	170	777
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.98	0.99
Frt					0.896	0.850
Flt Protected					0.985	
Satd. Flow (prot)	0	3197	2995	0	2773	1302
Flt Permitted					0.985	
Satd. Flow (perm)	0	3197	2995	0	2773	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					274	422
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	1159	576	0	185	845
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1159	576	0	608	422
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2031<AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

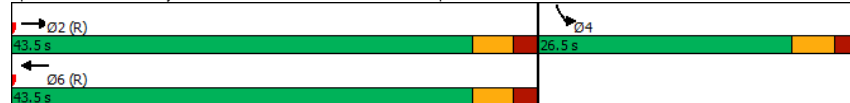


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.67	0.35			0.59	0.33
Control Delay	13.9	9.8			13.8	0.7
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	13.9	9.8			13.8	0.7
LOS	B	A			B	A
Approach Delay	13.9	9.8			8.4	
Approach LOS	B	A			A	
Queue Length 50th (m)	55.2	21.7			18.7	0.0
Queue Length 95th (m)	76.3	31.6			34.6	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			1023	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.67	0.35			0.59	0.33

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 11.0 Intersection LOS: B
 Intersection Capacity Utilization 58.7% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2031<AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	546	0	0	344	218	51
Future Volume (vph)	546	0	0	344	218	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Fit Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	593	0	0	374	237	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	593	0	0	374	237	55
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 36.2% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2031<AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	546	0	0	344	218	51
Future Volume (Veh/h)	546	0	0	344	218	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)	593	0	0	374	237	55
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			593		781	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			593		781	296
tC, single (s)			4.1		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			100		25	92
cM capacity (veh/h)			979		315	697
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	296	296	187	187	237	55
Volume Left	0	0	0	0	237	0
Volume Right	0	0	0	0	0	55
cSH	1700	1700	1700	1700	315	697
Volume to Capacity	0.17	0.17	0.11	0.11	0.75	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	45.8	2.1
Control Delay (s)	0.0	0.0	0.0	0.0	44.1	10.6
Lane LOS					E	B
Approach Delay (s)	0.0		0.0		37.8	
Approach LOS					E	
Intersection Summary						
Average Delay			8.8			
Intersection Capacity Utilization			36.2%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	
Traffic Volume (vph)	68	35	32	488	415	73
Future Volume (vph)	68	35	32	488	415	73
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.978	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3019	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	3019	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	74	38	35	530	451	79
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	38	35	530	530	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	32.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2031<AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕	↕	↔	
Traffic Volume (veh/h)	68	35	32	488	415	73	
Future Volume (Veh/h)	68	35	32	488	415	73	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	74	38	35	530	451	79	
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	826	265	530				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	826	265	530				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	71	95	96				
cM capacity (veh/h)	258	739	873				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	74	38	35	265	265	301	229
Volume Left	74	0	35	0	0	0	0
Volume Right	0	38	0	0	0	0	79
cSH	258	739	873	1700	1700	1700	1700
Volume to Capacity	0.29	0.05	0.04	0.16	0.16	0.18	0.13
Queue Length 95th (m)	9.2	1.3	1.0	0.0	0.0	0.0	0.0
Control Delay (s)	24.5	10.1	9.3	0.0	0.0	0.0	0.0
Lane LOS	C	B	A				
Approach Delay (s)	19.6	0.6		0.0			
Approach LOS	C						
Intersection Summary							
Average Delay	2.1						
Intersection Capacity Utilization	32.4%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031<AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (vph)	61	11	536	113	22	430
Future Volume (vph)	61	11	536	113	22	430
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.974			
Fit Protected	0.950					0.950
Satd. Flow (prot)	1498	1316	2992	0	1409	2995
Fit Permitted	0.950					0.950
Satd. Flow (perm)	1498	1316	2992	0	1409	2995
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	66	12	583	123	24	467
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	12	706	0	24	467
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 30.3%			ICU Level of Service A			
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Total_2031<AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕	↔	↔	↕↕	
Traffic Volume (veh/h)	61	11	536	113	22	430	
Future Volume (Veh/h)	61	11	536	113	22	430	
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)	66	12	583	123	24	467	
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	926	353			706		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	926	353			706		
tC, single (s)	7.0	7.2			4.5		
tC, 2 stage (s)							
tF (s)	3.6	3.4			2.4		
p0 queue free %	73	98			97		
cM capacity (veh/h)	244	612			789		
Direction_Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	66	12	389	317	24	234	234
Volume Left	66	0	0	0	24	0	0
Volume Right	0	12	0	123	0	0	0
cSH	244	612	1700	1700	789	1700	1700
Volume to Capacity	0.27	0.02	0.23	0.19	0.03	0.14	0.14
Queue Length 95th (m)	8.5	0.5	0.0	0.0	0.8	0.0	0.0
Control Delay (s)	25.1	11.0	0.0	0.0	9.7	0.0	0.0
Lane LOS	D	B			A		
Approach Delay (s)	23.0		0.0		0.5		
Approach LOS	C						
Intersection Summary							
Average Delay			1.6				
Intersection Capacity Utilization			30.3%		ICU Level of Service	A	
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	167	93	25	486	357	92
Future Volume (vph)	167	93	25	486	357	92
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2942	1352
Link Speed (k/h)	40		70	70		
Link Distance (m)	1391.9		268.2	493.4		
Travel Time (s)	125.3		13.8	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	182	101	27	528	388	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	101	27	528	388	100
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 34.1%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2031<AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔		
Traffic Volume (veh/h)	167	93	25	486	357	92		
Future Volume (Veh/h)	167	93	25	486	357	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)	182	101	27	528	388	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	706	194	488					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	706	194	488					
tC, single (s)	7.1	6.9	4.1					
tC, 2 stage (s)								
tF (s)	3.6	3.3	2.2					
p0 queue free %	46	88	98					
cM capacity (veh/h)	339	821	1086					
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	182	101	27	264	264	194	194	100
Volume Left	182	0	27	0	0	0	0	0
Volume Right	0	101	0	0	0	0	0	100
cSH	339	821	1086	1700	1700	1700	1700	1700
Volume to Capacity	0.54	0.12	0.02	0.16	0.16	0.11	0.11	0.06
Queue Length 95th (m)	24.2	3.4	0.6	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	27.3	10.0	8.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	A	A					
Approach Delay (s)	21.2	0.4		0.0				
Approach LOS	C							
Intersection Summary								
Average Delay	4.7							
Intersection Capacity Utilization	34.1%		ICU Level of Service		A			
Analysis Period (min)	15							

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	84	0	50	2	0	2	163	452	2	2	359	47
Future Volume (vph)	84	0	50	2	0	2	163	452	2	2	359	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0	0.0		0.0	0.0		15.0	0.0		15.0	30.0	
Storage Lanes	1	0		0	0		1	0		1	1	
Taper Length (m)	15.0	7.5			15.0			15.0				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Frt	0.850		0.932		0.999		0.850					
Fit Protected	0.950		0.976		0.950		0.950					
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.950		0.976		0.950		0.950					
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Link Speed (k/h)	50		50		80		70					
Link Distance (m)	118.9		332.1		226.1		359.6					
Travel Time (s)	8.6		23.9		10.2		18.5					
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	
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	91	0	54	2	0	2	177	491	2	2	390	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	54	0	0	4	0	177	493	0	2	390	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6		3.6		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.8		4.8		4.8		4.8					
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		25	15		25	15		25		
Sign Control	Stop		Stop		Free		Free					
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 39.5%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2031<AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	84	0	50	2	0	2	163	452	2	2	359	47
Future Volume (Veh/h)	84	0	50	2	0	2	163	452	2	2	359	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)	91	0	54	2	0	2	177	491	2	2	390	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)	226											
pX, platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	996	1241	195	1099	1291	246	441			493		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	912	1168	195	1020	1220	132	441			389		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	53	100	93	99	100	100	84			100		
cM capacity (veh/h)	192	155	814	152	144	863	1115			1133		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4		
Volume Total	91	54	4	177	327	166	2	195	195	51		
Volume Left	91	0	2	177	0	0	2	0	0	0		
Volume Right	0	54	2	0	0	2	0	0	0	51		
cSH	192	814	259	1115	1700	1700	1133	1700	1700	1700		
Volume to Capacity	0.47	0.07	0.02	0.16	0.19	0.10	0.00	0.11	0.11	0.03		
Queue Length 95th (m)	18.3	1.7	0.4	4.5	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (s)	39.5	9.7	19.1	8.8	0.0	0.0	8.2	0.0	0.0	0.0		
Lane LOS	E	A	C	A	A			A				
Approach Delay (s)	28.4		19.1	2.3	0.0							
Approach LOS	D		C									
Intersection Summary												
Average Delay	4.6											
Intersection Capacity Utilization	39.5%			ICU Level of Service			A					
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2031<AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	402	0	28	308	2	23
Future Volume (vph)	402	0	28	308	2	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.875					
Fit Protected			0.996		0.996	
Satd. Flow (prot)	1651	0	0	1589	1396	0
Fit Permitted			0.996		0.996	
Satd. Flow (perm)	1651	0	0	1589	1396	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	437	0	30	335	2	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	437	0	0	365	27	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 52.8%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2031<AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	402	0	28	308	2	23
Future Volume (Veh/h)	402	0	28	308	2	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)	437	0	30	335	2	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			437		832	437
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			437		832	437
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			97		99	96
cM capacity (veh/h)			947		331	603
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	437	365	27			
Volume Left	0	30	2			
Volume Right	0	0	25			
cSH	1700	947	568			
Volume to Capacity	0.26	0.03	0.05			
Queue Length 95th (m)	0.0	0.8	1.2			
Control Delay (s)	0.0	1.1	11.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.1	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		52.8%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	6	0	141	0	0	0	455	609	0	0	390	19
Future Volume (vph)	6	0	141	0	0	0	455	609	0	0	390	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.337					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	578	3228	0	1716	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		621										109
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		101.3			60.9			348.2			226.1	
Travel Time (s)		7.3			4.4			15.7			10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	5%	2%
Adj. Flow (vph)	7	0	153	0	0	0	495	662	0	0	424	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	662	0	0	424	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		27.0	52.5		25.5	25.5	25.5
Total Split (%)	34.4%	34.4%		34.4%	34.4%		33.8%	65.6%		31.9%	31.9%	31.9%
Maximum Green (s)	22.0	22.0		22.0	22.0		21.5	47.0		20.0	20.0	20.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0		20.0	20.0	
Actuated g/C Ratio	0.28	0.28					0.59	0.59		0.25	0.25	

Lanes, Volumes, Timings

Future Total_2031<AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023

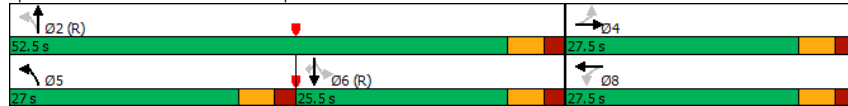


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.18					0.80	0.35			0.54	0.05
Control Delay	21.5	0.5					21.8	9.2			28.9	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.5					21.8	9.2			28.9	0.2
LOS	C	A					C	A			C	A
Approach Delay		1.4						14.6			27.6	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					42.6	26.3			30.9	0.0
Queue Length 95th (m)	3.8	0.0					#87.9	36.5			45.4	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	851					622	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.18					0.80	0.35			0.54	0.05

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 16.7 Intersection LOS: B
 Intersection Capacity Utilization 62.3% ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

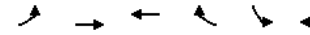


Lanes, Volumes, Timings

Future Total_2031<AM>

11: Biggar Rd & Hospital East Access

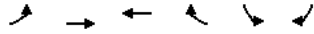
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (vph)	48	578	373	213	85	31
Future Volume (vph)	48	578	373	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fr			0.945			0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3043	0	1630	1458
Fit Permitted	0.382				0.950	
Satd. Flow (perm)	655	3228	3043	0	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			232			34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	628	405	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	628	637	0	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Prot	Perm	
Protected Phases		2	6		4	
Permitted Phases	2					4
Minimum Split (s)	24.5	24.5	24.5		27.5	27.5
Total Split (s)	41.0	41.0	41.0		29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%		41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5		23.5	23.5
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	35.5	35.5	35.5		23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51		0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2031<AM>
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.16	0.38	0.38		0.17	0.07
Control Delay	10.8	11.4	7.2		17.5	6.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	10.8	11.4	7.2		17.5	6.6
LOS	B	B	A		B	A
Approach Delay		11.4	7.2		14.5	
Approach LOS		B	A		B	
Queue Length 50th (m)	3.6	26.0	15.6		8.8	0.0
Queue Length 95th (m)	9.6	37.4	25.8		18.8	5.6
Internal Link Dist (m)		341.4	302.3		168.4	
Turn Bay Length (m)	30.0					
Base Capacity (vph)	332	1637	1657		547	512
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.38	0.38		0.17	0.07

Intersection Summary

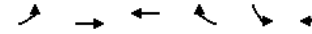
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 9.8
 Intersection LOS: A
 Intersection Capacity Utilization 47.4%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2031<AM>
01-31-2023



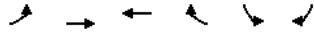
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	626	356	48	0	15
Future Volume (vph)	19	626	356	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fit			0.982		0.865	
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3147	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3147	0	1484	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		80.3	365.4		157.5	
Travel Time (s)		3.6	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	680	387	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	680	439	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 28.8%
 ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

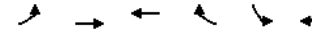
Future Total_2031<AM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↔
Traffic Volume (veh/h)	19	626	356	48	0	15
Future Volume (Veh/h)	19	626	356	48	0	15
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)	21	680	387	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None	None				
Median storage (veh)						
Upstream signal (m)	365					
pX, platoon unblocked						
vC, conflicting volume	439			795	220	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	439			795	220	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	98	
cM capacity (veh/h)	1117			319	785	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	340	340	258	181	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1117	1700	1700	1700	1700	785
Volume to Capacity	0.02	0.20	0.20	0.15	0.11	0.02
Queue Length 95th (m)	0.5	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	9.7
Lane LOS	A					A
Approach Delay (s)	0.2			0.0		9.7
Approach LOS						A
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			28.8%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031<AM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↔
Traffic Volume (vph)	34	383	261	112	263	69
Future Volume (vph)	34	383	261	112	263	69
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		60.0		0.0	0.0
Storage Lanes	1		1		1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1699	1683	1458	1604	0
Fit Permitted	0.950				0.962	
Satd. Flow (perm)	1630	1699	1683	1458	1604	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	208.5		125.0		190.1	
Travel Time (s)	9.4		5.6		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	37	416	284	122	286	75
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	416	284	122	361	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	15
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 48.9%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2031<AM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	↕
Traffic Volume (veh/h)	34	383	261	112	263	69
Future Volume (Veh/h)	34	383	261	112	263	69
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)	37	416	284	122	286	75
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				774	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				774	284
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				19	90
cM capacity (veh/h)	1153				355	755
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	37	416	284	122	361	
Volume Left	37	0	0	0	286	
Volume Right	0	0	0	122	75	
cSH	1153	1700	1700	1700	399	
Volume to Capacity	0.03	0.24	0.17	0.07	0.90	
Queue Length 95th (m)	0.8	0.0	0.0	0.0	76.0	
Control Delay (s)	8.2	0.0	0.0	0.0	56.9	
Lane LOS	A				F	
Approach Delay (s)	0.7		0.0		56.9	
Approach LOS					F	
Intersection Summary						
Average Delay		17.1				
Intersection Capacity Utilization		48.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	22	0	35	8	6	5	9	40	18	25	0
Future Volume (vph)	0	22	0	35	8	6	5	9	40	18	25	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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					0.982			0.900				
Fit Protected					0.966			0.996			0.979	
Satd. Flow (prot)	0	1716	0	0	1628	0	0	1538	0	0	1680	0
Fit Permitted					0.966			0.996			0.979	
Satd. Flow (perm)	0	1716	0	0	1628	0	0	1538	0	0	1680	0
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		277.4			1391.9			855.1			76.8	
Travel Time (s)		25.0			125.3			61.6			5.5	
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
Adj. Flow (vph)	0	24	0	38	9	7	5	10	43	20	27	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	54	0	0	58	0	0	47	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	23.6%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2031<AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	22	0	35	8	6	5	9	40	18	25	0
Future Volume (vph)	0	22	0	35	8	6	5	9	40	18	25	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	24	0	38	9	7	5	10	43	20	27	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	24	54	58	47								
Volume Left (vph)	0	38	5	20								
Volume Right (vph)	0	7	43	0								
Hadj (s)	0.03	0.10	-0.39	0.12								
Departure Headway (s)	4.2	4.2	3.7	4.2								
Degree Utilization, x	0.03	0.06	0.06	0.06								
Capacity (veh/h)	827	824	933	827								
Control Delay (s)	7.3	7.5	7.0	7.5								
Approach Delay (s)	7.3	7.5	7.0	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.3											
Level of Service	A											
Intersection Capacity Utilization	23.6%			ICU Level of Service	A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
15: Street A & Street HH

Future Total_2031<AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	41	3	53	32	6	150
Future Volume (vph)	41	3	53	32	6	150
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.992		0.949			
Fit Protected	0.955				0.998	
Satd. Flow (prot)	1625		0		1712	
Fit Permitted	0.955				0.998	
Satd. Flow (perm)	1625		0		1712	
Link Speed (k/h)	50		50		50	
Link Distance (m)	1017.7		238.9		855.1	
Travel Time (s)	73.3		17.2		61.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	3	58	35	7	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	48	0	93	0	0	170
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2031<AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	41	3	53	32	6	150
Future Volume (Veh/h)	41	3	53	32	6	150
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	3	58	35	7	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	252	76			93	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252	76			93	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	733	986			1501	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	48	93	170			
Volume Left	45	0	7			
Volume Right	3	35	0			
cSH	745	1700	1501			
Volume to Capacity	0.06	0.05	0.00			
Queue Length 95th (m)	1.6	0.0	0.1			
Control Delay (s)	10.2	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.2	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay		1.8				
Intersection Capacity Utilization		23.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2031<AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	31	12	5	510	403	11
Future Volume (vph)	31	12	5	510	403	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.963				0.996	
Fit Protected	0.965					
Satd. Flow (prot)	1594	0	0	3228	3186	0
Fit Permitted	0.965					
Satd. Flow (perm)	1594	0	0	3228	3186	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	34	13	5	554	438	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	47	0	0	559	450	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 29.1%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2031<AM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Volume (veh/h)	31	12	5	510	403	11
Future Volume (Veh/h)	31	12	5	510	403	11
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)	34	13	5	554	438	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	731	225	450			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	731	225	450			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	100			
cM capacity (veh/h)	355	778	1107			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	47	190	369	292	158	
Volume Left	34	5	0	0	0	
Volume Right	13	0	0	0	12	
cSH	418	1107	1700	1700	1700	
Volume to Capacity	0.11	0.00	0.22	0.17	0.09	
Queue Length 95th (m)	3.0	0.1	0.0	0.0	0.0	
Control Delay (s)	14.7	0.3	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	14.7	0.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			29.1%	ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	546	0	0	344	218	51
Future Volume (vph)	546	0	0	344	218	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Flt Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1510	1444
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						55
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	593	0	0	374	237	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	593	0	0	374	237	55
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	39.0			39.0	31.0	31.0
Total Split (%)	55.7%			55.7%	44.3%	44.3%
Maximum Green (s)	33.5			33.5	25.5	25.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	33.5			33.5	25.5	25.5
Actuated g/C Ratio	0.48			0.48	0.36	0.36
v/c Ratio	0.41			0.26	0.43	0.10

Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	13.0			11.5	19.8	5.3
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.0			11.5	19.8	5.3
LOS	B			B	B	A
Approach Delay	13.0			11.5	17.1	
Approach LOS	B			B	B	
Queue Length 50th (m)	26.4			15.2	24.0	0.0
Queue Length 95th (m)	38.4			23.5	43.0	6.6
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1433			1446	550	560
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.41			0.26	0.43	0.10

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	13.5
Intersection Capacity Utilization:	38.7%
Intersection LOS:	B
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↙	↘	↕	↔
Traffic Volume (vph)	68	35	32	488	415	73
Future Volume (vph)	68	35	32	488	415	73
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.978	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3019	0
Fit Permitted	0.950		0.442			
Satd. Flow (perm)	1330	1488	604	3197	3019	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		38			40	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	74	38	35	530	451	79
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	38	35	530	530	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	30.0	30.0	40.0	40.0	40.0	
Total Split (%)	42.9%	42.9%	57.1%	57.1%	57.1%	
Maximum Green (s)	24.5	24.5	34.5	34.5	34.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	24.5	24.5	34.5	34.5	34.5	
Actuated g/C Ratio	0.35	0.35	0.49	0.49	0.49	

Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

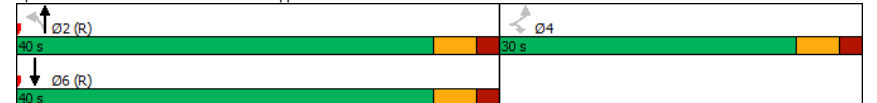
4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.16	0.07	0.12	0.34	0.35	
Control Delay	16.9	6.1	13.7	14.0	10.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	16.9	6.1	13.7	14.0	10.8	
LOS	B	A	B	B	B	
Approach Delay	13.2			14.0	10.8	
Approach LOS	B			B	B	
Queue Length 50th (m)	6.9	0.0	4.0	33.1	20.2	
Queue Length 95th (m)	15.8	5.7	m9.7	47.4	30.6	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	465	545	297	1575	1508	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.16	0.07	0.12	0.34	0.35	

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 12.5 Intersection LOS: B
 Intersection Capacity Utilization 43.7% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031 Improved<AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↔
Traffic Volume (vph)	61	11	536	113	22	430
Future Volume (vph)	61	11	536	113	22	430
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0			15.0		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.974			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2992	0	1409	2995
Fit Permitted	0.950				0.351	
Satd. Flow (perm)	1498	1316	2992	0	521	2995
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		12	54			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	66	12	583	123	24	467
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	12	706	0	24	467
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

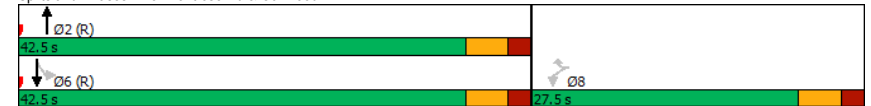
Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031 Improved<AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.14	0.03	0.44		0.09	0.30
Control Delay	18.3	9.5	5.6		7.6	7.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.3	9.5	5.6		7.6	7.7
LOS	B	A	A		A	A
Approach Delay	16.9		5.6			7.7
Approach LOS	B		A			A
Queue Length 50th (m)	6.5	0.0	10.5		1.1	11.5
Queue Length 95th (m)	15.1	3.5	28.4		m3.3	16.7
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	470	421	1606		275	1583
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.14	0.03	0.44		0.09	0.30

Intersection Summary
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 7.1 Intersection LOS: A
Intersection Capacity Utilization 35.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↑↑	↑↑	↔
Traffic Volume (vph)	167	93	25	486	357	92
Future Volume (vph)	167	93	25	486	357	92
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.522			
Satd. Flow (perm)	1471	1488	914	3167	2942	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		101				100
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			268.2	493.4	
Travel Time (s)	125.3			13.8	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	182	101	27	528	388	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	101	27	528	388	100
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	36.0	36.0	34.0	34.0	34.0	34.0
Total Split (%)	51.4%	51.4%	48.6%	48.6%	48.6%	48.6%
Maximum Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.44	0.44	0.41	0.41	0.41	0.41

Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

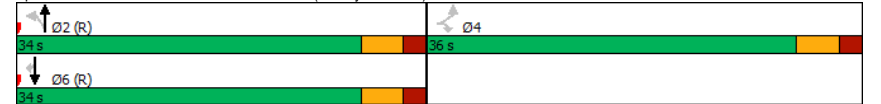
6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.28	0.14	0.07	0.41	0.32	0.16
Control Delay	14.3	3.5	23.6	27.5	16.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	3.5	23.6	27.5	16.9	8.4
LOS	B	A	C	C	B	A
Approach Delay	10.4			27.3	15.2	
Approach LOS	B			C	B	
Queue Length 50th (m)	15.5	0.0	3.3	35.9	22.8	1.1
Queue Length 95th (m)	28.9	7.7	10.3	52.7	36.4	13.8
Internal Link Dist (m)	1367.9			244.2	469.4	
Turn Bay Length (m)	125.0		15.0			40.0
Base Capacity (vph)	640	705	372	1289	1197	609
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.14	0.07	0.41	0.32	0.16

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	19.2
Intersection Capacity Utilization:	41.8%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	A

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↖	↖	↖	↖		↖	↖	↖
Traffic Volume (vph)	84	0	50	2	0	2	163	452	2	2	359	47
Future Volume (vph)	84	0	50	2	0	2	163	452	2	2	359	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850					0.932			0.999		0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.755				0.935		0.521			0.470		
Satd. Flow (perm)	1295	1458	0	0	1525	0	894	3225	0	822	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		416			39			1				51
Link Speed (k/h)	50				50			80				70
Link Distance (m)	118.9				332.1			226.1				359.6
Travel Time (s)	8.6				23.9			10.2				18.5
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	91	0	54	2	0	2	177	491	2	2	390	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	54	0	0	4	0	177	493	0	2	390	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	28.0	28.0		28.0	28.0		42.0	42.0		42.0	42.0	42.0
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	60.0%
Maximum Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.52	0.52		0.52	0.52	0.52

Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.22	0.07			0.01		0.38	0.29		0.00	0.24	0.07
Control Delay	20.5	0.2			0.0		13.0	10.0		15.5	13.4	8.1
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	20.5	0.2			0.0		13.0	10.0		15.5	13.4	8.1
LOS	C	A			A		B	B		B	B	A
Approach Delay		12.9						10.8				12.8
Approach LOS		B						B				B
Queue Length 50th (m)	9.5	0.0			0.0		13.5	18.6		0.1	16.7	0.0
Queue Length 95th (m)	18.6	0.0			0.0		27.8	27.6		m0.7	30.4	1.1
Internal Link Dist (m)		94.9					308.1			202.1		335.6
Turn Bay Length (m)	15.0							15.0				30.0
Base Capacity (vph)	416	750			516		466	1682		428	1651	784
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.22	0.07			0.01		0.38	0.29		0.00	0.24	0.07

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.38

Intersection Signal Delay: 11.7 Intersection LOS: B

Intersection Capacity Utilization 44.6% ICU Level of Service A

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Montrose Rd & Street HH/Reixinger Road



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031 Improved<AM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	34	383	261	112	263	69
Future Volume (vph)	34	383	261	112	263	69
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1699	1683	1458	1604	0
Fit Permitted	0.549				0.962	
Satd. Flow (perm)	942	1699	1683	1458	1604	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				122	23	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	37	416	284	122	286	75
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	416	284	122	361	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	36.0	36.0	36.0	36.0	34.0	
Total Split (%)	51.4%	51.4%	51.4%	51.4%	48.6%	
Maximum Green (s)	30.5	30.5	30.5	30.5	28.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	30.5	30.5	30.5	30.5	28.5	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.41	

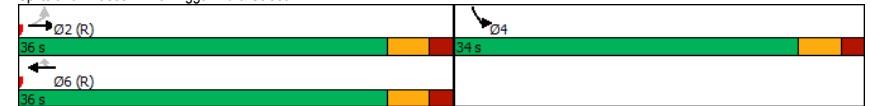
Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031 Improved<AM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.09	0.56	0.39	0.17	0.54	
Control Delay	12.4	18.4	19.8	6.1	18.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.4	18.4	19.8	6.1	18.4	
LOS	B	B	B	A	B	
Approach Delay		17.9	15.7		18.4	
Approach LOS		B	B		B	
Queue Length 50th (m)	2.9	41.1	24.0	0.2	34.0	
Queue Length 95th (m)	8.1	67.5	47.4	11.8	58.8	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	15.0			60.0		
Base Capacity (vph)	410	740	733	704	666	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.09	0.56	0.39	0.17	0.54	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 50	
Control Type: Pretimed	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 57.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2031 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	31	12	5	510	403	11
Future Volume (vph)	31	12	5	510	403	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.963			0.996		
Fit Protected	0.965					
Satd. Flow (prot)	1594	0	0	3228	3186	0
Fit Permitted	0.965					
Satd. Flow (perm)	1594	0	0	3228	3186	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	34	13	5	554	438	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	47	0	0	559	450	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	29.1%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

Future Total_2031 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	12	5	510	403	11
Future Volume (Veh/h)	31	12	5	510	403	11
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)	34	13	5	554	438	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)				360	268	
pX, platoon unblocked	0.99	0.98	0.98			
vC, conflicting volume	731	225	450			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	653	177	406			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	98	100			
cM capacity (veh/h)	394	821	1130			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	47	190	369	292	158
Volume Left	34	5	0	0	0
Volume Right	13	0	0	0	12
cSH	460	1130	1700	1700	1700
Volume to Capacity	0.10	0.00	0.22	0.17	0.09
Queue Length 95th (m)	2.7	0.1	0.0	0.0	0.0
Control Delay (s)	13.7	0.3	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.7	0.1	0.0		
Approach LOS	B				

Intersection Summary

Average Delay	0.7
Intersection Capacity Utilization	29.1%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031 <PM>

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	507	63	444	558	299	40	309	487	603	419	128
Future Volume (vph)	111	507	63	444	558	299	40	309	487	603	419	128
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	3260	1430	3162	3260	1430	1599	3228	1444	3131	3260	1473
Fit Permitted	0.422			0.950			0.490			0.950		
Satd. Flow (perm)	724	3260	1430	3162	3260	1430	825	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			278			474			139
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	2%	2%	4%	2%	2%	4%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	121	551	68	483	607	325	43	336	529	655	455	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	551	68	483	607	325	43	336	529	655	455	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0						0.0	
Detector 2 Size(m)		0.0			0.0						0.0	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031 <PM>

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	14.0	37.7	37.7	33.0	56.7		31.3	31.3			43.0	74.3
Total Split (%)	9.7%	26.0%	26.0%	22.8%	39.1%		21.6%	21.6%			29.7%	51.2%
Maximum Green (s)	10.5	31.4	31.4	27.5	50.4		25.0	25.0			37.5	68.0
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	45.3	32.8	32.8	25.3	50.4	144.2	25.0	25.0	144.2	37.5	68.0	68.0
Actuated g/C Ratio	0.31	0.23	0.23	0.18	0.35	1.00	0.17	0.17	1.00	0.26	0.47	0.47
v/c Ratio	0.42	0.74	0.16	0.87	0.53	0.23	0.30	0.60	0.37	0.81	0.30	0.18
Control Delay	29.4	59.3	0.8	74.9	39.7	0.4	59.0	60.2	0.7	58.8	24.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	59.3	0.8	74.9	39.7	0.4	59.0	60.2	0.7	58.8	24.2	3.8
LOS	C	E	A	E	D	A	E	E	A	E	C	A
Approach Delay		49.0			42.7			25.5			40.1	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	20.9	83.0	0.0	73.1	77.2	0.0	11.5	50.0	0.0	96.2	43.8	0.0
Queue Length 95th (m)	34.3	106.0	0.0	94.0	97.1	0.0	24.7	67.3	0.0	120.6	57.0	12.1
Internal Link Dist (m)		302.3			313.6			592.2			324.2	
Turn Bay Length (m)	130.0		30.0	265.0			30.0		150.0	275.0		40.0
Base Capacity (vph)	297	742	429	602	1139	1430	143	559	1444	813	1537	767
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.74	0.16	0.80	0.53	0.23	0.30	0.60	0.37	0.81	0.30	0.18
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	144.2											
Natural Cycle:	110											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.87											
Intersection Signal Delay:	39.4						Intersection LOS: D					
Intersection Capacity Utilization:	76.6%						ICU Level of Service D					
Analysis Period (min):	15											

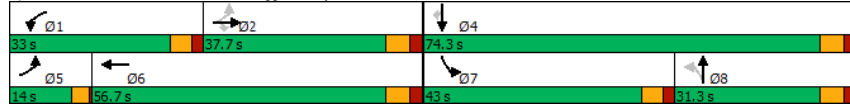
Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2031 <PM>

01-31-2023

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

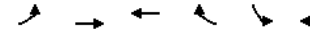


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2031 <PM>

01-31-2023



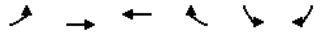
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓↓	↓
Traffic Volume (vph)	0	1195	548	0	279	701
Future Volume (vph)	0	1195	548	0	279	701
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.916	0.850
Flt Protected					0.978	
Satd. Flow (prot)	0	3197	3197	0	2933	1327
Flt Permitted					0.978	
Satd. Flow (perm)	0	3197	3197	0	2933	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					261	381
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1299	596	0	303	762
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1299	596	0	684	381
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2031 <PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023



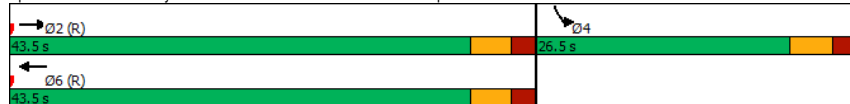
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.75	0.34			0.64	0.29
Control Delay	15.8	9.7			16.0	0.6
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	15.8	9.7			16.0	0.6
LOS	B	A			B	A
Approach Delay	15.8	9.7			10.5	
Approach LOS	B	A			B	
Queue Length 50th (m)	66.6	22.2			24.8	0.0
Queue Length 95th (m)	91.7	32.2			42.3	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			1062	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.75	0.34			0.64	0.29

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 12.6
 Intersection Capacity Utilization 62.5%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2031 <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	728	0	0	497	134	60
Future Volume (vph)	728	0	0	497	134	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1363	1352
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	791	0	0	540	146	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	791	0	0	540	146	65
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 36.6%
 Analysis Period (min) 15

ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2031 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	728	0	0	497	134	60
Future Volume (Veh/h)	728	0	0	497	134	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)	791	0	0	540	146	65
Pedestrians	1					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			791		1062	396
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			791		1062	396
tC, single (s)			4.1		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			100		22	89
cM capacity (veh/h)			825		188	582
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	396	396	270	270	146	65
Volume Left	0	0	0	0	146	0
Volume Right	0	0	0	0	0	65
cSH	1700	1700	1700	1700	188	582
Volume to Capacity	0.23	0.23	0.16	0.16	0.78	0.11
Queue Length 95th (m)	0.0	0.0	0.0	0.0	41.8	3.0
Control Delay (s)	0.0	0.0	0.0	0.0	69.7	12.0
Lane LOS					F	B
Approach Delay (s)	0.0		0.0		51.9	
Approach LOS					F	
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			36.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2031 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	50	44	44	598	861	51
Future Volume (vph)	50	44	44	598	861	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.992	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3190	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3190	0
Link Speed (k/h)	50		50	60	60	
Link Distance (m)	512.1		425.4	384.0		
Travel Time (s)	36.9		30.6	23.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	54	48	48	650	936	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	48	48	650	991	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	44.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2031 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	50	44	44	598	861	51	
Future Volume (Veh/h)	50	44	44	598	861	51	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	54	48	48	650	936	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	1384	496	991				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1384	496	991				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	56	90	93				
cM capacity (veh/h)	124	479	687				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	54	48	48	325	325	624	367
Volume Left	54	0	48	0	0	0	0
Volume Right	0	48	0	0	0	0	55
cSH	124	479	687	1700	1700	1700	1700
Volume to Capacity	0.44	0.10	0.07	0.19	0.19	0.37	0.22
Queue Length 95th (m)	15.2	2.7	1.8	0.0	0.0	0.0	0.0
Control Delay (s)	54.8	13.3	10.6	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	35.3	0.7		0.0			
Approach LOS	E						
Intersection Summary							
Average Delay	2.3						
Intersection Capacity Utilization	44.3%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031 <PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↕↕	↔	↕↕
Traffic Volume (vph)	135	37	599	99	37	842
Future Volume (vph)	135	37	599	99	37	842
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1	0	1		
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.979			
Fit Protected	0.950					0.950
Satd. Flow (prot)	1646	1488	3113	0	1662	3197
Fit Permitted	0.950					0.950
Satd. Flow (perm)	1646	1488	3113	0	1662	3197
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	147	40	651	108	40	915
Shared Lane Traffic (%)						
Lane Group Flow (vph)	147	40	759	0	40	915
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 42.9%					ICU Level of Service A	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
5: Montrose Rd & Oakwood Dr

Future Total_2031 <PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↕↕	↔	↔	↕↕	
Traffic Volume (veh/h)	135	37	599	99	37	842	
Future Volume (Veh/h)	135	37	599	99	37	842	
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)	147	40	651	108	40	915	
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	1242	380			759		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1242	380			759		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	8	94			95		
cM capacity (veh/h)	160	624			862		
Direction_Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	147	40	434	325	40	458	458
Volume Left	147	0	0	0	40	0	0
Volume Right	0	40	0	108	0	0	0
cSH	160	624	1700	1700	862	1700	1700
Volume to Capacity	0.92	0.06	0.26	0.19	0.05	0.27	0.27
Queue Length 95th (m)	53.1	1.6	0.0	0.0	1.2	0.0	0.0
Control Delay (s)	106.9	11.2	0.0	0.0	9.4	0.0	0.0
Lane LOS	F	B			A		
Approach Delay (s)	86.4		0.0		0.4		
Approach LOS	F						
Intersection Summary							
Average Delay			8.7				
Intersection Capacity Utilization			42.9%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2031 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	137	75	45	517	741	276
Future Volume (vph)	137	75	45	517	741	276
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1190	1662	3137	3197	1488
Link Speed (k/h)	40		70	70		
Link Distance (m)	1391.9		256.2	493.4		
Travel Time (s)	125.3		13.2	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	149	82	49	562	805	300
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	82	49	562	805	300
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 43.8%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2031 <PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔		
Traffic Volume (veh/h)	137	75	45	517	741	276		
Future Volume (Veh/h)	137	75	45	517	741	276		
Sign Control	Stop		Free					
Grade	0%		0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	149	82	49	562	805	300		
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	1184	402	1105					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1184	402	1105					
tC, single (s)	6.8	7.4	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.5	2.2					
p0 queue free %	13	85	92					
cM capacity (veh/h)	171	537	639					
Direction_Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	149	82	49	281	281	402	402	300
Volume Left	149	0	49	0	0	0	0	0
Volume Right	0	82	0	0	0	0	0	300
cSH	171	537	639	1700	1700	1700	1700	1700
Volume to Capacity	0.87	0.15	0.08	0.17	0.17	0.24	0.24	0.18
Queue Length 95th (m)	49.9	4.3	2.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	92.7	12.9	11.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	B			0.0		
Approach Delay (s)	64.4	0.9		0.0				
Approach LOS	F							
Intersection Summary								
Average Delay			7.9					
Intersection Capacity Utilization			43.8%		ICU Level of Service		A	
Analysis Period (min)	15							

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2031 <PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	62	0	101	2	0	2	83	471	2	2	673	126
Future Volume (vph)	62	0	101	2	0	2	83	471	2	2	673	126
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.932			0.999				0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				371.6
Travel Time (s)		8.6			23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	67	0	110	2	0	2	90	512	2	2	732	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	110	0	0	4	0	90	514	0	2	732	137
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 42.0%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2031 <PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	62	0	101	2	0	2	83	471	2	2	673	126
Future Volume (Veh/h)	62	0	101	2	0	2	83	471	2	2	673	126
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)	67	0	110	2	0	2	90	512	2	2	732	137
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	1174	1430	366	1173	1566	257	869			514		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1076	1346	366	1075	1489	110	869			380		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	55	100	83	98	100	100	88			100		
cM capacity (veh/h)	150	126	631	126	103	882	771			1128		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4		
Volume Total	67	110	4	90	341	173	2	366	366	137		
Volume Left	67	0	2	90	0	0	2	0	0	0		
Volume Right	0	110	2	0	0	2	0	0	0	137		
cSH	150	631	220	771	1700	1700	1128	1700	1700	1700		
Volume to Capacity	0.45	0.17	0.02	0.12	0.20	0.10	0.00	0.22	0.22	0.08		
Queue Length 95th (m)	16.3	5.0	0.4	3.2	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (s)	47.3	11.9	21.6	10.3	0.0	0.0	8.2	0.0	0.0	0.0		
Lane LOS	E	B	C	B	A							
Approach Delay (s)	25.3		21.6	1.5	0.0							
Approach LOS	D		C									
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			42.0%	ICU Level of Service		A						
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2031 <PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↔		↔	↔	↔	↔	
Traffic Volume (vph)	305	0	22	492	0	28	
Future Volume (vph)	305	0	22	492	0	28	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Storage Length (m)	0.0		15.0	0.0		0.0	
Storage Lanes	0		0	1		0	
Taper Length (m)			15.0	7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	0.865						
Fit Protected				0.998			
Satd. Flow (prot)	1683	0	0	1698	1514	0	
Fit Permitted	0.998						
Satd. Flow (perm)	1683	0	0	1698	1514	0	
Link Speed (k/h)	80			80	50		
Link Distance (m)	451.8			562.9	459.1		
Travel Time (s)	20.3			25.3	33.1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%	
Adj. Flow (vph)	332	0	24	535	0	30	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	332	0	0	559	30	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	0.0			0.0	3.6		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	15		25	25		15	
Sign Control	Free		Free		Stop		
Intersection Summary							
Area Type:	Other						
Control Type:	Unsignalized						
Intersection Capacity Utilization 57.5%				ICU Level of Service B			
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2031 <PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	305	0	22	492	0	28
Future Volume (Veh/h)	305	0	22	492	0	28
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)	332	0	24	535	0	30
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			332		915	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			332		915	332
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		100	96
cM capacity (veh/h)			1239		299	714
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	332	559	30			
Volume Left	0	24	0			
Volume Right	0	0	30			
cSH	1700	1239	714			
Volume to Capacity	0.20	0.02	0.04			
Queue Length 95th (m)	0.0	0.5	1.1			
Control Delay (s)	0.0	0.6	10.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.6	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		57.5%		ICU Level of Service		B
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2031 <PM>
01-31-2023

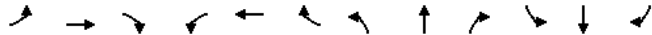
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	17	0	382	0	0	0	180	536	0	0	766	7
Future Volume (vph)	17	0	382	0	0	0	180	536	0	0	766	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.198					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	340	3228	0	1716	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		304										109
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		101.3			58.5			348.2			226.1	
Travel Time (s)		7.3			4.2			15.7			10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	583	0	0	833	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	583	0	0	833	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		15.1	52.5		37.4	37.4	37.4
Total Split (%)	34.4%	34.4%		34.4%	34.4%		18.9%	65.6%		46.8%	46.8%	46.8%
Maximum Green (s)	22.0	22.0		22.0	22.0		9.6	47.0		31.9	31.9	31.9
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0			31.9	31.9
Actuated g/C Ratio	0.28	0.28					0.59	0.59			0.40	0.40

Lanes, Volumes, Timings

Future Total_2031 <PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023

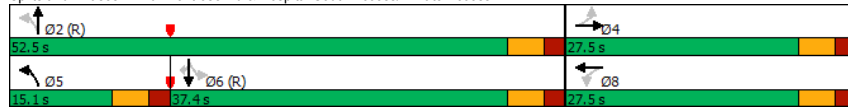


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.67					0.55	0.31			0.64	0.01
Control Delay	21.9	13.3					14.1	8.9			22.2	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	13.3					14.1	8.9			22.2	0.0
LOS	C	B					B	A			C	A
Approach Delay		13.7						10.2			22.0	
Approach LOS		B						B			C	
Queue Length 50th (m)	2.1	13.9					13.4	22.4			55.2	0.0
Queue Length 95th (m)	7.2	45.2					23.5	31.6			74.8	0.0
Internal Link Dist (m)		77.3			34.5			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)		357	621				354	1896			1299	646
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.05	0.67					0.55	0.31			0.64	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 15.8
 Intersection LOS: B
 Intersection Capacity Utilization 73.2%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

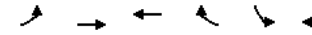


Lanes, Volumes, Timings

Future Total_2031 <PM>

11: Biggar Rd & Hospital East Access

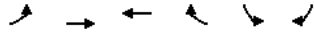
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓	↓
Traffic Volume (vph)	19	494	639	84	187	85
Future Volume (vph)	19	494	639	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.983			0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3177	0	1630	1458
Fit Permitted	0.311				0.950	
Satd. Flow (perm)	534	3197	3177	0	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			30			92
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	537	695	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	537	786	0	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Prot	Perm	
Protected Phases		2	6		4	
Permitted Phases	2					4
Minimum Split (s)	24.5	24.5	24.5		27.5	27.5
Total Split (s)	42.0	42.0	42.0		28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%		40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5		22.5	22.5
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	36.5	36.5	36.5		22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52		0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2031 <PM>
01-31-2023

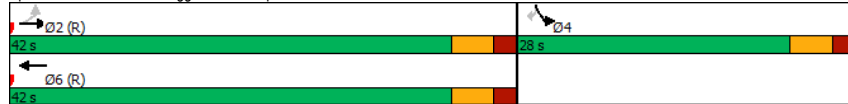


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.08	0.32	0.47		0.39	0.17
Control Delay	9.3	10.3	11.3		21.1	5.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	9.3	10.3	11.3		21.1	5.3
LOS	A	B	B		C	A
Approach Delay		10.3	11.3		16.2	
Approach LOS		B	B		B	
Queue Length 50th (m)	1.4	20.7	32.0		21.4	0.0
Queue Length 95th (m)	4.8	30.4	45.6		38.8	9.2
Internal Link Dist (m)		341.4	302.3		168.4	
Turn Bay Length (m)	30.0					
Base Capacity (vph)	278	1667	1670		523	531
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.08	0.32	0.47		0.39	0.17

Intersection Summary

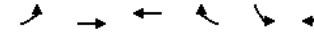
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Pretimed	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 42.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2031 <PM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	↓
Traffic Volume (vph)	7	470	705	19	43	42
Future Volume (vph)	7	470	705	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.996		0.933	
Fit Protected	0.950				0.975	
Satd. Flow (prot)	1630	3197	3216	0	1561	0
Fit Permitted	0.950				0.975	
Satd. Flow (perm)	1630	3197	3216	0	1561	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		74.2	365.4		157.5	
Travel Time (s)		3.3	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	511	766	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	511	787	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 33.9%	ICU Level of Service A
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

Future Total_2031 <PM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕	↕	↕	↕
Traffic Volume (veh/h)	7	470	705	19	43	42
Future Volume (Veh/h)	7	470	705	19	43	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)	8	511	766	21	47	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)	365					
pX, platoon unblocked	0.90				0.90	0.90
vC, conflicting volume	787				1048	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551				840	116
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				83	94
cM capacity (veh/h)	917				272	827
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	256	256	511	276	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	917	1700	1700	1700	1700	408
Volume to Capacity	0.01	0.15	0.15	0.30	0.16	0.23
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	6.9
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	16.4
Lane LOS	A				C	
Approach Delay (s)	0.1				0.0	16.4
Approach LOS					C	
Intersection Summary						
Average Delay	1.1					
Intersection Capacity Utilization	33.9%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031 <PM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕	↕	↕	↕
Traffic Volume (vph)	90	253	462	286	226	59
Future Volume (vph)	90	253	462	286	226	59
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0				60.0	0.0
Storage Lanes	1				1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.950				0.962	
Satd. Flow (perm)	1630	1683	1699	1458	1604	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	208.5		131.1		190.1	
Travel Time (s)	9.4		5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	98	275	502	311	246	64
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	275	502	311	310	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 59.3%					ICU Level of Service B	
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2031 <PM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	↕
Traffic Volume (veh/h)	90	253	462	286	226	59
Future Volume (Veh/h)	90	253	462	286	226	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)	98	275	502	311	246	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	813				973	502
vC1, stage 1 conf vol					973	502
vC2, stage 2 conf vol					973	502
vCu, unblocked vol	813				973	502
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				0	89
cM capacity (veh/h)	814				246	569
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	98	275	502	311	310	
Volume Left	98	0	0	0	246	
Volume Right	0	0	0	311	64	
cSH	814	1700	1700	1700	279	
Volume to Capacity	0.12	0.16	0.30	0.18	1.11	
Queue Length 95th (m)	3.3	0.0	0.0	0.0	103.3	
Control Delay (s)	10.0	0.0	0.0	0.0	127.5	
Lane LOS	B				F	
Approach Delay (s)	2.6		0.0		127.5	
Approach LOS					F	
Intersection Summary						
Average Delay	27.1					
Intersection Capacity Utilization	59.3%		ICU Level of Service		B	
Analysis Period (min)	15					

Lanes, Volumes, Timings

14: Street A & Grassy Street Q (Grassy Brook Rd)/Street Q (Grassy Brook Rd) 01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (vph)	0	14	0	56	27	21	15	30	49	12	19	0	
Future Volume (vph)	0	14	0	56	27	21	15	30	49	12	19	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
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	
Fit							0.973	0.930					
Fit Protected							0.974	0.992		0.981			
Satd. Flow (prot)	0	1716	0	0	1626	0	0	1583	0	0	1683	0	
Fit Permitted							0.974	0.992		0.981			
Satd. Flow (perm)	0	1716	0	0	1626	0	0	1583	0	0	1683	0	
Link Speed (k/h)					40			50					
Link Distance (m)					277.4			1391.9			855.1		
Travel Time (s)					25.0			125.3			61.6		
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	
Adj. Flow (vph)	0	15	0	61	29	23	16	33	53	13	21	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	15	0	0	113	0	0	102	0	0	34	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	3.6				3.6			0.0			0.0		
Link Offset(m)	0.0				0.0			0.0			0.0		
Crosswalk Width(m)	4.8				4.8			4.8			4.8		
Two way Left Turn Lane													
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Sign Control	Stop				Stop			Stop			Stop		

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	25.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 14: Street A & Grassy Street Q (Grassy Brook Rd)/Street Q (Grassy Brook Rd) Future Total_2031 <PM>
 01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	14	0	56	27	21	15	30	49	12	19	0
Future Volume (vph)	0	14	0	56	27	21	15	30	49	12	19	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	15	0	61	29	23	16	33	53	13	21	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	15	113	102	34								
Volume Left (vph)	0	61	16	13								
Volume Right (vph)	0	23	53	0								
Hadj (s)	0.03	0.02	-0.25	0.11								
Departure Headway (s)	4.3	4.2	4.0	4.4								
Degree Utilization, x	0.02	0.13	0.11	0.04								
Capacity (veh/h)	793	824	869	787								
Control Delay (s)	7.4	7.9	7.5	7.6								
Approach Delay (s)	7.4	7.9	7.5	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.7											
Level of Service	A											
Intersection Capacity Utilization	25.9%			ICU Level of Service	A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
 15: Street A & Street HH Future Total_2031 <PM>
 01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	66	14	166	42	4	110
Future Volume (vph)	66	14	166	42	4	110
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.977		0.973			
Flt Protected	0.960				0.998	
Satd. Flow (prot)	1609		0		1712	
Flt Permitted	0.960				0.998	
Satd. Flow (perm)	1609		0		1712	
Link Speed (k/h)	50		50		50	
Link Distance (m)	1017.7		238.9		855.1	
Travel Time (s)	73.3		17.2		61.6	
Peak Hour Factor	0.92		0.92		0.92	
Adj. Flow (vph)	72		15		120	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87		0		124	
Enter Blocked Intersection	No		No		No	
Lane Alignment	Left		Right		Left	
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11		1.11		1.11	
Turning Speed (k/h)	25		15		25	
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.8%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2031 <PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	↔
Traffic Volume (veh/h)	66	14	166	42	4	110
Future Volume (Veh/h)	66	14	166	42	4	110
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)	72	15	180	46	4	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	331	203			226	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	331	203			226	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	98			100	
cM capacity (veh/h)	662	838			1342	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	87	226	124			
Volume Left	72	0	4			
Volume Right	15	46	0			
cSH	687	1700	1342			
Volume to Capacity	0.13	0.13	0.00			
Queue Length 95th (m)	3.5	0.0	0.1			
Control Delay (s)	11.0	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		23.8%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2031 <PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↔↔	↔↔	
Traffic Volume (vph)	24	16	17	539	775	40
Future Volume (vph)	24	16	17	539	775	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.993	
Fit Protected	0.971			0.999		
Satd. Flow (prot)	1578	0	0	3226	3237	0
Fit Permitted	0.971			0.999		
Satd. Flow (perm)	1578	0	0	3226	3237	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	26	17	18	586	842	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	604	885	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 39.5%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2031 <PM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (veh/h)	24	16	17	539	775	40
Future Volume (Veh/h)	24	16	17	539	775	40
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)	26	17	18	586	842	43
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	1192	442	885			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1192	442	885			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	97	98			
cM capacity (veh/h)	175	563	760			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	43	213	391	561	324	
Volume Left	26	18	0	0	0	
Volume Right	17	0	0	0	43	
cSH	241	760	1700	1700	1700	
Volume to Capacity	0.18	0.02	0.23	0.33	0.19	
Queue Length 95th (m)	5.1	0.6	0.0	0.0	0.0	
Control Delay (s)	23.1	1.1	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	23.1	0.4		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			39.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023

	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	728	0	0	497	134	60
Future Volume (vph)	728	0	0	497	134	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Flt Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1361	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						65
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	791	0	0	540	146	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	791	0	0	540	146	65
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	41.0			41.0	29.0	29.0
Total Split (%)	58.6%			58.6%	41.4%	41.4%
Maximum Green (s)	35.5			35.5	23.5	23.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.5			35.5	23.5	23.5
Actuated g/C Ratio	0.51			0.51	0.34	0.34
v/c Ratio	0.49			0.32	0.32	0.13

Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023

	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	12.6			10.9	19.8	5.6
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	12.6			10.9	19.8	5.6
LOS	B			B	B	A
Approach Delay	12.6			10.9	15.4	
Approach LOS	B			B	B	
Queue Length 50th (m)	35.1			21.5	14.7	0.0
Queue Length 95th (m)	49.3			31.4	28.9	7.6
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1621			1669	457	497
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.49			0.32	0.32	0.13

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.49
 Intersection Signal Delay: 12.4 Intersection LOS: B
 Intersection Capacity Utilization 38.8% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↙	↘	↕	↔
Traffic Volume (vph)	50	44	44	598	861	51
Future Volume (vph)	50	44	44	598	861	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.992	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3190	0
Fit Permitted	0.950		0.227			
Satd. Flow (perm)	1614	1261	386	3260	3190	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		48			13	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	54	48	48	650	936	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	48	48	650	991	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	27.5	27.5	42.5	42.5	42.5	
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	

Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

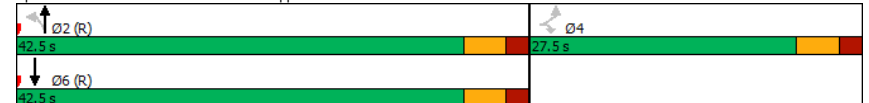
4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.11	0.11	0.24	0.38	0.59	
Control Delay	17.8	6.6	15.0	12.0	12.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.8	6.6	15.0	12.0	12.9	
LOS	B	A	B	B	B	
Approach Delay	12.5			12.2	12.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	5.2	0.0	4.4	31.7	44.6	
Queue Length 95th (m)	12.9	6.8	m11.6	49.2	62.1	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	507	429	204	1723	1692	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.11	0.11	0.24	0.38	0.59	

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 12.6 Intersection LOS: B
 Intersection Capacity Utilization 55.5% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031 Improved <PM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↙	↓
Traffic Volume (vph)	135	37	599	99	37	842
Future Volume (vph)	135	37	599	99	37	842
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0			15.0		
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.979			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3113	0	1662	3197
Fit Permitted	0.950				0.325	
Satd. Flow (perm)	1646	1488	3113	0	569	3197
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		40	40			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	147	40	651	108	40	915
Shared Lane Traffic (%)						
Lane Group Flow (vph)	147	40	759	0	40	915
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

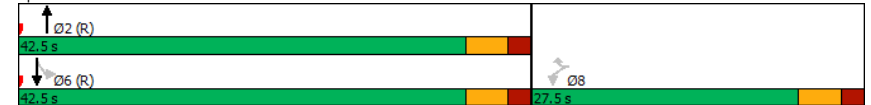
Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2031 Improved <PM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.28	0.08	0.46		0.13	0.54
Control Delay	20.0	6.7	6.3		10.8	11.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.0	6.7	6.3		10.8	11.0
LOS	B	A	A		B	B
Approach Delay	17.1		6.3			11.0
Approach LOS	B		A			B
Queue Length 50th (m)	15.1	0.0	23.4		2.0	24.2
Queue Length 95th (m)	29.0	6.3	25.0		m5.1	44.2
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	517	495	1664		300	1689
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.28	0.08	0.46		0.13	0.54

Intersection Summary
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 50.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	137	75	45	517	741	276
Future Volume (vph)	137	75	45	517	741	276
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.304			
Satd. Flow (perm)	1662	1190	532	3137	3197	1488
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		82				300
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			256.2	493.4	
Travel Time (s)	125.3			13.2	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	149	82	49	562	805	300
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	82	49	562	805	300
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	42.5	42.5	42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	0.53

Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

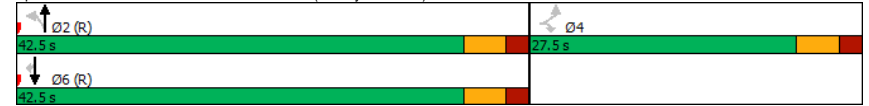
6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.29	0.19	0.17	0.34	0.48	0.32
Control Delay	19.9	6.0	14.8	13.2	13.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	6.0	14.8	13.2	13.2	5.8
LOS	B	A	B	B	B	A
Approach Delay	15.0			13.3	11.2	
Approach LOS	B			B	B	
Queue Length 50th (m)	15.3	0.0	3.6	23.3	45.0	14.0
Queue Length 95th (m)	29.3	8.9	11.5	37.9	49.6	20.9
Internal Link Dist (m)	1367.9			232.2	469.4	
Turn Bay Length (m)	125.0		15.0			40.0
Base Capacity (vph)	522	430	281	1658	1689	927
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.19	0.17	0.34	0.48	0.32

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	55
Control Type:	Pretimed
Maximum v/c Ratio:	0.48
Intersection Signal Delay:	12.3
Intersection Capacity Utilization:	52.6%
Analysis Period (min):	15
ICU Level of Service:	A
Intersection LOS:	B

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↖	↖	↖	↖		↖	↖	↖
Traffic Volume (vph)	62	0	101	2	0	2	83	471	2	2	673	126
Future Volume (vph)	62	0	101	2	0	2	83	471	2	2	673	126
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850					0.932			0.999		0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Fit Permitted	0.755				0.924		0.338			0.458		
Satd. Flow (perm)	1295	1458	0	0	1507	0	580	3225	0	802	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		177			39			1				137
Link Speed (k/h)	50				50			80				70
Link Distance (m)	118.9				332.1			226.1				371.6
Travel Time (s)	8.6				23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	67	0	110	2	0	2	90	512	2	2	732	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	110	0	0	4	0	90	514	0	2	732	137
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		42.5	42.5		42.5	42.5	42.5
Total Split (%)	39.3%	39.3%		39.3%	39.3%		60.7%	60.7%		60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.53	0.53		0.53	0.53	0.53

Lanes, Volumes, Timings

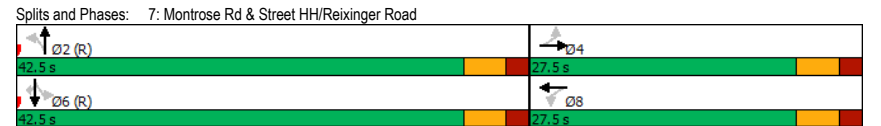
Future Total_2031 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.16	0.19			0.01		0.29	0.30		0.00	0.42	0.16
Control Delay	20.0	1.9			0.0		12.5	9.8		15.5	18.6	8.1
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	20.0	1.9			0.0		12.5	9.8		15.5	18.6	8.1
LOS	B	A			A		B	A		B	B	A
Approach Delay		8.7						10.2				16.9
Approach LOS		A						B				B
Queue Length 50th (m)	7.0	0.0			0.0		6.4	19.3		0.2	42.5	1.7
Queue Length 95th (m)	15.0	2.7			0.0		15.9	28.3		m0.5	60.6	17.8
Internal Link Dist (m)		94.9			308.1			202.1				347.6
Turn Bay Length (m)	15.0						15.0			15.0		30.0
Base Capacity (vph)	407	579			500		306	1705		423	1723	835
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.16	0.19			0.01		0.29	0.30		0.00	0.42	0.16

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 13.6 Intersection LOS: B
 Intersection Capacity Utilization 49.1% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031 Improved <PM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	90	253	462	286	226	59
Future Volume (vph)	90	253	462	286	226	59
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.365				0.962	
Satd. Flow (perm)	626	1683	1699	1458	1604	0
Right Turn on Red				Yes	Yes	
Satd. Flow (RTOR)				311	21	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	98	275	502	311	246	64
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	275	502	311	310	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	40.0	40.0	40.0	40.0	30.0	
Total Split (%)	57.1%	57.1%	57.1%	57.1%	42.9%	
Maximum Green (s)	34.5	34.5	34.5	34.5	24.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	34.5	34.5	34.5	34.5	24.5	
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.35	

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2031 Improved <PM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.32	0.33	0.60	0.36	0.54	
Control Delay	14.3	12.2	19.5	4.3	21.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	14.3	12.2	19.5	4.3	21.1	
LOS	B	B	B	A	C	
Approach Delay		12.7	13.7		21.1	
Approach LOS		B	B		C	
Queue Length 50th (m)	7.6	21.6	40.6	0.5	31.1	
Queue Length 95th (m)	18.5	37.2	70.9	18.1	54.7	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	15.0			60.0		
Base Capacity (vph)	308	829	837	876	575	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.32	0.33	0.60	0.36	0.54	

Intersection Summary

Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Pretimed	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2031 Improved <PM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	[Diagrammatic symbols]					
Traffic Volume (vph)	24	16	17	539	775	40
Future Volume (vph)	24	16	17	539	775	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.993	
Fit Protected	0.971			0.999		
Satd. Flow (prot)	1578	0	0	3226	3237	0
Fit Permitted	0.971			0.999		
Satd. Flow (perm)	1578	0	0	3226	3237	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	26	17	18	586	842	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	604	885	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.5%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

Future Total_2031 Improved <PM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	[Diagrammatic symbols]					
Traffic Volume (veh/h)	24	16	17	539	775	40
Future Volume (Veh/h)	24	16	17	539	775	40
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)	26	17	18	586	842	43
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)				372	256	
pX, platoon unblocked	0.87	0.86	0.86			
vC, conflicting volume	1192	442	885			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	812	34	547			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	98			
cM capacity (veh/h)	271	889	878			

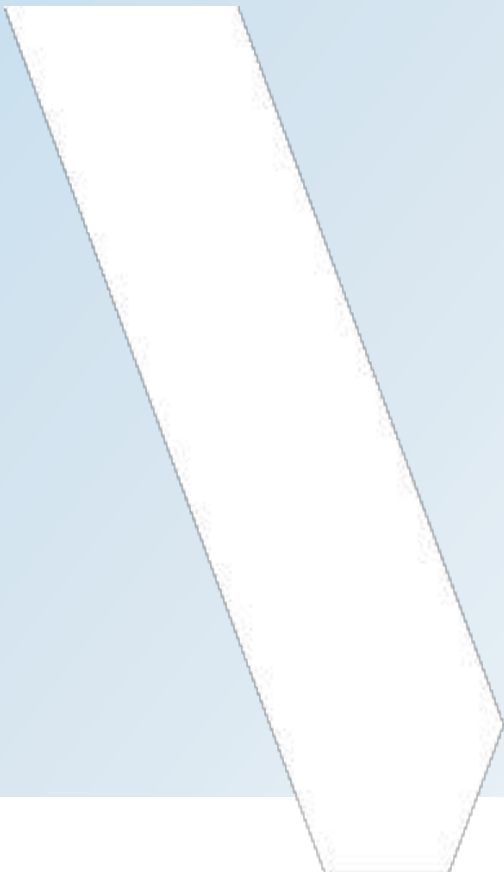
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	43	213	391	561	324
Volume Left	26	18	0	0	0
Volume Right	17	0	0	0	43
cSH	374	878	1700	1700	1700
Volume to Capacity	0.11	0.02	0.23	0.33	0.19
Queue Length 95th (m)	3.1	0.5	0.0	0.0	0.0
Control Delay (s)	15.9	1.0	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	15.9	0.3		0.0	
Approach LOS	C				

Intersection Summary

Average Delay	0.6
Intersection Capacity Utilization	39.5%
Analysis Period (min)	15
	ICU Level of Service A

APPENDIX

2036
HORIZON



Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036 <AM>

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	690	41	351	560	556	72	381	560	417	173	88
Future Volume (vph)	204	690	41	351	560	556	72	381	560	417	173	88
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1390	3043	3260	1444	1614	3228	1458	3072	3197	1444
Fit Permitted	0.341			0.950			0.633			0.950		
Satd. Flow (perm)	579	3260	1390	3043	3260	1444	1075	3228	1458	3072	3197	1444
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			112			570			508			96
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	3%	2%	7%	6%	2%	3%	3%	3%	2%	5%	4%	3%
Adj. Flow (vph)	222	750	45	382	609	604	78	414	609	453	188	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	750	45	382	609	604	78	414	609	453	188	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)												
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036 <AM>

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		8	Free		4
Detector Phase	5	2	2	1	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0		8.0	10.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3		13.5	31.3	31.3
Total Split (s)	22.2	38.7	38.7	24.0	40.5		31.3	31.3		26.0	57.3	57.3
Total Split (%)	18.5%	32.3%	32.3%	20.0%	33.8%		26.1%	26.1%		21.7%	47.8%	47.8%
Maximum Green (s)	18.7	32.4	32.4	18.5	34.2		25.0	25.0		20.5	51.0	51.0
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2		2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0		3.0	6.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max		Max	Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	0
Act Effect Green (s)	49.6	32.4	32.4	17.6	37.6	119.1	25.0	25.0	119.1	20.5	51.0	51.0
Actuated g/C Ratio	0.42	0.27	0.27	0.15	0.32	1.00	0.21	0.21	1.00	0.17	0.43	0.43
v/c Ratio	0.61	0.85	0.10	0.85	0.59	0.42	0.35	0.61	0.42	0.86	0.14	0.14
Control Delay	26.1	51.3	0.4	67.9	37.7	0.9	45.6	47.3	0.9	64.8	21.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	51.3	0.4	67.9	37.7	0.9	45.6	47.3	0.9	64.8	21.2	4.6
LOS	C	D	A	E	D	A	D	D	A	E	C	A
Approach Delay		43.6			31.0			21.5				45.9
Approach LOS		D			C			C				D
Queue Length 50th (m)	31.4	92.9	0.0	47.7	66.2	0.0	16.6	49.4	0.0	56.9	14.7	0.0
Queue Length 95th (m)	48.6	#124.0	0.0	#71.0	90.5	0.0	32.4	67.0	0.0	#84.6	22.6	10.3
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0		150.0	275.0		40.0
Base Capacity (vph)	424	887	459	473	1029	1444	225	677	1458	528	1369	673
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.85	0.10	0.81	0.59	0.42	0.35	0.61	0.42	0.86	0.14	0.14
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	119.1											
Natural Cycle:	100											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.86											
Intersection Signal Delay:	34.0						Intersection LOS: C					
Intersection Capacity Utilization:	75.6%						ICU Level of Service D					
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												

Lanes, Volumes, Timings

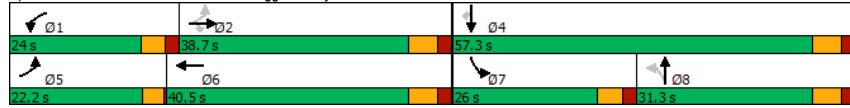
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036 <AM>

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Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

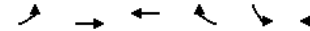


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2036 <AM>

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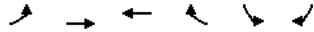
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↑
Traffic Volume (vph)	0	1448	604	0	178	855
Future Volume (vph)	0	1448	604	0	178	855
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.98	0.99
Frt					0.894	0.850
Flt Protected					0.986	
Satd. Flow (prot)	0	3197	2995	0	2771	1302
Flt Permitted					0.986	
Satd. Flow (perm)	0	3197	2995	0	2771	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					224	464
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	1574	657	0	193	929
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1574	657	0	658	464
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2036 <AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

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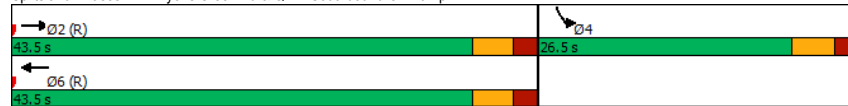


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.91	0.40			0.67	0.36
Control Delay	24.1	10.3			17.6	0.8
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	24.1	10.3			17.6	0.8
LOS	C	B			B	A
Approach Delay	24.1	10.3			10.7	
Approach LOS	C	B			B	
Queue Length 50th (m)	94.3	25.5			26.0	0.0
Queue Length 95th (m)	#149.8	36.8			43.6	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			988	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.91	0.40			0.67	0.36

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 16.9 Intersection LOS: B
 Intersection Capacity Utilization 70.1% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2036 <AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	682	0	0	404	231	53
Future Volume (vph)	682	0	0	404	231	53
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Flt Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1511	1444
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						58
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	741	0	0	439	251	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	741	0	0	439	251	58
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	39.0			39.0	31.0	31.0
Total Split (%)	55.7%			55.7%	44.3%	44.3%
Maximum Green (s)	33.5			33.5	25.5	25.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	33.5			33.5	25.5	25.5
Actuated g/C Ratio	0.48			0.48	0.36	0.36
v/c Ratio	0.52			0.30	0.46	0.10

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2036 <AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	14.3			11.9	20.3	5.2
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	14.3			11.9	20.3	5.2
LOS	B			B	C	A
Approach Delay	14.3			11.9	17.5	
Approach LOS	B			B	B	
Queue Length 50th (m)	35.1			18.3	25.7	0.0
Queue Length 95th (m)	50.1			27.6	45.6	6.8
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1433			1446	550	562
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.52			0.30	0.46	0.10

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 14.2
 Intersection LOS: B
 Intersection Capacity Utilization 41.9%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	75	38	36	754	552	80
Future Volume (vph)	75	38	36	754	552	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.981	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3044	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	3044	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	82	41	39	820	600	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	41	39	820	687	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 37.2%
 ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	75	38	36	754	552	80	
Future Volume (Veh/h)	75	38	36	754	552	80	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	82	41	39	820	600	87	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None		None		
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1132	344	687				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1132	344	687				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	48	94	95				
cM capacity (veh/h)	156	658	749				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	82	41	39	410	410	400	287
Volume Left	82	0	39	0	0	0	0
Volume Right	0	41	0	0	0	0	87
cSH	156	658	749	1700	1700	1700	1700
Volume to Capacity	0.52	0.06	0.05	0.24	0.24	0.24	0.17
Queue Length 95th (m)	20.7	1.6	1.3	0.0	0.0	0.0	0.0
Control Delay (s)	51.0	10.8	10.1	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	37.6		0.5		0.0		
Approach LOS	E						
Intersection Summary							
Average Delay			3.0				
Intersection Capacity Utilization			37.2%		ICU Level of Service A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2036 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↕↕	↔	↔
Traffic Volume (vph)	68	12	808	125	24	569
Future Volume (vph)	68	12	808	125	24	569
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.980			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1498	1316	2999	0	1409	2995
Fit Permitted	0.950				0.218	
Satd. Flow (perm)	1498	1316	2999	0	323	2995
Right Turn on Red	Yes		Yes			
Satd. Flow (RTOR)	13		37			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	74	13	878	136	26	618
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	13	1014	0	26	618
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2		6	
Permitted Phases	8		8		6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0		0		0	
Act Effct Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2036 <AM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.16	0.03	0.63		0.15	0.39
Control Delay	18.5	9.3	13.4		11.2	10.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.5	9.3	13.4		11.2	10.7
LOS	B	A	B		B	B
Approach Delay	17.1		13.4			10.7
Approach LOS	B		B			B
Queue Length 50th (m)	7.3	0.0	46.3		1.7	24.6
Queue Length 95th (m)	16.5	3.6	65.3		6.1	35.7
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	470	422	1602		170	1583
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.03	0.63		0.15	0.39

Intersection Summary

Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 44.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2036 <AM>
01-31-2023

	↖	↗	↖	↑	↓	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↑	↓	↙
Traffic Volume (vph)	300	185	44	636	432	158
Future Volume (vph)	300	185	44	636	432	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2942	1352
Link Speed (k/h)	40		70	70		
Link Distance (m)	1391.9		268.2	493.4		
Travel Time (s)	125.3		13.8	25.4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	326	201	48	691	470	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	326	201	48	691	470	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 44.3%	ICU Level of Service A
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔		
Traffic Volume (veh/h)	300	185	44	636	432	158		
Future Volume (Veh/h)	300	185	44	636	432	158		
Sign Control	Stop		Free					
Grade	0%		0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	326	201	48	691	470	172		
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	912	235	642					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	912	235	642					
tC, single (s)	7.1	6.9	4.1					
tC, 2 stage (s)								
tF (s)	3.6	3.3	2.2					
p0 queue free %	0	74	95					
cM capacity (veh/h)	241	773	952					
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	326	201	48	346	346	235	235	172
Volume Left	326	0	48	0	0	0	0	0
Volume Right	0	201	0	0	0	0	0	172
cSH	241	773	952	1700	1700	1700	1700	1700
Volume to Capacity	1.35	0.26	0.05	0.20	0.20	0.14	0.14	0.10
Queue Length 95th (m)	140.6	8.3	1.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	223.4	11.3	9.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	A					
Approach Delay (s)	142.5	0.6		0.0				
Approach LOS	F							
Intersection Summary								
Average Delay	39.6							
Intersection Capacity Utilization	44.3%		ICU Level of Service		A			
Analysis Period (min)	15							

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	164	0	68	2	0	2	171	519	2	2	486	85
Future Volume (vph)	164	0	68	2	0	2	171	519	2	2	486	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt	0.850				0.932		0.999					0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Link Speed (k/h)	50				50		80				70	
Link Distance (m)	118.9				332.1		226.1				359.6	
Travel Time (s)	8.6				23.9		10.2				18.5	
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	178	0	74	2	0	2	186	564	2	2	528	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	74	0	0	4	0	186	566	0	2	528	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		3.6				3.6	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control	Stop				Stop		Free				Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 51.4%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔	
Traffic Volume (veh/h)	164	0	68	2	0	2	171	519	2	2	486	85	
Future Volume (Veh/h)	164	0	68	2	0	2	171	519	2	2	486	85	
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)	178	0	74	2	0	2	186	564	2	2	528	92	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None						None						
Median storage (veh)													
Upstream signal (m)	226												
pX, platoon unblocked	0.94	0.94		0.94	0.94	0.94				0.94			
vC, conflicting volume	1188	1470	264	1279	1561	283	620			566			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1065	1366	264	1162	1463	98	620			400			
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	100	90	98	100	100	81			100			
cM capacity (veh/h)	140	110	734	109	96	885	956			1095			
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4			
Volume Total	178	74	4	186	376	190	2	264	264	92			
Volume Left	178	0	2	186	0	0	2	0	0	0			
Volume Right	0	74	2	0	0	2	0	0	0	92			
cSH	140	734	194	956	1700	1700	1095	1700	1700	1700			
Volume to Capacity	1.27	0.10	0.02	0.19	0.22	0.11	0.00	0.16	0.16	0.05			
Queue Length 95th (m)	86.8	2.7	0.5	5.8	0.0	0.0	0.0	0.0	0.0	0.0			
Control Delay (s)	225.9	10.5	23.9	9.7	0.0	0.0	8.3	0.0	0.0	0.0			
Lane LOS	F	B	C	A	A			A					
Approach Delay (s)	162.6		23.9	2.4	0.0								
Approach LOS	F		C										
Intersection Summary													
Average Delay	26.3												
Intersection Capacity Utilization	51.4%			ICU Level of Service						A			
Analysis Period (min)	15												

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2036 <AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	417	0	36	317	2	31
Future Volume (vph)	417	0	36	317	2	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.872					
Fit Protected			0.995		0.997	
Satd. Flow (prot)	1651	0	0	1578	1390	0
Fit Permitted			0.995		0.997	
Satd. Flow (perm)	1651	0	0	1578	1390	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	453	0	39	345	2	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	453	0	0	384	36	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 57.4%	ICU Level of Service B					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2036 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	417	0	36	317	2	31
Future Volume (Veh/h)	417	0	36	317	2	31
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)	453	0	39	345	2	34
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			453		876	453
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			453		876	453
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			96		99	94
cM capacity (veh/h)			934		308	590
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	453	384	36			
Volume Left	0	39	2			
Volume Right	0	0	34			
cSH	1700	934	562			
Volume to Capacity	0.27	0.04	0.06			
Queue Length 95th (m)	0.0	1.0	1.6			
Control Delay (s)	0.0	1.3	11.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.3	11.8			
Approach LOS			B			
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		57.4%		ICU Level of Service		B
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	6	0	141	0	0	0	455	684	0	0	535	19
Future Volume (vph)	6	0	141	0	0	0	455	684	0	0	535	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.224					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	384	3228	0	1716	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		588										109
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		101.3			60.9			348.2			226.1	
Travel Time (s)		7.3			4.4			15.7			10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	5%	2%
Adj. Flow (vph)	7	0	153	0	0	0	495	743	0	0	582	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	743	0	0	582	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		27.0	52.5		25.5	25.5	25.5
Total Split (%)	34.4%	34.4%		34.4%	34.4%		33.8%	65.6%		31.9%	31.9%	31.9%
Maximum Green (s)	22.0	22.0		22.0	22.0		21.5	47.0		20.0	20.0	20.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0			20.0	20.0
Actuated g/C Ratio	0.28	0.28					0.59	0.59			0.25	0.25

Lanes, Volumes, Timings

Future Total_2036 <AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.19					0.88	0.39			0.74	0.05
Control Delay	21.5	0.5					34.8	9.6			34.0	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.5					34.8	9.6			34.0	0.2
LOS	C	A					C	A			C	A
Approach Delay		1.4						19.7			32.9	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					51.7	30.4			45.1	0.0
Queue Length 95th (m)	3.8	0.0					#109.9	41.9			63.5	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	827					560	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.19					0.88	0.39			0.74	0.05

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 22.2 Intersection LOS: C
 Intersection Capacity Utilization 66.7% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

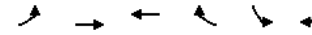


Lanes, Volumes, Timings

Future Total_2036 <AM>

11: Biggar Rd & Hospital East Access

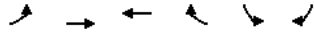
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔	↔	↔	↔
Traffic Volume (vph)	48	851	506	213	85	31
Future Volume (vph)	48	851	506	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3197	1458	1630	1458
Fit Permitted	0.432				0.950	
Satd. Flow (perm)	741	3228	3197	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	925	550	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	925	550	232	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	41.0	41.0	41.0	41.0	29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%	58.6%	41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2036 <AM>
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.14	0.57	0.34	0.27	0.17	0.07
Control Delay	10.4	13.6	11.0	2.4	17.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	13.6	11.0	2.4	17.5	6.6
LOS	B	B	B	A	B	A
Approach Delay		13.4	8.5		14.5	
Approach LOS		B	A		B	
Queue Length 50th (m)	3.6	43.2	22.1	0.0	8.8	0.0
Queue Length 95th (m)	9.4	60.1	32.3	9.7	18.8	5.6
Internal Link Dist (m)		341.4	302.3		168.4	
Turn Bay Length (m)	30.0			50.0		
Base Capacity (vph)	375	1637	1621	853	547	512
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.57	0.34	0.27	0.17	0.07

Intersection Summary

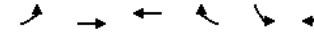
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 11.4 Intersection LOS: B
 Intersection Capacity Utilization 43.9% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2036 <AM>
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	899	489	48	0	15
Future Volume (vph)	19	899	489	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.987		0.865	
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3161	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3161	0	1484	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		74.2	365.4		157.5	
Travel Time (s)		3.3	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	977	532	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	977	584	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 37.0% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↔
Traffic Volume (veh/h)	19	899	489	48	0	15
Future Volume (Veh/h)	19	899	489	48	0	15
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)	21	977	532	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			365			
pX, platoon unblocked	0.94			0.94	0.94	
vC, conflicting volume	584			1088	292	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441			976	132	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	98	
cM capacity (veh/h)	1053			230	843	
Direction_Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	488	488	355	229	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1053	1700	1700	1700	1700	843
Volume to Capacity	0.02	0.29	0.29	0.21	0.13	0.02
Queue Length 95th (m)	0.5	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	9.4
Lane LOS	A					A
Approach Delay (s)	0.2			0.0		9.4
Approach LOS						A
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			37.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↔
Traffic Volume (vph)	34	436	296	209	483	62
Future Volume (vph)	34	436	296	209	483	62
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.985	
Fit Protected	0.950				0.958	
Satd. Flow (prot)	1630	1699	1683	1458	1619	0
Fit Permitted	0.950				0.958	
Satd. Flow (perm)	1630	1699	1683	1458	1619	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	37	474	322	227	525	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	474	322	227	592	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 64.7%				ICU Level of Service C		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	↕
Traffic Volume (veh/h)	34	436	296	209	483	62
Future Volume (Veh/h)	34	436	296	209	483	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)	37	474	322	227	525	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	549				870	322
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	549				870	322
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				0	91
cM capacity (veh/h)	1021				310	719
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	37	474	322	227	525	
Volume Left	37	0	0	0	525	
Volume Right	0	0	0	227	67	
cSH	1021	1700	1700	1700	332	
Volume to Capacity	0.04	0.28	0.19	0.13	1.79	
Queue Length 95th (m)	0.9	0.0	0.0	0.0	306.7	
Control Delay (s)	8.7	0.0	0.0	0.0	392.3	
Lane LOS	A				F	
Approach Delay (s)	0.6		0.0		392.3	
Approach LOS					F	
Intersection Summary						
Average Delay			140.8			
Intersection Capacity Utilization			64.7%		ICU Level of Service C	
Analysis Period (min)			15			

Lanes, Volumes, Timings
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	63	3	53	59	12	15	12	73	36	32	17
Future Volume (vph)	7	63	3	53	59	12	15	12	73	36	32	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		0.995			0.987			0.901			0.974	
Fit Protected		0.995			0.979			0.993			0.979	
Satd. Flow (prot)	0	1699	0	0	1658	0	0	1535	0	0	1636	0
Fit Permitted		0.995			0.979			0.993			0.979	
Satd. Flow (perm)	0	1699	0	0	1658	0	0	1535	0	0	1636	0
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		277.4			1391.9			855.1			76.8	
Travel Time (s)		25.0			125.3			61.6			5.5	
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
Adj. Flow (vph)	8	68	3	58	64	13	16	13	79	39	35	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	79	0	0	135	0	0	108	0	0	92	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	32.2%			ICU Level of Service A								
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2036 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	63	3	53	59	12	15	12	73	36	32	17
Future Volume (vph)	7	63	3	53	59	12	15	12	73	36	32	17
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)	8	68	3	58	64	13	16	13	79	39	35	18
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	79	135	108	92								
Volume Left (vph)	8	58	16	39								
Volume Right (vph)	3	13	79	18								
Hadj (s)	0.03	0.06	-0.38	0.00								
Departure Headway (s)	4.5	4.5	4.1	4.5								
Degree Utilization, x	0.10	0.17	0.12	0.12								
Capacity (veh/h)	751	754	818	745								
Control Delay (s)	8.0	8.4	7.7	8.1								
Approach Delay (s)	8.0	8.4	7.7	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.1								
Level of Service				A								
Intersection Capacity Utilization				32.2%	ICU Level of Service	A						
Analysis Period (min)				15								

Lanes, Volumes, Timings
15: Street A & Street HH

Future Total_2036 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	81	5	62	62	12	193
Future Volume (vph)	81	5	62	62	12	193
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.993		0.932			
Flt Protected	0.955					0.997
Satd. Flow (prot)	1627	0	1599	0	0	1711
Flt Permitted	0.955					0.997
Satd. Flow (perm)	1627	0	1599	0	0	1711
Link Speed (k/h)	50		50			50
Link Distance (m)	1017.7		238.9			855.1
Travel Time (s)	73.3		17.2			61.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	5	67	67	13	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	134	0	0	223
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2036 <AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕	↕	↔	↕
Traffic Volume (veh/h)	81	5	62	62	12	193
Future Volume (Veh/h)	81	5	62	62	12	193
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	5	67	67	13	210
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	100			134	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	336	100			134	
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	99			99	
cM capacity (veh/h)	653	955			1451	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	93	134	223			
Volume Left	88	0	13			
Volume Right	5	67	0			
cSH	664	1700	1451			
Volume to Capacity	0.14	0.08	0.01			
Queue Length 95th (m)	3.9	0.0	0.2			
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		2.6				
Intersection Capacity Utilization		33.6%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2036 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	62	24	10	679	524	22
Future Volume (vph)	62	24	10	679	524	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.962				0.994	
Fit Protected	0.965			0.999		
Satd. Flow (prot)	1593	0	0	3225	3180	0
Fit Permitted	0.965			0.999		
Satd. Flow (perm)	1593	0	0	3225	3180	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	67	26	11	738	570	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	749	594	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 40.0%				ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2036 <AM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (veh/h)	62	24	10	679	524	22
Future Volume (Veh/h)	62	24	10	679	524	22
Sign Control	Stop			Free		Free
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	26	11	738	570	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	973	297	594			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	973	297	594			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	96	99			
cM capacity (veh/h)	247	699	978			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	93	257	492	380	214	
Volume Left	67	11	0	0	0	
Volume Right	26	0	0	0	24	
cSH	301	978	1700	1700	1700	
Volume to Capacity	0.31	0.01	0.29	0.22	0.13	
Queue Length 95th (m)	10.2	0.3	0.0	0.0	0.0	
Control Delay (s)	22.2	0.5	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	22.2	0.2		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			40.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↙	↘	↕	↔
Traffic Volume (vph)	75	38	36	754	552	80
Future Volume (vph)	75	38	36	754	552	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.981	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3044	0
Fit Permitted	0.950		0.352			
Satd. Flow (perm)	1330	1488	481	3197	3044	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		41			32	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	82	41	39	820	600	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	41	39	820	687	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	30.0	30.0	40.0	40.0	40.0	
Total Split (%)	42.9%	42.9%	57.1%	57.1%	57.1%	
Maximum Green (s)	24.5	24.5	34.5	34.5	34.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	24.5	24.5	34.5	34.5	34.5	
Actuated g/C Ratio	0.35	0.35	0.49	0.49	0.49	

Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.18	0.07	0.16	0.52	0.45	
Control Delay	17.1	5.9	20.4	21.4	12.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.1	5.9	20.4	21.4	12.2	
LOS	B	A	C	C	B	
Approach Delay	13.4			21.3	12.2	
Approach LOS	B			C	B	
Queue Length 50th (m)	7.7	0.0	5.0	55.1	28.9	
Queue Length 95th (m)	17.1	5.9	m8.2	73.6	41.8	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	465	547	237	1575	1516	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.07	0.16	0.52	0.45	

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 17.0 Intersection LOS: B
 Intersection Capacity Utilization 48.1% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↑↑	↑↑	↔
Traffic Volume (vph)	298	183	43	638	433	157
Future Volume (vph)	298	183	43	638	433	157
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.463			
Satd. Flow (perm)	1471	1488	810	3167	2942	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		199				171
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			268.2	493.4	
Travel Time (s)	125.3			13.8	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	324	199	47	693	471	171
Shared Lane Traffic (%)						
Lane Group Flow (vph)	324	199	47	693	471	171
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	36.0	36.0	34.0	34.0	34.0	34.0
Total Split (%)	51.4%	51.4%	48.6%	48.6%	48.6%	48.6%
Maximum Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.44	0.44	0.41	0.41	0.41	0.41

Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

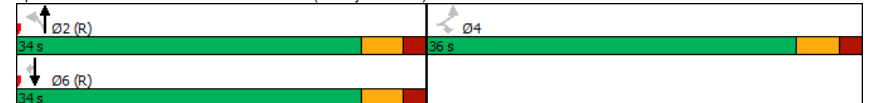
6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.51	0.26	0.14	0.54	0.39	0.26
Control Delay	17.8	3.1	22.1	26.3	19.2	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	3.1	22.1	26.3	19.2	8.7
LOS	B	A	C	C	B	A
Approach Delay	12.2			26.0	16.4	
Approach LOS	B			C	B	
Queue Length 50th (m)	30.9	0.0	5.3	45.0	30.1	6.2
Queue Length 95th (m)	53.4	10.6	m13.1	62.6	45.0	21.4
Internal Link Dist (m)	1367.9			244.2	469.4	
Turn Bay Length (m)	125.0		15.0			25.0
Base Capacity (vph)	640	760	329	1289	1197	651
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.26	0.14	0.54	0.39	0.26

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.54
 Intersection Signal Delay: 19.0 Intersection LOS: B
 Intersection Capacity Utilization 53.0% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	165	0	68	2	0	2	171	519	2	2	485	85
Future Volume (vph)	165	0	68	2	0	2	171	519	2	2	485	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		40.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850				0.932		0.999				0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.755				0.931		0.449			0.426		
Satd. Flow (perm)	1295	1458	0	0	1518	0	770	3225	0	746	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		293			39			1				92
Link Speed (k/h)	50				50			80				70
Link Distance (m)	118.9				332.1			226.1				359.6
Travel Time (s)	8.6				23.9			10.2				18.5
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	179	0	74	2	0	2	186	564	2	2	527	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	74	0	0	4	0	186	566	0	2	527	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	28.0	28.0		28.0	28.0		42.0	42.0		42.0	42.0	42.0
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	60.0%
Maximum Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.52	0.52		0.52	0.52	0.52

Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.43	0.11			0.01		0.46	0.34		0.01	0.32	0.11
Control Delay	21.0	0.3			0.0		15.4	10.4		15.0	15.1	7.9
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	21.0	0.3			0.0		15.4	10.4		15.0	15.1	7.9
LOS	C	A			A		B	B		B	B	A
Approach Delay		15.0						11.6				14.0
Approach LOS		B						B				B
Queue Length 50th (m)	17.5	0.0			0.0		15.0	22.0		0.2	24.8	0.0
Queue Length 95th (m)	33.9	0.0			0.0		32.1	32.1		m0.5	40.2	5.3
Internal Link Dist (m)		94.9			308.1			202.1				335.6
Turn Bay Length (m)	15.0						15.0			15.0		40.0
Base Capacity (vph)	416	667			514		401	1682		388	1651	804
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.43	0.11			0.01		0.46	0.34		0.01	0.32	0.11

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 13.0 Intersection LOS: B

Intersection Capacity Utilization 55.2% ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Montrose Rd & Street HH/Reixinger Road



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036 Improved<AM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	68	404	285	223	526	137
Future Volume (vph)	68	404	285	223	526	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1699	1683	1458	1604	0
Fit Permitted	0.460				0.962	
Satd. Flow (perm)	789	1699	1683	1458	1604	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				242	28	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	74	439	310	242	572	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	439	310	242	721	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	28.0	28.0	28.0	28.0	42.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	
Maximum Green (s)	22.5	22.5	22.5	22.5	36.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	22.5	22.5	22.5	22.5	36.5	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.52	

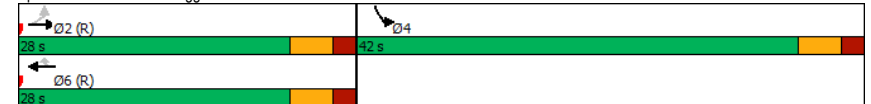
Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036 Improved<AM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.29	0.80	0.57	0.38	0.85	
Control Delay	21.7	35.4	42.9	21.1	25.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.7	35.4	42.9	21.1	25.9	
LOS	C	D	D	C	C	
Approach Delay		33.5	33.4		25.9	
Approach LOS		C	C		C	
Queue Length 50th (m)	7.5	54.6	47.3	16.9	76.2	
Queue Length 95th (m)	18.2	#101.0	71.7	37.1	#148.1	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	30.0			60.0		
Base Capacity (vph)	253	546	540	632	849	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.29	0.80	0.57	0.38	0.85	

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	30.4
Intersection Capacity Utilization:	79.1%
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2036 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	62	24	10	679	524	22
Future Volume (vph)	62	24	10	679	524	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.962			0.994		
Fit Protected	0.965			0.999		
Satd. Flow (prot)	1593	0	0	3225	3180	0
Fit Permitted	0.965			0.999		
Satd. Flow (perm)	1593	0	0	3225	3180	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	67	26	11	738	570	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	749	594	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	40.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

Future Total_2036 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	24	10	679	524	22
Future Volume (Veh/h)	62	24	10	679	524	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	26	11	738	570	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)				360	268	
pX, platoon unblocked	0.97	0.96	0.96			
vC, conflicting volume	973	297	594			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	194	502			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	97	99			
cM capacity (veh/h)	336	785	1019			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	93	257	492	380	214
Volume Left	67	11	0	0	0
Volume Right	26	0	0	0	24
cSH	400	1019	1700	1700	1700
Volume to Capacity	0.23	0.01	0.29	0.22	0.13
Queue Length 95th (m)	7.1	0.3	0.0	0.0	0.0
Control Delay (s)	16.7	0.5	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	16.7	0.2		0.0	
Approach LOS	C				

Intersection Summary

Average Delay		1.2			
Intersection Capacity Utilization		40.0%	ICU Level of Service	A	
Analysis Period (min)		15			

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036<PM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	135	716	80	487	829	361	55	338	532	688	457	158
Future Volume (vph)	135	716	80	487	829	361	55	338	532	688	457	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	3260	1430	3162	3260	1430	1599	3228	1444	3131	3260	1473
Fit Permitted	0.240			0.950			0.470			0.950		
Satd. Flow (perm)	412	3260	1430	3162	3260	1430	791	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			226			444			172
Link Speed (k/h)		80			80			80				80
Link Distance (m)		326.3			337.6			616.2				348.2
Travel Time (s)		14.7			15.2			27.7				15.7
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
Heavy Vehicles (%)	2%	2%	4%	2%	2%	4%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	147	778	87	529	901	392	60	367	578	748	497	172
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	778	87	529	901	392	60	367	578	748	497	172
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2				7.2
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Size(m)		0.0			0.0							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036<PM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (%)	13.1	41.5	41.5	31.0	59.4		31.3	31.3			41.2	72.5
Total Split (%)	9.0%	28.6%	28.6%	21.4%	41.0%		21.6%	21.6%			28.4%	50.0%
Maximum Green (s)	9.6	35.2	35.2	25.5	53.1		25.0	25.0			35.7	66.2
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	47.4	35.2	35.2	25.4	53.2	144.9	25.0	25.0	144.9	35.7	66.2	66.2
Actuated g/C Ratio	0.33	0.24	0.24	0.18	0.37	1.00	0.17	0.17	1.00	0.25	0.46	0.46
v/c Ratio	0.69	0.98	0.19	0.95	0.75	0.27	0.44	0.66	0.40	0.97	0.33	0.22
Control Delay	43.4	82.2	2.2	87.4	45.0	0.5	65.3	62.4	0.8	79.7	26.0	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	82.2	2.2	87.4	45.0	0.5	65.3	62.4	0.8	79.7	26.0	3.8
LOS	D	F	A	F	D	A	E	E	A	E	C	A
Approach Delay		69.7			47.7			27.2				51.7
Approach LOS		E			D			C				D
Queue Length 50th (m)	25.1	124.0	0.0	82.6	125.1	0.0	16.5	55.2	0.0	116.2	49.8	0.0
Queue Length 95th (m)	#41.5	#168.3	3.0	#118.9	151.6	0.0	32.7	73.7	0.0	#158.1	64.1	13.5
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0		150.0	275.0		40.0
Base Capacity (vph)	215	792	448	556	1196	1430	136	556	1444	771	1489	766
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.98	0.19	0.95	0.75	0.27	0.44	0.66	0.40	0.97	0.33	0.22
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	144.9											
Natural Cycle:	140											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.98											
Intersection Signal Delay:	49.1						Intersection LOS: D					
Intersection Capacity Utilization:	87.7%						ICU Level of Service E					
Analysis Period (min)	15											
# 95th percentile volume exceeds capacity, queue may be longer.												

Lanes, Volumes, Timings

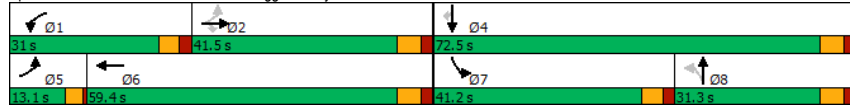
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2036<PM>

01-31-2023

Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

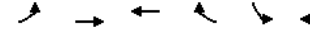


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2036<PM>

01-31-2023



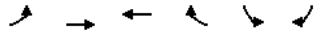
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓	↑
Traffic Volume (vph)	0	1511	715	0	291	886
Future Volume (vph)	0	1511	715	0	291	886
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.909	0.850
Flt Protected					0.981	
Satd. Flow (prot)	0	3197	3197	0	2918	1327
Flt Permitted					0.981	
Satd. Flow (perm)	0	3197	3197	0	2918	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					166	481
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1642	777	0	316	963
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1642	777	0	798	481
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2036<PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

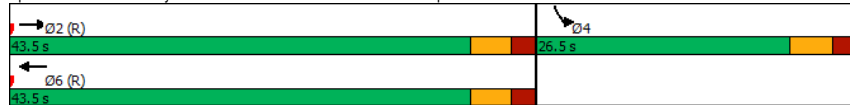


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.95	0.45			0.88dr	0.37
Control Delay	28.8	10.7			25.5	0.8
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	28.8	10.7			25.5	0.8
LOS	C	B			C	A
Approach Delay	28.8	10.7			16.2	
Approach LOS	C	B			B	
Queue Length 50th (m)	102.8	31.2			41.3	0.0
Queue Length 95th (m)	#160.7	43.9			#66.0	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			991	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.95	0.45			0.81	0.37

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 20.6 Intersection LOS: C
 Intersection Capacity Utilization 73.7% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2036<PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↓	↑
Traffic Volume (vph)	847	0	0	641	163	63
Future Volume (vph)	847	0	0	641	163	63
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Fit Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Fit Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1361	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						68
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	921	0	0	697	177	68
Shared Lane Traffic (%)						
Lane Group Flow (vph)	921	0	0	697	177	68
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	41.0			41.0	29.0	29.0
Total Split (%)	58.6%			58.6%	41.4%	41.4%
Maximum Green (s)	35.5			35.5	23.5	23.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.5			35.5	23.5	23.5
Actuated g/C Ratio	0.51			0.51	0.34	0.34
v/c Ratio	0.57			0.42	0.39	0.14

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2036<PM>
01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	13.7			11.8	20.9	5.6
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.7			11.8	20.9	5.6
LOS	B			B	C	A
Approach Delay	13.7			11.8	16.6	
Approach LOS	B			B	B	
Queue Length 50th (m)	43.1			29.4	18.3	0.0
Queue Length 95th (m)	60.1			41.8	34.8	7.8
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1621			1669	457	499
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.57			0.42	0.39	0.14

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 13.3
 Intersection Capacity Utilization 44.4%
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2036<PM>
01-31-2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	48	48	789	1275	57
Future Volume (vph)	55	48	48	789	1275	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.994	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3199	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3199	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	60	52	52	858	1386	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	52	52	858	1448	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 53.3%
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2036<PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	55	48	48	789	1275	57	
Future Volume (Veh/h)	55	48	48	789	1275	57	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	60	52	52	858	1386	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	1950	724	1448				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1950	724	1448				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	0	84	89				
cM capacity (veh/h)	49	334	459				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	60	52	52	429	429	924	524
Volume Left	60	0	52	0	0	0	0
Volume Right	0	52	0	0	0	0	62
cSH	49	334	459	1700	1700	1700	1700
Volume to Capacity	1.22	0.16	0.11	0.25	0.25	0.54	0.31
Queue Length 95th (m)	43.6	4.4	3.0	0.0	0.0	0.0	0.0
Control Delay (s)	331.8	17.8	13.8	0.0	0.0	0.0	0.0
Lane LOS	F	C	B				
Approach Delay (s)	186.0	0.8		0.0			
Approach LOS	F						
Intersection Summary							
Average Delay	8.7						
Intersection Capacity Utilization	53.3%		ICU Level of Service		A		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2036<PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↕↕	↔	↕↕
Traffic Volume (vph)	149	41	791	110	41	1254
Future Volume (vph)	149	41	791	110	41	1254
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0		15.0	
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.982			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3121	0	1662	3197
Fit Permitted	0.950		0.231			
Satd. Flow (perm)	1646	1488	3121	0	404	3197
Right Turn on Red	Yes		Yes			
Satd. Flow (RTOR)	45		33			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	162	45	860	120	45	1363
Shared Lane Traffic (%)						
Lane Group Flow (vph)	162	45	980	0	45	1363
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/hr)	25		15		25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2		6	
Permitted Phases	8		8		6	
Minimum Split (s)	27.5	27.5	24.5	24.5		24.5
Total Split (s)	27.5	27.5	42.5	42.5		42.5
Total Split (%)	39.3%	39.3%	60.7%	60.7%		60.7%
Maximum Green (s)	22.0	22.0	37.0	37.0		37.0
Yellow Time (s)	3.5	3.5	3.5	3.5		3.5
All-Red Time (s)	2.0	2.0	2.0	2.0		2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5		5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0		12.0
Pedestrian Calls (#/hr)	0		0		0	
Act Effct Green (s)	22.0	22.0	37.0	37.0		37.0
Actuated g/C Ratio	0.31	0.31	0.53	0.53		0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2036<PM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.31	0.09	0.59		0.21	0.81
Control Delay	20.4	6.5	12.7		12.0	18.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.4	6.5	12.7		12.0	18.4
LOS	C	A	B		B	B
Approach Delay	17.3		12.7			18.2
Approach LOS	B		B			B
Queue Length 50th (m)	16.8	0.0	43.2		3.1	75.1
Queue Length 95th (m)	31.6	6.6	60.7		9.3	103.6
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	517	498	1665		213	1689
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.31	0.09	0.59		0.21	0.81

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 65
 Control Type: Pretimed
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 16.0 Intersection LOS: B
 Intersection Capacity Utilization 55.8% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2036<PM>
01-31-2023

	↖	↗	↖	↑	↓	↘
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↑	↑	↘
Traffic Volume (vph)	223	145	89	629	953	494
Future Volume (vph)	223	145	89	629	953	494
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1190	1662	3137	3197	1488
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			256.2	493.4	
Travel Time (s)	125.3			13.2	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	242	158	97	684	1036	537
Shared Lane Traffic (%)						
Lane Group Flow (vph)	242	158	97	684	1036	537
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary
 Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 57.4% ICU Level of Service B
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2036<PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR				
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔				
Traffic Volume (veh/h)	223	145	89	629	953	494				
Future Volume (Veh/h)	223	145	89	629	953	494				
Sign Control	Stop		Free							
Grade	0%		0%							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				
Hourly flow rate (vph)	242	158	97	684	1036	537				
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	1572	518	1573							
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	1572	518	1573							
tC, single (s)	6.8	7.4	4.1							
tC, 2 stage (s)										
tF (s)	3.5	3.5	2.2							
p0 queue free %	0	65	77							
cM capacity (veh/h)	80	447	425							
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	242	158	97	342	342	518	518	537		
Volume Left	242	0	97	0	0	0	0	0		
Volume Right	0	158	0	0	0	0	0	537		
cSH	80	447	425	1700	1700	1700	1700	1700		
Volume to Capacity	3.04	0.35	0.23	0.20	0.20	0.30	0.30	0.32		
Queue Length 95th (m)	Err	12.6	7.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (s)	Err	17.4	16.0	0.0	0.0	0.0	0.0	0.0		
Lane LOS	F	C	C							
Approach Delay (s)	6056.3		2.0		0.0					
Approach LOS	F									
Intersection Summary										
Average Delay	880.2									
Intersection Capacity Utilization	57.4%		ICU Level of Service		B					
Analysis Period (min)	15									

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2036<PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↕↕	↕↕	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	116	0	117	2	0	2	104	563	2	2	809	249
Future Volume (vph)	116	0	117	2	0	2	104	563	2	2	809	249
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.932							0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3228	0	1662	3260	1458
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3228	0	1662	3260	1458
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				371.6
Travel Time (s)		8.6			23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	126	0	127	2	0	2	113	612	2	2	879	271
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	127	0	0	4	0	113	614	0	2	879	271
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control	Stop				Stop				Free		Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 52.8%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2036<PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	116	0	117	2	0	2	104	563	2	2	809	249
Future Volume (Veh/h)	116	0	117	2	0	2	104	563	2	2	809	249
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)	126	0	127	2	0	2	113	612	2	2	879	271
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.92	0.92		0.92	0.92	0.92				0.92		
vC, conflicting volume	1417	1723	440	1410	1993	307	1150			614		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1284	1615	440	1275	1908	80	1150			413		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	100	78	97	100	100	81			100		
cM capacity (veh/h)	96	77	565	77	51	895	603			1067		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4		
Volume Total	126	127	4	113	408	206	2	440	440	271		
Volume Left	126	0	2	113	0	0	2	0	0	0		
Volume Right	0	127	2	0	0	2	0	0	0	271		
cSH	96	565	142	603	1700	1700	1067	1700	1700	1700		
Volume to Capacity	1.31	0.22	0.03	0.19	0.24	0.12	0.00	0.26	0.26	0.16		
Queue Length 95th (m)	72.0	6.8	0.7	5.5	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (s)	277.3	13.2	31.1	12.3	0.0	0.0	8.4	0.0	0.0	0.0		
Lane LOS	F	B	D	B			A					
Approach Delay (s)	144.7		31.1	1.9			0.0					
Approach LOS	F		D									
Intersection Summary												
Average Delay	17.9											
Intersection Capacity Utilization	52.8%		ICU Level of Service		A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2036<PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	392	0	37	565	0	52
Future Volume (vph)	392	0	37	565	0	52
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Fit Protected	0.997					
Satd. Flow (prot)	1683	0	0	1697	1514	0
Fit Permitted	0.997					
Satd. Flow (perm)	1683	0	0	1697	1514	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%
Adj. Flow (vph)	426	0	40	614	0	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	426	0	0	654	57	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	70.4%		ICU Level of Service C			
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2036<PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	392	0	37	565	0	52
Future Volume (Veh/h)	392	0	37	565	0	52
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)	426	0	40	614	0	57
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			426		1120	426
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			426		1120	426
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	91
cM capacity (veh/h)			1144		222	633
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	426	654	57			
Volume Left	0	40	0			
Volume Right	0	0	57			
cSH	1700	1144	633			
Volume to Capacity	0.25	0.03	0.09			
Queue Length 95th (m)	0.0	0.9	2.4			
Control Delay (s)	0.0	0.9	11.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.9	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		70.4%		ICU Level of Service	C	
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2036<PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	17	0	382	0	0	0	180	650	0	0	918	7
Future Volume (vph)	17	0	382	0	0	0	180	650	0	0	918	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.135					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	232	3228	0	1716	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		281										109
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		101.3			58.5			348.2			226.1	
Travel Time (s)		7.3			4.2			15.7			10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	707	0	0	998	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	707	0	0	998	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		15.1	52.5		37.4	37.4	37.4
Total Split (%)	34.4%	34.4%		34.4%	34.4%		18.9%	65.6%		46.8%	46.8%	46.8%
Maximum Green (s)	22.0	22.0		22.0	22.0		9.6	47.0		31.9	31.9	31.9
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0			31.9	31.9
Actuated g/C Ratio	0.28	0.28					0.59	0.59			0.40	0.40

Lanes, Volumes, Timings

Future Total_2036<PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.69					0.64	0.37			0.77	0.01
Control Delay	21.9	15.2					21.1	9.4			25.7	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	15.2					21.1	9.4			25.7	0.0
LOS	C	B					C	A			C	A
Approach Delay		15.5						12.0			25.5	
Approach LOS		B						B			C	
Queue Length 50th (m)	2.1	17.1					13.4	28.5			70.8	0.0
Queue Length 95th (m)	7.2	50.1					#35.9	39.4			95.0	0.0
Internal Link Dist (m)		77.3			34.5			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)		357	604				304	1896			1299	646
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.05	0.69					0.64	0.37			0.77	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 18.4 Intersection LOS: B
 Intersection Capacity Utilization 77.8% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

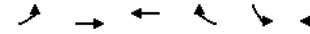


Lanes, Volumes, Timings

Future Total_2036<PM>

11: Biggar Rd & Hospital East Access

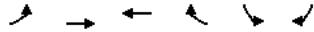
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↕	↕	↕
Traffic Volume (vph)	19	742	956	84	187	85
Future Volume (vph)	19	742	956	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3228	1458	1630	1458
Fit Permitted	0.207					0.950
Satd. Flow (perm)	355	3197	3228	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				91		77
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	807	1039	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	807	1039	91	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	42.0	42.0	42.0	42.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2036<PM>
01-31-2023

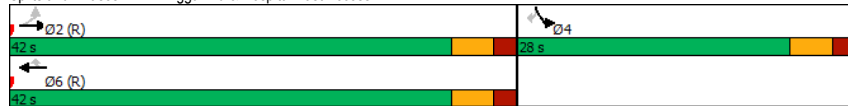


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.11	0.48	0.62	0.11	0.39	0.18
Control Delay	10.5	12.0	13.8	2.6	21.1	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	12.0	13.8	2.6	21.1	7.0
LOS	B	B	B	A	C	A
Approach Delay	11.9		12.9		16.7	
Approach LOS	B		B		B	
Queue Length 50th (m)	1.4	34.7	49.4	0.0	21.4	1.4
Queue Length 95th (m)	5.2	48.7	68.0	6.1	38.8	10.8
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	185	1667	1683	803	523	520
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.48	0.62	0.11	0.39	0.18

Intersection Summary

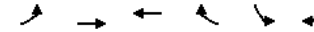
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 13.1 Intersection LOS: B
 Intersection Capacity Utilization 49.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2036<PM>
01-31-2023



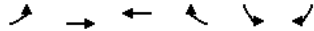
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	
Traffic Volume (vph)	7	718	1022	19	43	42
Future Volume (vph)	7	718	1022	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.997		0.933	
Fit Protected	0.950				0.975	
Satd. Flow (prot)	1630	3197	3219	0	1561	0
Fit Permitted	0.950				0.975	
Satd. Flow (perm)	1630	3197	3219	0	1561	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		74.2	365.4		157.5	
Travel Time (s)		3.3	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	780	1111	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	780	1132	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 43.4% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

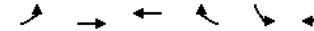
Future Total_2036<PM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕		↕	
Traffic Volume (veh/h)	7	718	1022	19	43	42
Future Volume (Veh/h)	7	718	1022	19	43	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)	8	780	1111	21	47	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)			365			
pX, platoon unblocked	0.79			0.79	0.79	
vC, conflicting volume	1132			1528	566	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624			1127	0	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			70	95	
cM capacity (veh/h)	749			154	852	
Direction_Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	390	390	741	391	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	749	1700	1700	1700	1700	259
Volume to Capacity	0.01	0.23	0.23	0.44	0.23	0.36
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	12.5
Control Delay (s)	9.9	0.0	0.0	0.0	0.0	26.4
Lane LOS	A					D
Approach Delay (s)	0.1			0.0		26.4
Approach LOS						D
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			43.4%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036<PM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↕	↕	↕	↕	
Traffic Volume (vph)	179	276	495	570	450	117
Future Volume (vph)	179	276	495	570	450	117
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.950				0.962	
Satd. Flow (perm)	1630	1683	1699	1458	1604	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	195	300	538	620	489	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	300	538	620	616	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 83.9%	ICU Level of Service E					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2036<PM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↔	↔
Traffic Volume (veh/h)	179	276	495	570	450	117
Future Volume (Veh/h)	179	276	495	570	450	117
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)	195	300	538	620	489	127
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	1158				1228	538
vC1, stage 1 conf vol					1228	538
vC2, stage 2 conf vol					1228	538
vCu, unblocked vol	1158				1228	538
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	68				0	77
cM capacity (veh/h)	603				133	543
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	195	300	538	620	616	
Volume Left	195	0	0	0	489	
Volume Right	0	0	0	620	127	
cSH	603	1700	1700	1700	158	
Volume to Capacity	0.32	0.18	0.32	0.36	3.91	
Queue Length 95th (m)	11.2	0.0	0.0	0.0	Err	
Control Delay (s)	13.8	0.0	0.0	0.0	Err	
Lane LOS	B		F			
Approach Delay (s)	5.4		0.0		Err	
Approach LOS					F	
Intersection Summary						
Average Delay			2715.8			
Intersection Capacity Utilization			83.9%		ICU Level of Service E	
Analysis Period (min)			15			

Lanes, Volumes, Timings
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2036<PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Future Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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
Friction							0.973	0.929				
Fit Protected							0.974	0.992		0.981		
Satd. Flow (prot)	0	1716	0	0	1626	0	0	1581	0	0	1683	0
Fit Permitted							0.974	0.992		0.981		
Satd. Flow (perm)	0	1716	0	0	1626	0	0	1581	0	0	1683	0
Link Speed (k/h)				40			50			50		
Link Distance (m)	277.4			1391.9			855.1			76.8		
Travel Time (s)	25.0			125.3			61.6			5.5		
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
Adj. Flow (vph)	0	29	0	122	58	46	32	64	107	26	40	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	29	0	0	226	0	0	203	0	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		0.0				0.0	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Sign Control	Stop				Stop		Stop				Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	38.3%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2036<PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Future Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	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	29	0	122	58	46	32	64	107	26	40	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	29	226	203	66								
Volume Left (vph)	0	122	32	26								
Volume Right (vph)	0	46	107	0								
Hadj (s)	0.03	0.02	-0.25	0.11								
Departure Headway (s)	4.9	4.6	4.4	4.9								
Degree Utilization, x	0.04	0.29	0.25	0.09								
Capacity (veh/h)	679	741	782	685								
Control Delay (s)	8.0	9.4	8.8	8.4								
Approach Delay (s)	8.0	9.4	8.8	8.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	9.0											
Level of Service	A											
Intersection Capacity Utilization	38.3%			ICU Level of Service	A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
15: Street A & Street HH

Future Total_2036<PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	132	28	331	84	7	220
Future Volume (vph)	132	28	331	84	7	220
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.977		0.973			
Flt Protected	0.960					0.998
Satd. Flow (prot)	1609	0	1669	0	0	1712
Flt Permitted	0.960					0.998
Satd. Flow (perm)	1609	0	1669	0	0	1712
Link Speed (k/h)	50		50			50
Link Distance (m)	1017.7		238.9			855.1
Travel Time (s)	73.3		17.2			61.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	30	360	91	8	239
Shared Lane Traffic (%)						
Lane Group Flow (vph)	173	0	451	0	0	247
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	40.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2036<PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	132	28	331	84	7	220
Future Volume (Veh/h)	132	28	331	84	7	220
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)	143	30	360	91	8	239
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	660	406			451	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	406			451	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	95			99	
cM capacity (veh/h)	425	645			1109	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	173	451	247			
Volume Left	143	0	8			
Volume Right	30	91	0			
cSH	451	1700	1109			
Volume to Capacity	0.38	0.27	0.01			
Queue Length 95th (m)	14.2	0.0	0.2			
Control Delay (s)	17.8	0.0	0.3			
Lane LOS	C		A			
Approach Delay (s)	17.8	0.0	0.3			
Approach LOS	C					
Intersection Summary						
Average Delay		3.6				
Intersection Capacity Utilization		40.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2036<PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	47	30	34	671	1018	79
Future Volume (vph)	47	30	34	671	1018	79
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.989	
Fit Protected	0.971			0.998		
Satd. Flow (prot)	1578	0	0	3223	3224	0
Fit Permitted	0.971			0.998		
Satd. Flow (perm)	1578	0	0	3223	3224	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	51	33	37	729	1107	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	766	1193	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 59.0%				ICU Level of Service B		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2036<PM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	[Lane configuration symbols]					
Traffic Volume (veh/h)	47	30	34	671	1018	79
Future Volume (Veh/h)	47	30	34	671	1018	79
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)	51	33	37	729	1107	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	1588	596	1193			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1588	596	1193			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	45	93	94			
cM capacity (veh/h)	92	446	581			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	84	280	486	738	455	
Volume Left	51	37	0	0	0	
Volume Right	33	0	0	0	86	
cSH	134	581	1700	1700	1700	
Volume to Capacity	0.63	0.06	0.29	0.43	0.27	
Queue Length 95th (m)	26.4	1.6	0.0	0.0	0.0	
Control Delay (s)	68.9	2.3	0.0	0.0	0.0	
Lane LOS	F	A				
Approach Delay (s)	68.9	0.8	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			59.0%		ICU Level of Service B	
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↙	↘	↕	↔
Traffic Volume (vph)	55	48	48	789	1275	57
Future Volume (vph)	55	48	48	789	1275	57
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.994	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3199	0
Fit Permitted	0.950		0.108			
Satd. Flow (perm)	1614	1261	183	3260	3199	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		31			10	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	60	52	52	858	1386	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	52	52	858	1448	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	27.5	27.5	42.5	42.5	42.5	
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	

Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

4: Montrose Rd & Chippawa Creek Rd

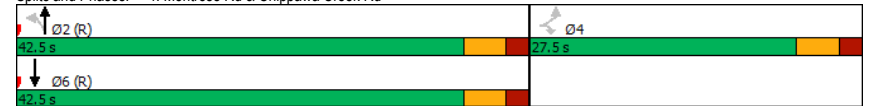
01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.12	0.12	0.54	0.50	0.85	
Control Delay	18.0	10.5	41.5	16.7	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.0	10.5	41.5	16.7	20.7	
LOS	B	B	D	B	C	
Approach Delay	14.5			18.1	20.7	
Approach LOS	B			B	C	
Queue Length 50th (m)	5.8	2.0	5.6	48.4	83.0	
Queue Length 95th (m)	13.9	9.3	m11.3	67.9	#116.8	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	507	417	96	1723	1695	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.12	0.12	0.54	0.50	0.85	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Pretimed
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 19.5 Intersection LOS: B
 Intersection Capacity Utilization 59.1% ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	223	145	89	629	953	494
Future Volume (vph)	223	145	89	629	953	494
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.210			
Satd. Flow (perm)	1662	1190	368	3137	3197	1488
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		80				537
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			256.2	493.4	
Travel Time (s)	125.3			13.2	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	242	158	97	684	1036	537
Shared Lane Traffic (%)						
Lane Group Flow (vph)	242	158	97	684	1036	537
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	42.5	42.5	42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	0.53

Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

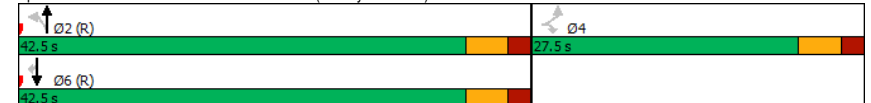
01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.46	0.37	0.50	0.41	0.61	0.52
Control Delay	22.8	12.7	28.7	14.3	16.6	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	12.7	28.7	14.3	16.6	6.4
LOS	C	B	C	B	B	A
Approach Delay	18.8			16.1	13.1	
Approach LOS	B			B	B	
Queue Length 50th (m)	26.4	7.8	8.4	29.8	53.7	14.4
Queue Length 95th (m)	46.4	22.3	25.5	46.3	74.0	m33.5
Internal Link Dist (m)	1367.9			232.2	469.4	
Turn Bay Length (m)	125.0		15.0			40.0
Base Capacity (vph)	522	428	194	1658	1689	1039
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.37	0.50	0.41	0.61	0.52

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.61
 Intersection Signal Delay: 14.8 Intersection LOS: B
 Intersection Capacity Utilization 64.1% ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↘	↘	↖	↖		↖	↖	↖
Traffic Volume (vph)	116	0	117	2	0	2	104	563	2	2	809	249
Future Volume (vph)	116	0	117	2	0	2	104	563	2	2	809	249
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850					0.932					0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3228	0	1662	3260	1458
Fit Permitted	0.755				0.921		0.271			0.400		
Satd. Flow (perm)	1295	1458	0	0	1502	0	465	3228	0	700	3260	1458
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		121			39			1				271
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				371.6
Travel Time (s)		8.6			23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	126	0	127	2	0	2	113	612	2	2	879	271
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	127	0	0	4	0	113	614	0	2	879	271
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		42.5	42.5		42.5	42.5	42.5
Total Split (%)	39.3%	39.3%		39.3%	39.3%		60.7%	60.7%		60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.53	0.53		0.53	0.53	0.53

Lanes, Volumes, Timings

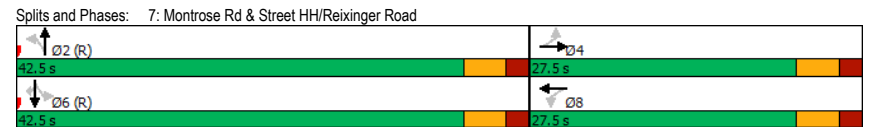
Future Total_2036 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.31	0.23			0.01		0.46	0.36		0.01	0.51	0.30
Control Delay	20.1	4.9			0.0		18.0	10.4		15.0	19.7	7.7
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	20.1	4.9			0.0		18.0	10.4		15.0	19.7	7.7
LOS	C	A			A		B	B		B	B	A
Approach Delay		12.5						11.5			16.9	
Approach LOS		B						B			B	
Queue Length 50th (m)	12.5	0.0			0.0		9.0	23.8		0.2	55.3	7.1
Queue Length 95th (m)	m21.2	m7.1			0.0		23.8	34.4		m0.5	73.6	28.5
Internal Link Dist (m)		94.9			308.1			202.1			347.6	
Turn Bay Length (m)	15.0						15.0			15.0		30.0
Base Capacity (vph)	407	541			498		245	1706		370	1723	898
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.31	0.23			0.01		0.46	0.36		0.01	0.51	0.30

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.51
 Intersection Signal Delay: 14.5 Intersection LOS: B
 Intersection Capacity Utilization 58.7% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036 Improved <PM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	179	276	495	570	450	117
Future Volume (vph)	179	276	495	570	450	117
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.291				0.962	
Satd. Flow (perm)	499	1683	1699	1458	1604	0
Right Turn on Red				Yes	Yes	
Satd. Flow (RTOR)				620	23	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	195	300	538	620	489	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	300	538	620	616	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	36.0	36.0	36.0	36.0	34.0	
Total Split (%)	51.4%	51.4%	51.4%	51.4%	48.6%	
Maximum Green (s)	30.5	30.5	30.5	30.5	28.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	30.5	30.5	30.5	30.5	28.5	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.41	

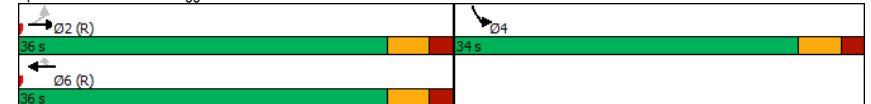
Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2036 Improved <PM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.90	0.41	0.73	0.63	0.92	
Control Delay	63.4	15.7	32.9	14.8	42.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.4	15.7	32.9	14.8	42.2	
LOS	E	B	C	B	D	
Approach Delay		34.5	23.2		42.2	
Approach LOS		C	C		D	
Queue Length 50th (m)	23.9	27.2	65.1	40.0	75.6	
Queue Length 95th (m)	#63.2	46.3	95.4	64.9	#141.5	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	15.0			60.0		
Base Capacity (vph)	217	733	740	985	666	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.90	0.41	0.73	0.63	0.92	

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle:	80
Control Type:	Pretimed
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	30.8
Intersection Capacity Utilization:	87.6%
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2036 Improved <PM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	47	30	34	671	1018	79
Future Volume (vph)	47	30	34	671	1018	79
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.989	
Fit Protected	0.971			0.998		
Satd. Flow (prot)	1578	0	0	3223	3224	0
Fit Permitted	0.971			0.998		
Satd. Flow (perm)	1578	0	0	3223	3224	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	51	33	37	729	1107	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	766	1193	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	59.0%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

Future Total_2036 Improved <PM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	47	30	34	671	1018	79
Future Volume (Veh/h)	47	30	34	671	1018	79
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)	51	33	37	729	1107	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)				372	256	
pX, platoon unblocked	0.81	0.79	0.79			
vC, conflicting volume	1588	596	1193			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	951	0	699			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	96	95			
cM capacity (veh/h)	199	852	702			

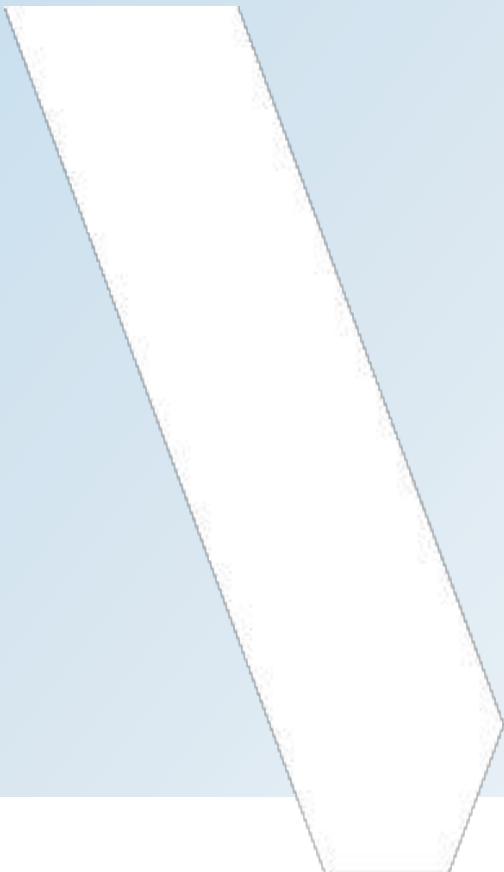
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	84	280	486	738	455
Volume Left	51	37	0	0	0
Volume Right	33	0	0	0	86
cSH	284	702	1700	1700	1700
Volume to Capacity	0.30	0.05	0.29	0.43	0.27
Queue Length 95th (m)	9.6	1.3	0.0	0.0	0.0
Control Delay (s)	22.9	1.9	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	22.9	0.7		0.0	
Approach LOS	C				

Intersection Summary

Average Delay	1.2
Intersection Capacity Utilization	59.0%
ICU Level of Service	B
Analysis Period (min)	15

APPENDIX

2041 HORIZON



Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041 <AM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖↖	↖	↖	↖	↖↖	↖	↖↖	↖	↖
Traffic Volume (vph)	208	708	42	368	571	561	72	393	588	419	178	91
Future Volume (vph)	208	708	42	368	571	561	72	393	588	419	178	91
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1614	3260	1390	3043	3260	1444	1614	3228	1458	3072	3197	1444
Fit Permitted	0.334			0.950			0.630			0.950		
Satd. Flow (perm)	567	3260	1390	3043	3260	1444	1070	3228	1458	3072	3197	1444
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			112		565				507		99	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	3%	2%	7%	6%	2%	3%	3%	2%	5%	4%	3%	3%
Adj. Flow (vph)	226	770	46	400	621	610	78	427	639	455	193	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	770	46	400	621	610	78	427	639	455	193	99
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0			0.0			0.0	
Detector 2 Size(m)		0.0			0.0			0.0			0.0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041 <AM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		Free		7	4
Detector Phase	5	2	2	1	6		8	8			7	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0			8.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3			13.5	31.3
Total Split (s)	22.2	38.7	38.7	24.0	40.5		31.3	31.3			26.0	57.3
Total Split (%)	18.5%	32.3%	32.3%	20.0%	33.8%		26.1%	26.1%			21.7%	47.8%
Maximum Green (s)	18.7	32.4	32.4	18.5	34.2		25.0	25.0			20.5	51.0
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1			3.5	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2			2.0	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3			5.5	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0			3.0	6.0
Recall Mode	None	Max	Max	None	Max		Max	Max			Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0			10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0			15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0			0	0
Act Effect Green (s)	49.7	32.4	32.4	17.9	37.8		119.4	25.0			119.4	20.5
Actuated g/C Ratio	0.42	0.27	0.27	0.15	0.32		1.00	0.21			0.21	0.17
v/c Ratio	0.62	0.87	0.10	0.88	0.60		0.42	0.35			0.63	0.44
Control Delay	26.6	53.5	0.4	70.7	38.1		0.9	45.8			48.0	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	26.6	53.5	0.4	70.7	38.1		0.9	45.8			48.0	1.0
LOS	C	D	A	E	D		A	D			D	A
Approach Delay		45.3			32.2			21.6				46.1
Approach LOS		D			C			C				D
Queue Length 50th (m)	32.0	96.2	0.0	50.3	68.0		0.0	16.6			51.2	0.0
Queue Length 95th (m)	49.6	#129.7	0.0	#76.4	92.6		0.0	32.4			69.3	0.0
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0				150.0	275.0
Base Capacity (vph)	419	885	459	471	1031		1444	223			676	1458
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.54	0.87	0.10	0.85	0.60		0.42	0.35			0.63	0.44
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	119.4											
Natural Cycle:	100											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	0.88											
Intersection Signal Delay:	34.8						Intersection LOS: C					
Intersection Capacity Utilization:	77.1%						ICU Level of Service D					
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												

Lanes, Volumes, Timings

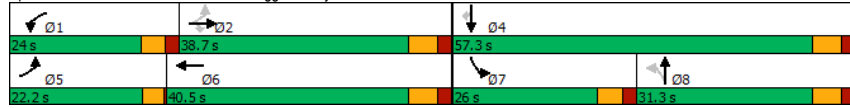
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041 <AM>

01-31-2023

Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

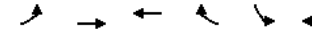


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2041 <AM>

01-31-2023



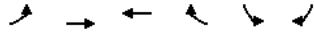
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓↓	↑
Traffic Volume (vph)	0	1492	617	0	187	874
Future Volume (vph)	0	1492	617	0	187	874
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.98	0.99
Frt					0.895	0.850
Flt Protected					0.985	
Satd. Flow (prot)	0	3197	2995	0	2770	1302
Flt Permitted					0.985	
Satd. Flow (perm)	0	3197	2995	0	2770	1286
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					217	475
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	11%	6%	12%	4%
Adj. Flow (vph)	0	1622	671	0	203	950
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1622	671	0	678	475
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2041 <AM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

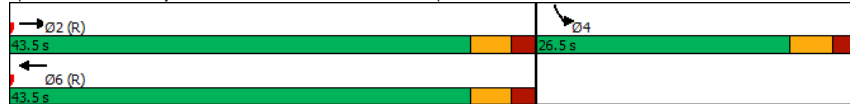


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.93	0.41			0.69	0.37
Control Delay	27.2	10.4			18.7	0.8
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	27.2	10.4			18.7	0.8
LOS	C	B			B	A
Approach Delay	27.2	10.4			11.3	
Approach LOS	C	B			B	
Queue Length 50th (m)	100.2	26.3			28.0	0.0
Queue Length 95th (m)	#157.4	37.7			46.3	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1625			982	1286
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.93	0.41			0.69	0.37

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 70
 Control Type: Pretimed
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 18.6 Intersection LOS: B
 Intersection Capacity Utilization 71.4% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2041 <AM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

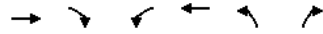
01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↓	↑
Traffic Volume (vph)	706	0	0	415	235	56
Future Volume (vph)	706	0	0	415	235	56
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	2995	0	0	3023	1511	1444
Flt Permitted					0.950	
Satd. Flow (perm)	2995	0	0	3023	1510	1444
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						61
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	2%	2%	10%	10%	3%
Adj. Flow (vph)	767	0	0	451	255	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	767	0	0	451	255	61
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	39.0			39.0	31.0	31.0
Total Split (%)	55.7%			55.7%	44.3%	44.3%
Maximum Green (s)	33.5			33.5	25.5	25.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	33.5			33.5	25.5	25.5
Actuated g/C Ratio	0.48			0.48	0.36	0.36
v/c Ratio	0.54			0.31	0.46	0.11

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2041 <AM>
01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	14.5			11.9	20.5	5.1
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	14.5			11.9	20.5	5.1
LOS	B			B	C	A
Approach Delay	14.5			11.9	17.5	
Approach LOS	B			B	B	
Queue Length 50th (m)	36.8			18.9	26.3	0.0
Queue Length 95th (m)	52.3			28.4	46.4	7.0
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1433			1446	550	564
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.54			0.31	0.46	0.11

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.54
 Intersection Signal Delay: 14.4 Intersection LOS: B
 Intersection Capacity Utilization 42.4% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2041 <AM>
01-31-2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	40	38	762	562	85
Future Volume (vph)	79	40	38	762	562	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.980	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3038	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1330	1488	1299	3197	3038	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	86	43	41	828	611	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	43	41	828	703	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 37.9% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2041 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	79	40	38	762	562	85	
Future Volume (Veh/h)	79	40	38	762	562	85	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	86	43	41	828	611	92	
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	1153	352	703				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1153	352	703				
tC, single (s)	7.3	6.9	4.7				
tC, 2 stage (s)							
tF (s)	3.8	3.3	2.5				
p0 queue free %	43	93	94				
cM capacity (veh/h)	150	651	737				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	86	43	41	414	414	407	296
Volume Left	86	0	41	0	0	0	0
Volume Right	0	43	0	0	0	0	92
cSH	150	651	737	1700	1700	1700	1700
Volume to Capacity	0.57	0.07	0.06	0.24	0.24	0.24	0.17
Queue Length 95th (m)	23.5	1.7	1.4	0.0	0.0	0.0	0.0
Control Delay (s)	56.9	10.9	10.2	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	41.6		0.5	0.0			
Approach LOS	E						
Intersection Summary							
Average Delay			3.4				
Intersection Capacity Utilization			37.9%	ICU Level of Service		A	
Analysis Period (min)			15				

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2041 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	72	13	819	132	26	580
Future Volume (vph)	72	13	819	132	26	580
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.850		0.979			
Fit Protected	0.950			0.950		
Satd. Flow (prot)	1498	1316	2997	0	1409	2995
Fit Permitted	0.950			0.212		
Satd. Flow (perm)	1498	1316	2997	0	314	2995
Right Turn on Red	Yes		Yes			
Satd. Flow (RTOR)	14		39			
Link Speed (k/h)	60	70		70		
Link Distance (m)	170.9	493.4		425.4		
Travel Time (s)	10.3	25.4		21.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	13%	10%	0%	18%	11%
Adj. Flow (vph)	78	14	890	143	28	630
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	14	1033	0	28	630
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	3.6		3.6		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Turn Type	Perm	Perm	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Minimum Split (s)	27.5	27.5	24.5		24.5	24.5
Total Split (s)	27.5	27.5	42.5		42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%		60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0		37.0	37.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	22.0	22.0	37.0		37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53		0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2041 <AM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.17	0.03	0.64		0.17	0.40
Control Delay	18.6	9.1	13.6		11.8	10.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.6	9.1	13.6		11.8	10.8
LOS	B	A	B		B	B
Approach Delay	17.1		13.6			10.8
Approach LOS	B		B			B
Queue Length 50th (m)	7.7	0.0	47.6		1.9	25.1
Queue Length 95th (m)	17.2	3.7	67.2		6.5	36.4
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	470	423	1602		165	1583
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.17	0.03	0.64		0.17	0.40

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 12.8 Intersection LOS: B
 Intersection Capacity Utilization 45.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2041 <AM>
01-31-2023

	↖	↗	↖	↑	↓	↘
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗	↖ ↗	↑	↓	↖ ↗
Traffic Volume (vph)	299	184	44	654	444	158
Future Volume (vph)	299	184	44	654	444	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Fit		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1471	1488	1662	3167	2942	1352
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			268.2	493.4	
Travel Time (s)	125.3			13.8	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	325	200	48	711	483	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	325	200	48	711	483	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 44.6% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2041 <AM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔		
Traffic Volume (veh/h)	299	184	44	654	444	158		
Future Volume (Veh/h)	299	184	44	654	444	158		
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)	325	200	48	711	483	172		
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	934	242	655					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	934	242	655					
tC, single (s)	7.1	6.9	4.1					
tC, 2 stage (s)								
tF (s)	3.6	3.3	2.2					
p0 queue free %	0	74	95					
cM capacity (veh/h)	233	766	942					
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	325	200	48	356	356	242	242	172
Volume Left	325	0	48	0	0	0	0	0
Volume Right	0	200	0	0	0	0	0	172
cSH	233	766	942	1700	1700	1700	1700	1700
Volume to Capacity	1.40	0.26	0.05	0.21	0.21	0.14	0.14	0.10
Queue Length 95th (m)	145.9	8.4	1.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	243.2	11.4	9.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	A					
Approach Delay (s)	154.9		0.6			0.0		
Approach LOS	F							
Intersection Summary								
Average Delay			42.2					
Intersection Capacity Utilization			44.6%	ICU Level of Service		A		
Analysis Period (min)	15							

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2041 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	165	0	68	3	0	3	171	539	3	3	494	85
Future Volume (vph)	165	0	68	3	0	3	171	539	3	3	494	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.932			0.999				0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				359.6
Travel Time (s)		8.6			23.9			10.2				18.5
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	179	0	74	3	0	3	186	586	3	3	537	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	74	0	0	6	0	186	589	0	3	537	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 51.7%	ICU Level of Service A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2041 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	165	0	68	3	0	3	171	539	3	3	494	85
Future Volume (Veh/h)	165	0	68	3	0	3	171	539	3	3	494	85
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)	179	0	74	3	0	3	186	586	3	3	537	92
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	1211	1504	268	1308	1594	294	629			589		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1074	1389	268	1178	1487	87	629			404		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	100	90	97	100	100	80			100		
cM capacity (veh/h)	137	105	730	105	92	892	949			1082		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4		
Volume Total	179	74	6	186	391	198	3	268	268	92		
Volume Left	179	0	3	186	0	0	3	0	0	0		
Volume Right	0	74	3	0	0	3	0	0	0	92		
cSH	137	730	188	949	1700	1700	1082	1700	1700	1700		
Volume to Capacity	1.31	0.10	0.03	0.20	0.23	0.12	0.00	0.16	0.16	0.05		
Queue Length 95th (m)	90.0	2.7	0.8	5.8	0.0	0.0	0.1	0.0	0.0	0.0		
Control Delay (s)	243.7	10.5	24.8	9.7	0.0	0.0	8.3	0.0	0.0	0.0		
Lane LOS	F	B	C	A				A				
Approach Delay (s)	175.5		24.8	2.3				0.0				
Approach LOS	F		C									
Intersection Summary												
Average Delay	27.8											
Intersection Capacity Utilization	51.7%			ICU Level of Service			A					
Analysis Period (min)	15											

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2041 <AM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	459	0	50	388	3	34
Future Volume (vph)	459	0	50	388	3	34
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected			0.994		0.996	
Satd. Flow (prot)	1651	0	0	1571	1396	0
Fit Permitted			0.994		0.996	
Satd. Flow (perm)	1651	0	0	1571	1396	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	2%	40%	7%	0%	10%
Adj. Flow (vph)	499	0	54	422	3	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	499	0	0	476	40	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	64.7%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2041 <AM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	459	0	50	388	3	34
Future Volume (Veh/h)	459	0	50	388	3	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)	499	0	54	422	3	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			499		1029	499
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			499		1029	499
tC, single (s)			4.5		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.4
p0 queue free %			94		99	93
cM capacity (veh/h)			895		245	556
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	499	476	40			
Volume Left	0	54	3			
Volume Right	0	0	37			
cSH	1700	895	508			
Volume to Capacity	0.29	0.06	0.08			
Queue Length 95th (m)	0.0	1.5	2.0			
Control Delay (s)	0.0	1.7	12.7			
Lane LOS	A		B			
Approach Delay (s)	0.0	1.7	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			64.7%		ICU Level of Service C	
Analysis Period (min)			15			

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2041 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Traffic Volume (vph)	6	0	141	0	0	0	455	704	0	0	543	19
Future Volume (vph)	6	0	141	0	0	0	455	704	0	0	543	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0		0.0		30.0		0.0		80.0	
Storage Lanes	1		0		1		0		1		1	
Taper Length (m)	7.5		7.5		7.5		15.0		15.0		15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt	0.850										0.850	
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3167	1458
Fit Permitted	0.757						0.219					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	376	3228	0	1716	3167	1458
Right Turn on Red			Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	587										109	
Link Speed (k/h)	50				50		80				80	
Link Distance (m)	101.3				60.9		348.2				226.1	
Travel Time (s)	7.3				4.4		15.7				10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	5%	2%
Adj. Flow (vph)	7	0	153	0	0	0	495	765	0	0	590	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	153	0	0	0	0	495	765	0	0	590	21
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6		7.2				7.2	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Turn Type	Perm	NA	Perm	Perm	pm+pt	NA	Perm	NA	Perm	NA	Perm	
Protected Phases	4		8		8		5		2		6	
Permitted Phases	4		8		8		5		2		6	
Minimum Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	13.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	27.5	27.5	27.5	27.5	27.0	52.5	25.5	25.5	25.5	25.5
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	33.8%	65.6%	31.9%	31.9%	31.9%	31.9%
Maximum Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	21.5	47.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag							Lead		Lag		Lag	
Lead-Lag Optimize?							Yes		Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effct Green (s)	22.0	22.0	22.0	22.0	22.0	22.0	47.0	47.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.59	0.59	0.25	0.25	0.25	0.25

Lanes, Volumes, Timings

Future Total_2041 <AM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023

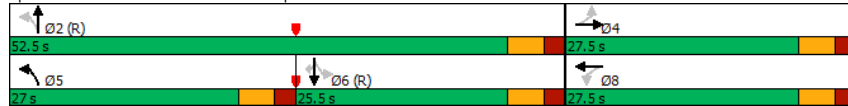


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.02	0.19					0.89	0.40			0.75	0.05
Control Delay	21.5	0.5					35.7	9.7			34.5	0.2
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.5	0.5					35.7	9.7			34.5	0.2
LOS	C	A					D	A			C	A
Approach Delay		1.4						19.9			33.3	
Approach LOS		A						B			C	
Queue Length 50th (m)	0.8	0.0					52.3	31.6			45.7	0.0
Queue Length 95th (m)	3.8	0.0					#110.8	43.4			64.5	0.0
Internal Link Dist (m)		77.3			36.9			324.2			202.1	
Turn Bay Length (m)							30.0					15.0
Base Capacity (vph)	357	826					557	1896			791	446
Starvation Cap Reductn	0	0					0	0			0	0
Spillback Cap Reductn	0	0					0	0			0	0
Storage Cap Reductn	0	0					0	0			0	0
Reduced v/c Ratio	0.02	0.19					0.89	0.40			0.75	0.05

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 22.5 Intersection LOS: C
 Intersection Capacity Utilization 66.9% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

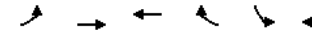


Lanes, Volumes, Timings

Future Total_2041 <AM>

11: Biggar Rd & Hospital East Access

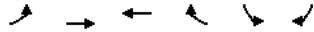
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑	↓	↓
Traffic Volume (vph)	48	872	518	213	85	31
Future Volume (vph)	48	872	518	213	85	31
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Fit				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3228	3197	1458	1630	1458
Fit Permitted	0.425					0.950
Satd. Flow (perm)	729	3228	3197	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		34
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	52	948	563	232	92	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	948	563	232	92	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	41.0	41.0	41.0	41.0	29.0	29.0
Total Split (%)	58.6%	58.6%	58.6%	58.6%	41.4%	41.4%
Maximum Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	35.5	35.5	35.5	35.5	23.5	23.5
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.34	0.34

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2041 <AM>
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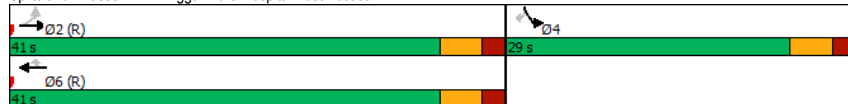


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.14	0.58	0.35	0.27	0.17	0.07
Control Delay	10.4	13.8	11.1	2.4	17.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	13.8	11.1	2.4	17.5	6.6
LOS	B	B	B	A	B	A
Approach Delay	13.6		8.5		14.5	
Approach LOS	B		A		B	
Queue Length 50th (m)	3.6	44.7	22.7	0.0	8.8	0.0
Queue Length 95th (m)	9.4	62.0	33.2	9.7	18.8	5.6
Internal Link Dist (m)	341.4		302.3		168.4	
Turn Bay Length (m)	30.0		50.0			
Base Capacity (vph)	369	1637	1621	853	547	512
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.58	0.35	0.27	0.17	0.07

Intersection Summary

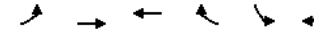
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 11.6 Intersection LOS: B
 Intersection Capacity Utilization 44.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2041 <AM>
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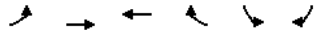
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↓	
Traffic Volume (vph)	19	920	501	48	0	15
Future Volume (vph)	19	920	501	48	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt	0.987			0.865		
Fit Protected	0.950					
Satd. Flow (prot)	1630	3228	3161	0	1484	0
Fit Permitted	0.950					
Satd. Flow (perm)	1630	3228	3161	0	1484	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	74.2		365.4		157.5	
Travel Time (s)	3.3		16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	21	1000	545	52	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	1000	597	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control	Free		Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 37.6% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

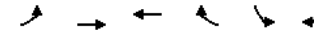
Future Total_2041 <AM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	
Traffic Volume (veh/h)	19	920	501	48	0	15
Future Volume (Veh/h)	19	920	501	48	0	15
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)	21	1000	545	52	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			365			
pX, platoon unblocked	0.94			0.94	0.94	
vC, conflicting volume	597			1113	298	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	444			993	126	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	98	
cM capacity (veh/h)	1046			223	846	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	21	500	500	363	234	16
Volume Left	21	0	0	0	0	0
Volume Right	0	0	0	0	52	16
cSH	1046	1700	1700	1700	1700	846
Volume to Capacity	0.02	0.29	0.29	0.21	0.14	0.02
Queue Length 95th (m)	0.5	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	9.3
Lane LOS	A					A
Approach Delay (s)	0.2			0.0		9.3
Approach LOS						A
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			37.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041 <AM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	
Traffic Volume (vph)	68	414	294	223	526	137
Future Volume (vph)	68	414	294	223	526	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1699	1683	1458	1604	0
Fit Permitted	0.950				0.962	
Satd. Flow (perm)	1630	1699	1683	1458	1604	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	74	450	320	242	572	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	450	320	242	721	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 71.6%				ICU Level of Service C		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2041 <AM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	↕
Traffic Volume (veh/h)	68	414	294	223	526	137
Future Volume (Veh/h)	68	414	294	223	526	137
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	450	320	242	572	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	562				918	320
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562				918	320
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				0	79
cM capacity (veh/h)	1009				279	721
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	74	450	320	242	721	
Volume Left	74	0	0	0	572	
Volume Right	0	0	0	242	149	
cSH	1009	1700	1700	1700	320	
Volume to Capacity	0.07	0.26	0.19	0.14	2.25	
Queue Length 95th (m)	1.9	0.0	0.0	0.0	440.4	
Control Delay (s)	8.8	0.0	0.0	0.0	600.0	
Lane LOS	A				F	
Approach Delay (s)	1.2		0.0		600.0	
Approach LOS					F	
Intersection Summary						
Average Delay	239.7					
Intersection Capacity Utilization	71.6%		ICU Level of Service		C	
Analysis Period (min)	15					

Lanes, Volumes, Timings
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2041 <AM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	43	0	70	15	12	9	18	79	36	49	0
Future Volume (vph)	0	43	0	70	15	12	9	18	79	36	49	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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
Fit					0.983			0.900				
Fit Protected					0.965			0.996				0.979
Satd. Flow (prot)	0	1716	0	0	1627	0	0	1538	0	0	1680	0
Fit Permitted					0.965			0.996				0.979
Satd. Flow (perm)	0	1716	0	0	1627	0	0	1538	0	0	1680	0
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		277.4			1391.9			855.1			76.8	
Travel Time (s)		25.0			125.3			61.6			5.5	
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
Adj. Flow (vph)	0	47	0	76	16	13	10	20	86	39	53	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	105	0	0	116	0	0	92	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	30.8%			ICU Level of Service A								
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2041 <AM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	43	0	70	15	12	9	18	79	36	49	0
Future Volume (vph)	0	43	0	70	15	12	9	18	79	36	49	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	47	0	76	16	13	10	20	86	39	53	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	47	105	116	92								
Volume Left (vph)	0	76	10	39								
Volume Right (vph)	0	13	86	0								
Hadj (s)	0.03	0.10	-0.39	0.12								
Departure Headway (s)	4.5	4.5	4.0	4.5								
Degree Utilization, x	0.06	0.13	0.13	0.11								
Capacity (veh/h)	753	751	863	759								
Control Delay (s)	7.8	8.2	7.6	8.1								
Approach Delay (s)	7.8	8.2	7.6	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.9											
Level of Service	A											
Intersection Capacity Utilization	30.8%			ICU Level of Service	A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
15: Street A & Street HH

Future Total_2041 <AM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	81	5	106	63	12	299
Future Volume (vph)	81	5	106	63	12	299
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.993		0.950			
Flt Protected	0.955					0.998
Satd. Flow (prot)	1627	0	1630	0	0	1712
Flt Permitted	0.955					0.998
Satd. Flow (perm)	1627	0	1630	0	0	1712
Link Speed (k/h)	50		50			50
Link Distance (m)	1017.7		238.9			855.1
Travel Time (s)	73.3		17.2			61.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	5	115	68	13	325
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	183	0	0	338
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	39.5%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2041 <AM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	81	5	106	63	12	299
Future Volume (Veh/h)	81	5	106	63	12	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)	88	5	115	68	13	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	500	149			183	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	500	149			183	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	99			99	
cM capacity (veh/h)	525	898			1392	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	93	183	338			
Volume Left	88	0	13			
Volume Right	5	68	0			
cSH	537	1700	1392			
Volume to Capacity	0.17	0.11	0.01			
Queue Length 95th (m)	5.0	0.0	0.2			
Control Delay (s)	13.1	0.0	0.4			
Lane LOS	B		A			
Approach Delay (s)	13.1	0.0	0.4			
Approach LOS	B					
Intersection Summary						
Average Delay		2.2				
Intersection Capacity Utilization		39.5%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2041 <AM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	62	24	10	696	536	22
Future Volume (vph)	62	24	10	696	536	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.962				0.994	
Fit Protected	0.965			0.999		
Satd. Flow (prot)	1593	0	0	3225	3180	0
Fit Permitted	0.965			0.999		
Satd. Flow (perm)	1593	0	0	3225	3180	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	67	26	11	757	583	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	768	607	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 40.6%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2041 <AM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	RT			LT	LT	
Traffic Volume (veh/h)	62	24	10	696	536	22
Future Volume (Veh/h)	62	24	10	696	536	22
Sign Control	Stop			Free		Free
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	26	11	757	583	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	996	304	607			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	996	304	607			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	96	99			
cM capacity (veh/h)	239	693	967			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	93	263	505	389	218	
Volume Left	67	11	0	0	0	
Volume Right	26	0	0	0	24	
cSH	292	967	1700	1700	1700	
Volume to Capacity	0.32	0.01	0.30	0.23	0.13	
Queue Length 95th (m)	10.6	0.3	0.0	0.0	0.0	
Control Delay (s)	23.0	0.5	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	23.0	0.2		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			40.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↙	↘	↕	↔
Traffic Volume (vph)	79	40	38	762	562	85
Future Volume (vph)	79	40	38	762	562	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.980	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1330	1488	1299	3197	3038	0
Fit Permitted	0.950		0.343			
Satd. Flow (perm)	1330	1488	469	3197	3038	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		43			34	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	25%	0%	28%	4%	4%	29%
Adj. Flow (vph)	86	43	41	828	611	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	43	41	828	703	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	30.0	30.0	40.0	40.0	40.0	
Total Split (%)	42.9%	42.9%	57.1%	57.1%	57.1%	
Maximum Green (s)	24.5	24.5	34.5	34.5	34.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	24.5	24.5	34.5	34.5	34.5	
Actuated g/C Ratio	0.35	0.35	0.49	0.49	0.49	

Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

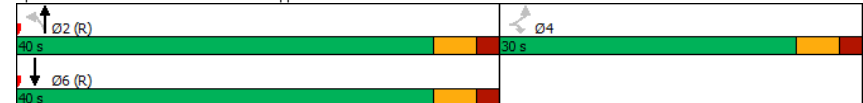
4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.18	0.08	0.18	0.53	0.46	
Control Delay	17.2	5.9	20.8	21.6	12.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.2	5.9	20.8	21.6	12.3	
LOS	B	A	C	C	B	
Approach Delay	13.4			21.6	12.3	
Approach LOS	B			C	B	
Queue Length 50th (m)	8.1	0.0	5.2	55.8	29.7	
Queue Length 95th (m)	17.8	6.0	m8.6	74.4	43.1	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	465	548	231	1575	1514	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.08	0.18	0.53	0.46	

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 17.1 Intersection LOS: B
 Intersection Capacity Utilization 48.6% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	299	184	44	654	444	158
Future Volume (vph)	299	184	44	654	444	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1471	1488	1662	3167	2942	1352
Fit Permitted	0.950		0.454			
Satd. Flow (perm)	1471	1488	794	3167	2942	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		200				172
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			268.2	493.4	
Travel Time (s)	125.3			13.8	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	0%	5%	13%	10%
Adj. Flow (vph)	325	200	48	711	483	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	325	200	48	711	483	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	36.0	36.0	34.0	34.0	34.0	34.0
Total Split (%)	51.4%	51.4%	48.6%	48.6%	48.6%	48.6%
Maximum Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	30.5	30.5	28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.44	0.44	0.41	0.41	0.41	0.41

Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

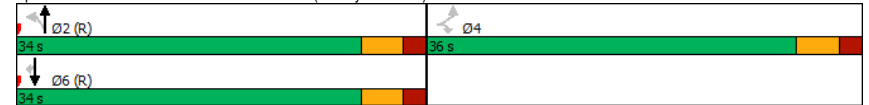
6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.51	0.26	0.15	0.55	0.40	0.26
Control Delay	17.8	3.1	22.5	26.8	19.5	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	3.1	22.5	26.8	19.5	8.7
LOS	B	A	C	C	B	A
Approach Delay	12.2			26.5	16.7	
Approach LOS	B			C	B	
Queue Length 50th (m)	31.1	0.0	5.5	47.6	31.1	6.4
Queue Length 95th (m)	53.7	10.6	m13.6	65.0	46.1	21.5
Internal Link Dist (m)	1367.9			244.2	469.4	
Turn Bay Length (m)	125.0		15.0			25.0
Base Capacity (vph)	640	761	323	1289	1197	652
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.26	0.15	0.55	0.40	0.26

Intersection Summary
 Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 19.3 Intersection LOS: B
 Intersection Capacity Utilization 53.4% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↖	↖	↖	↖		↖	↖	↖
Traffic Volume (vph)	165	0	68	3	0	3	171	539	3	3	494	85
Future Volume (vph)	165	0	68	3	0	3	171	539	3	3	494	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		40.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850					0.932			0.999		0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3167	1458
Fit Permitted	0.754				0.926		0.443			0.412		
Satd. Flow (perm)	1294	1458	0	0	1510	0	760	3225	0	721	3167	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		286			39			1				92
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				359.6
Travel Time (s)		8.6			23.9			10.2				18.5
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	5%	2%
Adj. Flow (vph)	179	0	74	3	0	3	186	586	3	3	537	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	74	0	0	6	0	186	589	0	3	537	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	28.0	28.0		28.0	28.0		42.0	42.0		42.0	42.0	42.0
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	60.0%
Maximum Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.5	22.5		22.5	22.5		36.5	36.5		36.5	36.5	36.5
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.52	0.52		0.52	0.52	0.52

Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.43	0.11			0.01		0.47	0.35		0.01	0.33	0.11
Control Delay	21.0	0.3			0.0		15.6	10.5		15.0	15.5	8.1
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	21.0	0.3			0.0		15.6	10.5		15.0	15.5	8.1
LOS	C	A			A		B	B		B	B	A
Approach Delay		15.0						11.7				14.4
Approach LOS		B						B				B
Queue Length 50th (m)	17.5	0.0			0.0		15.1	23.1		0.3	25.7	0.0
Queue Length 95th (m)	33.8	0.0			0.0		32.4	33.5		m0.9	41.2	5.8
Internal Link Dist (m)		94.9			308.1			202.1				335.6
Turn Bay Length (m)	15.0						15.0			15.0		40.0
Base Capacity (vph)	415	662			511		396	1682		375	1651	804
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.43	0.11			0.01		0.47	0.35		0.01	0.33	0.11

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.47

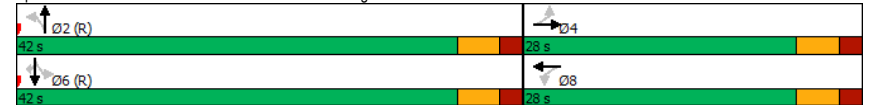
Intersection Signal Delay: 13.2 Intersection LOS: B

Intersection Capacity Utilization 55.5% ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Montrose Rd & Street HH/Reixinger Road



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041 Improved<AM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↔	↕	↔	↕
Traffic Volume (vph)	68	414	294	223	526	137
Future Volume (vph)	68	414	294	223	526	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1699	1683	1458	1604	0
Fit Permitted	0.446				0.962	
Satd. Flow (perm)	765	1699	1683	1458	1604	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				242	28	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	4%	2%	2%	2%
Adj. Flow (vph)	74	450	320	242	572	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	450	320	242	721	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	28.0	28.0	28.0	28.0	42.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	
Maximum Green (s)	22.5	22.5	22.5	22.5	36.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	22.5	22.5	22.5	22.5	36.5	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.52	

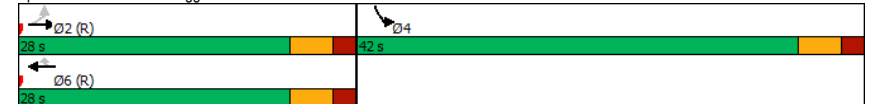
Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041 Improved<AM>
01-31-2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.30	0.82	0.59	0.38	0.85	
Control Delay	22.1	37.1	43.5	21.1	25.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.1	37.1	43.5	21.1	25.9	
LOS	C	D	D	C	C	
Approach Delay		34.9	33.8		25.9	
Approach LOS		C	C		C	
Queue Length 50th (m)	7.6	56.6	48.9	16.9	76.2	
Queue Length 95th (m)	18.4	#104.8	73.4	37.3	#148.1	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	30.0			60.0		
Base Capacity (vph)	245	546	540	632	849	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.30	0.82	0.59	0.38	0.85	

Intersection Summary	
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	31.0
Intersection Capacity Utilization:	79.6%
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2041 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↕↕	↕↕	
Traffic Volume (vph)	62	24	10	696	536	22
Future Volume (vph)	62	24	10	696	536	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	20.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.962				0.994	
Fit Protected	0.965			0.999		
Satd. Flow (prot)	1593	0	0	3225	3180	0
Fit Permitted	0.965			0.999		
Satd. Flow (perm)	1593	0	0	3225	3180	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	107.7			359.6	268.2	
Travel Time (s)	7.8			18.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	4%	2%
Adj. Flow (vph)	67	26	11	757	583	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	768	607	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	40.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

Future Total_2041 Improved<AM>

16: Montrose Rd & Mixed-used block 93 Driveway

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	↔			↕↕	↕↕	
Lane Configurations	↔			↕↕	↕↕	
Traffic Volume (veh/h)	62	24	10	696	536	22
Future Volume (Veh/h)	62	24	10	696	536	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	26	11	757	583	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)				360	268	
pX, platoon unblocked	0.97	0.96	0.96			
vC, conflicting volume	996	304	607			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	735	187	503			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	97	99			
cM capacity (veh/h)	340	789	1013			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	93	263	505	389	218
Volume Left	67	11	0	0	0
Volume Right	26	0	0	0	24
cSH	404	1013	1700	1700	1700
Volume to Capacity	0.23	0.01	0.30	0.23	0.13
Queue Length 95th (m)	7.0	0.3	0.0	0.0	0.0
Control Delay (s)	16.6	0.5	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	16.6	0.2		0.0	
Approach LOS	C				

Intersection Summary

Average Delay		1.1			
Intersection Capacity Utilization		40.6%	ICU Level of Service	A	
Analysis Period (min)		15			

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041<PM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖↖	↖	↖	↖	↖↖	↖	↖↖	↖	↖
Traffic Volume (vph)	136	724	81	511	842	365	56	349	557	697	471	161
Future Volume (vph)	136	724	81	511	842	365	56	349	557	697	471	161
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	130.0		30.0	265.0		0.0	30.0		150.0	275.0		40.0
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (m)	15.0			15.0			15.0			15.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1630	3260	1430	3162	3260	1430	1599	3228	1444	3131	3260	1473
Fit Permitted	0.231			0.950			0.463			0.950		
Satd. Flow (perm)	396	3260	1430	3162	3260	1430	779	3228	1444	3131	3260	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134			225			444			175
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		326.3			337.6			616.2			348.2	
Travel Time (s)		14.7			15.2			27.7			15.7	
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
Heavy Vehicles (%)	2%	2%	4%	2%	2%	4%	4%	3%	3%	3%	2%	1%
Adj. Flow (vph)	148	787	88	555	915	397	61	379	605	758	512	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	787	88	555	915	397	61	379	605	758	512	175
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.2			7.2			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	1	1	1	1	1
Detector Template												
Leading Detector (m)	21.5	0.0	0.0	21.5	0.0	0.0	21.5	7.5	7.5	21.5	7.5	7.5
Trailing Detector (m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Position(m)	12.5	0.0	0.0	12.5	0.0	0.0	12.5	-1.5	-1.5	12.5	-1.5	-1.5
Detector 1 Size(m)	9.0	0.0	0.0	9.0	0.0	0.0	9.0	9.0	9.0	9.0	9.0	9.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		0.0			0.0			0.0			0.0	
Detector 2 Size(m)		0.0			0.0			0.0			0.0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	Perm	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6			8		7		4

Lanes, Volumes, Timings

1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041<PM>

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2			Free	8		8	Free		4
Detector Phase	5	2	2	1	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	8.0	10.0		10.0	10.0		8.0	10.0	10.0
Minimum Split (s)	7.5	31.3	31.3	13.5	31.3		31.3	31.3		13.5	31.3	31.3
Total Split (%)	13.1	41.5	41.5	31.0	59.4		31.3	31.3		41.2	72.5	72.5
Total Split (%)	9.0%	28.6%	28.6%	21.4%	41.0%		21.6%	21.6%		28.4%	50.0%	50.0%
Maximum Green (s)	9.6	35.2	35.2	25.5	53.1		25.0	25.0		35.7	66.2	66.2
Yellow Time (s)	3.0	4.1	4.1	3.5	4.1		4.1	4.1		3.5	4.1	4.1
All-Red Time (s)	0.5	2.2	2.2	2.0	2.2		2.2	2.2		2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.5	6.3	6.3	5.5	6.3		6.3	6.3		5.5	6.3	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		6.0	6.0		3.0	6.0	6.0
Recall Mode	None	Max	Max	None	Max		Min	Min		Max	Max	Max
Walk Time (s)		8.0	8.0		8.0		10.0	10.0		10.0	10.0	10.0
Flash Dont Walk (s)		17.0	17.0		17.0		15.0	15.0		15.0	15.0	15.0
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	0
Act Effect Green (s)	47.4	35.2	35.2	25.5	53.3	145.0	25.0	25.0	145.0	35.7	66.2	66.2
Actuated g/C Ratio	0.33	0.24	0.24	0.18	0.37	1.00	0.17	0.17	1.00	0.25	0.46	0.46
v/c Ratio	0.71	0.99	0.20	1.00	0.76	0.28	0.46	0.68	0.42	0.98	0.34	0.23
Control Delay	45.2	85.1	2.3	96.7	45.5	0.5	66.2	63.3	0.9	82.8	26.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	85.1	2.3	96.7	45.5	0.5	66.2	63.3	0.9	82.8	26.2	3.8
LOS	D	F	A	F	D	A	E	E	A	F	C	A
Approach Delay		72.2			51.1			27.3				53.2
Approach LOS		E			D			C				D
Queue Length 50th (m)	25.3	126.0	0.0	87.5	127.8	0.0	16.8	57.2	0.0	118.4	51.7	0.0
Queue Length 95th (m)	#44.1	#171.3		3.5	#127.6	154.9	0.0	33.5	76.1	0.0	#161.7	66.1
Internal Link Dist (m)		302.3			313.6			592.2				324.2
Turn Bay Length (m)	130.0		30.0	265.0			30.0	150.0	275.0			40.0
Base Capacity (vph)	211	791	448	556	1198	1430	134	556	1444	770	1488	767
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.99	0.20	1.00	0.76	0.28	0.46	0.68	0.42	0.98	0.34	0.23
Intersection Summary												
Area Type:	Other											
Cycle Length:	145											
Actuated Cycle Length:	145											
Natural Cycle:	150											
Control Type:	Semi Act-Uncoord											
Maximum v/c Ratio:	1.00											
Intersection Signal Delay:	51.1						Intersection LOS: D					
Intersection Capacity Utilization:	89.3%						ICU Level of Service E					
Analysis Period (min):	15											
# 95th percentile volume exceeds capacity, queue may be longer.												

Lanes, Volumes, Timings

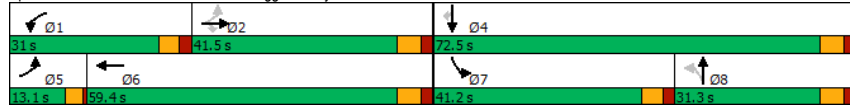
1: Montrose Rd & Biggar Rd/Lyons Creek Rd

Future Total_2041<PM>

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Queue shown is maximum after two cycles.

Splits and Phases: 1: Montrose Rd & Biggar Rd/Lyons Creek Rd

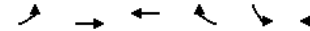


Lanes, Volumes, Timings

2: Lyons Creek Rd & QEW Southbound Off Ramp

Future Total_2041<PM>

01-31-2023



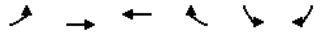
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↓↓↓	↓
Traffic Volume (vph)	0	1549	731	0	304	906
Future Volume (vph)	0	1549	731	0	304	906
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	200.0	200.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Ped Bike Factor					0.99	0.99
Frt					0.910	0.850
Flt Protected					0.980	
Satd. Flow (prot)	0	3197	3197	0	2918	1327
Flt Permitted					0.980	
Satd. Flow (perm)	0	3197	3197	0	2918	1311
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					159	491
Link Speed (k/h)		50	80		60	
Link Distance (m)		111.5	196.3		309.9	
Travel Time (s)		8.0	8.8		18.6	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	6%	3%	2%
Adj. Flow (vph)	0	1684	795	0	330	985
Shared Lane Traffic (%)						50%
Lane Group Flow (vph)	0	1684	795	0	823	492
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		7.2	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type		NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases						Free
Minimum Split (s)		28.5	28.5		26.5	
Total Split (s)		43.5	43.5		26.5	
Total Split (%)		62.1%	62.1%		37.9%	
Maximum Green (s)		38.0	38.0		21.0	
Yellow Time (s)		3.5	3.5		3.5	
All-Red Time (s)		2.0	2.0		2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.5	5.5		5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)		7.0	7.0		7.0	
Flash Dont Walk (s)		16.0	16.0		14.0	
Pedestrian Calls (#/hr)		0	0		0	

Lanes, Volumes, Timings

Future Total_2041<PM>

2: Lyons Creek Rd & QEW Southbound Off Ramp

01-31-2023

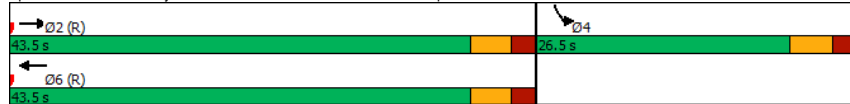


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	38.0	38.0			21.0	70.0
Actuated g/C Ratio	0.54	0.54			0.30	1.00
v/c Ratio	0.97	0.46			0.91dr	0.38
Control Delay	32.9	10.8			27.6	0.8
Queue Delay	0.0	0.0			0.0	0.0
Total Delay	32.9	10.8			27.6	0.8
LOS	C	B			C	A
Approach Delay	32.9	10.8			17.6	
Approach LOS	C	B			B	
Queue Length 50th (m)	108.4	32.2			44.1	0.0
Queue Length 95th (m)	#167.3	45.3			#74.8	0.0
Internal Link Dist (m)	87.5	172.3			285.9	
Turn Bay Length (m)					200.0	200.0
Base Capacity (vph)	1735	1735			986	1311
Starvation Cap Reductn	0	0			0	0
Spillback Cap Reductn	0	0			0	0
Storage Cap Reductn	0	0			0	0
Reduced v/c Ratio	0.97	0.46			0.83	0.38

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 23.0 Intersection LOS: C
 Intersection Capacity Utilization 75.5% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 2: Lyons Creek Rd & QEW Southbound Off Ramp



Lanes, Volumes, Timings

Future Total_2041<PM>

3: QEW Northbound Off Ramp & Lyons Creek Rd

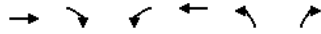
01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (vph)	873	0	0	659	166	66
Future Volume (vph)	873	0	0	659	166	66
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor					1.00	
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	3197	0	0	3292	1363	1352
Flt Permitted					0.950	
Satd. Flow (perm)	3197	0	0	3292	1361	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						72
Link Speed (k/h)	80			80	60	
Link Distance (m)	160.2			176.5	223.3	
Travel Time (s)	7.2			7.9	13.4	
Confl. Peds. (#/hr)					1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	1%	22%	10%
Adj. Flow (vph)	949	0	0	716	180	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	949	0	0	716	180	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		15	25		25	15
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Minimum Split (s)	28.5			28.5	26.5	26.5
Total Split (s)	41.0			41.0	29.0	29.0
Total Split (%)	58.6%			58.6%	41.4%	41.4%
Maximum Green (s)	35.5			35.5	23.5	23.5
Yellow Time (s)	3.5			3.5	3.5	3.5
All-Red Time (s)	2.0			2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	5.5			5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	16.0			16.0	14.0	14.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.5			35.5	23.5	23.5
Actuated g/C Ratio	0.51			0.51	0.34	0.34
v/c Ratio	0.59			0.43	0.39	0.14

Lanes, Volumes, Timings
3: QEW Northbound Off Ramp & Lyons Creek Rd

Future Total_2041<PM>
01-31-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Control Delay	13.9			11.9	21.0	5.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.9			11.9	21.0	5.5
LOS	B			B	C	A
Approach Delay	13.9			11.9	16.6	
Approach LOS	B			B	B	
Queue Length 50th (m)	45.0			30.5	18.7	0.0
Queue Length 95th (m)	62.5			43.2	35.2	8.0
Internal Link Dist (m)	136.2			152.5	199.3	
Turn Bay Length (m)						
Base Capacity (vph)	1621			1669	457	501
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.59			0.43	0.39	0.14

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Pretimed
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 13.5
 Intersection LOS: B
 Intersection Capacity Utilization 45.4%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off Ramp & Lyons Creek Rd



Lanes, Volumes, Timings
4: Montrose Rd & Chippawa Creek Rd

Future Total_2041<PM>
01-31-2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	58	51	51	803	1290	60
Future Volume (vph)	58	51	51	803	1290	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.993	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3196	0
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1614	1261	1614	3260	3196	0
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	63	55	55	873	1402	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	55	55	873	1467	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

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

HCM Unsignalized Intersection Capacity Analysis
4: Montrose Rd & Chippawa Creek Rd

Future Total_2041<PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔	
Traffic Volume (veh/h)	58	51	51	803	1290	60	
Future Volume (Veh/h)	58	51	51	803	1290	60	
Sign Control	Stop		Free				
Grade	0%		0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	63	55	55	873	1402	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	1981	734	1467				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1981	734	1467				
tC, single (s)	6.9	7.3	4.2				
tC, 2 stage (s)							
tF (s)	3.5	3.5	2.2				
p0 queue free %	0	83	88				
cM capacity (veh/h)	47	329	451				
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	63	55	55	436	436	935	532
Volume Left	63	0	55	0	0	0	0
Volume Right	0	55	0	0	0	0	65
cSH	47	329	451	1700	1700	1700	1700
Volume to Capacity	1.35	0.17	0.12	0.26	0.26	0.55	0.31
Queue Length 95th (m)	48.0	4.7	3.3	0.0	0.0	0.0	0.0
Control Delay (s)	392.5	18.1	14.1	0.0	0.0	0.0	0.0
Lane LOS	F	C	B				
Approach Delay (s)	218.0	0.8		0.0			
Approach LOS	F						
Intersection Summary							
Average Delay	10.5						
Intersection Capacity Utilization	56.2%		ICU Level of Service		B		
Analysis Period (min)	15						

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2041<PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↕↕	↕↕	↔	↔
Traffic Volume (vph)	157	44	805	116	44	1268
Future Volume (vph)	157	44	805	116	44	1268
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	0.0	15.0		
Storage Lanes	1	1	0		1	
Taper Length (m)	15.0					15.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fit	0.850		0.981			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1646	1488	3118	0	1662	3197
Fit Permitted	0.950		0.223			
Satd. Flow (perm)	1646	1488	3118	0	390	3197
Right Turn on Red	Yes		Yes			
Satd. Flow (RTOR)	48		34			
Link Speed (k/h)	60		70		70	
Link Distance (m)	170.9		493.4		425.4	
Travel Time (s)	10.3		25.4		21.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	5%	2%	0%	4%
Adj. Flow (vph)	171	48	875	126	48	1378
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	48	1001	0	48	1378
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25	
Turn Type	Perm	Perm	NA	Perm	NA	
Protected Phases	2		6			
Permitted Phases	8		6			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	42.5	42.5	42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0		0		0	
Act Effct Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	0.53

Lanes, Volumes, Timings
5: Montrose Rd & Oakwood Dr

Future Total_2041<PM>
01-31-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
v/c Ratio	0.33	0.10	0.60		0.23	0.82
Control Delay	20.6	6.4	12.9		12.5	18.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.6	6.4	12.9		12.5	18.8
LOS	C	A	B		B	B
Approach Delay	17.5		12.9			18.6
Approach LOS	B		B			B
Queue Length 50th (m)	17.8	0.0	44.6		3.3	76.4
Queue Length 95th (m)	33.2	6.8	62.7		10.0	105.5
Internal Link Dist (m)	146.9		469.4			401.4
Turn Bay Length (m)	35.0				15.0	
Base Capacity (vph)	517	500	1664		206	1689
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.33	0.10	0.60		0.23	0.82

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Pretimed	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 58.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Montrose Rd & Oakwood Dr



Lanes, Volumes, Timings
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2041<PM>
01-31-2023

	↖	↗	↘	↑	↓	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↘	↑↑	↑↑	↙
Traffic Volume (vph)	224	146	89	646	977	495
Future Volume (vph)	224	146	89	646	977	495
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1190	1662	3137	3197	1488
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			256.2	493.4	
Travel Time (s)	125.3			13.2	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	243	159	97	702	1062	538
Shared Lane Traffic (%)						
Lane Group Flow (vph)	243	159	97	702	1062	538
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 58.1%	ICU Level of Service B
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
6: Montrose Rd & Street Q (Grassy Brook Rd)

Future Total_2041<PM>
01-31-2023

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔		
Traffic Volume (veh/h)	224	146	89	646	977	495		
Future Volume (Veh/h)	224	146	89	646	977	495		
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)	243	159	97	702	1062	538		
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	1607	531	1600					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1607	531	1600					
tC, single (s)	6.8	7.4	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.5	2.2					
p0 queue free %	0	64	77					
cM capacity (veh/h)	75	437	415					
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	243	159	97	351	351	531	531	538
Volume Left	243	0	97	0	0	0	0	0
Volume Right	0	159	0	0	0	0	0	538
cSH	75	437	415	1700	1700	1700	1700	1700
Volume to Capacity	3.25	0.36	0.23	0.21	0.21	0.31	0.31	0.32
Queue Length 95th (m)	Err	13.1	7.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	Err	17.9	16.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	C	C					
Approach Delay (s)	6051.2		2.0			0.0		
Approach LOS	F							
Intersection Summary								
Average Delay	869.0							
Intersection Capacity Utilization	58.1%		ICU Level of Service			B		
Analysis Period (min)	15							

Lanes, Volumes, Timings
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2041<PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	116	0	117	3	0	3	104	579	3	3	834	249
Future Volume (vph)	116	0	117	3	0	3	104	579	3	3	834	249
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.932			0.999				0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Fit Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				371.6
Travel Time (s)		8.6			23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	126	0	127	3	0	3	113	629	3	3	907	271
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	127	0	0	6	0	113	632	0	3	907	271
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free				Free
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	53.6%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
7: Montrose Rd & Street HH/Reixinger Road

Future Total_2041<PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	116	0	117	3	0	3	104	579	3	3	834	249
Future Volume (Veh/h)	116	0	117	3	0	3	104	579	3	3	834	249
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)	126	0	127	3	0	3	113	629	3	3	907	271
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)	226											
pX, platoon unblocked	0.92	0.92		0.92	0.92	0.92				0.92		
vC, conflicting volume	1456	1771	454	1443	2040	316	1178			632		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1318	1661	454	1303	1954	75	1178			419		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	100	77	96	100	100	81			100		
cM capacity (veh/h)	90	71	554	72	47	897	589			1056		
Direction_Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4		
Volume Total	126	127	6	113	419	213	3	454	454	271		
Volume Left	126	0	3	113	0	0	3	0	0	0		
Volume Right	0	127	3	0	0	3	0	0	0	271		
cSH	90	554	134	589	1700	1700	1056	1700	1700	1700		
Volume to Capacity	1.41	0.23	0.04	0.19	0.25	0.13	0.00	0.27	0.27	0.16		
Queue Length 95th (m)	76.2	7.0	1.1	5.6	0.0	0.0	0.1	0.0	0.0	0.0		
Control Delay (s)	320.7	13.4	33.2	12.6	0.0	0.0	8.4	0.0	0.0	0.0		
Lane LOS	F	B	D	B			A					
Approach Delay (s)	166.5		33.2	1.9			0.0					
Approach LOS	F		D									
Intersection Summary												
Average Delay			20.0									
Intersection Capacity Utilization			53.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
8: Crowland Avenue & Biggar Rd

Future Total_2041<PM>
01-31-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (vph)	400	0	38	580	0	53
Future Volume (vph)	400	0	38	580	0	53
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		15.0		0.0	
Storage Lanes	0		0		1	
Taper Length (m)			15.0		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Fit Protected	0.997					
Satd. Flow (prot)	1683	0	0	1697	1514	0
Fit Permitted	0.997					
Satd. Flow (perm)	1683	0	0	1697	1514	0
Link Speed (k/h)	80		80		50	
Link Distance (m)	451.8		562.9		459.1	
Travel Time (s)	20.3		25.3		33.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	0%	0%
Adj. Flow (vph)	435	0	41	630	0	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	435	0	0	671	58	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0		3.6	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	15		25		25	
Sign Control	Free		Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 71.8%	ICU Level of Service C					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
8: Crowland Avenue & Biggar Rd

Future Total_2041<PM>
01-31-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Volume (veh/h)	400	0	38	580	0	53
Future Volume (Veh/h)	400	0	38	580	0	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)	435	0	41	630	0	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			435		1147	435
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			435		1147	435
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	91
cM capacity (veh/h)			1135		214	625
Direction_Lane #	EB 1	WB 1	NB 1			
Volume Total	435	671	58			
Volume Left	0	41	0			
Volume Right	0	0	58			
cSH	1700	1135	625			
Volume to Capacity	0.26	0.04	0.09			
Queue Length 95th (m)	0.0	0.9	2.4			
Control Delay (s)	0.0	1.0	11.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.0	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		71.8%		ICU Level of Service	C	
Analysis Period (min)		15				

Lanes, Volumes, Timings
10: Montrose Rd & Hospital South Access/Private Access

Future Total_2041<PM>
01-31-2023

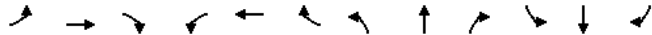
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	17	0	382	0	0	0	180	666	0	0	943	7
Future Volume (vph)	17	0	382	0	0	0	180	666	0	0	943	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	80.0		15.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fit		0.850										0.850
Fit Protected	0.950						0.950					
Satd. Flow (prot)	1630	1458	0	1716	1716	0	1630	3228	0	1716	3260	1458
Fit Permitted	0.757						0.126					
Satd. Flow (perm)	1299	1458	0	1716	1716	0	216	3228	0	1716	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		278										109
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		101.3			58.5			348.2			226.1	
Travel Time (s)		7.3			4.2			15.7			10.2	
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
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	415	0	0	0	196	724	0	0	1025	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	415	0	0	0	0	196	724	0	0	1025	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm		pm+pt	NA		Perm	NA		Perm
Protected Phases		4			8		5	2			6	6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		13.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		15.1	52.5		37.4	37.4	37.4
Total Split (%)	34.4%	34.4%		34.4%	34.4%		18.9%	65.6%		46.8%	46.8%	46.8%
Maximum Green (s)	22.0	22.0		22.0	22.0		9.6	47.0		31.9	31.9	31.9
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0		7.0			7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0			12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0			0	0	0
Act Effct Green (s)	22.0	22.0					47.0	47.0			31.9	31.9
Actuated g/C Ratio	0.28	0.28					0.59	0.59			0.40	0.40

Lanes, Volumes, Timings

Future Total_2041<PM>

10: Montrose Rd & Hospital South Access/Private Access

01-31-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.05	0.69					0.66	0.38			0.79	0.01
Control Delay	21.9	15.5					23.2	9.5			26.5	0.0
Queue Delay	0.0	0.0					0.0	0.0			0.0	0.0
Total Delay	21.9	15.5					23.2	9.5			26.5	0.0
LOS	C	B					C	A			C	A
Approach Delay	15.7						12.4					
Approach LOS	B						B					
Queue Length 50th (m)	2.1	17.5					13.4	29.5				
Queue Length 95th (m)	7.2	50.8					#38.6	40.5				
Internal Link Dist (m)	77.3		34.5				324.2		202.1			
Turn Bay Length (m)							30.0		15.0			
Base Capacity (vph)	357		602				296		1896			
Starvation Cap Reductn	0	0					0	0	0			
Spillback Cap Reductn	0	0					0	0	0			
Storage Cap Reductn	0	0					0	0	0			
Reduced v/c Ratio	0.05	0.69					0.66	0.38				

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 19.0 Intersection LOS: B
 Intersection Capacity Utilization 78.6% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Montrose Rd & Hospital South Access/Private Access

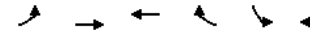


Lanes, Volumes, Timings

Future Total_2041<PM>

11: Biggar Rd & Hospital East Access

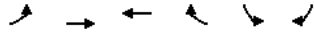
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔	↔	↔	↔
Traffic Volume (vph)	19	751	972	84	187	85
Future Volume (vph)	19	751	972	84	187	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			50.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1630	3197	3228	1458	1630	1458
Fit Permitted	0.200					0.950
Satd. Flow (perm)	343	3197	3228	1458	1630	1458
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				91		73
Link Speed (k/h)		80	80		50	
Link Distance (m)		365.4	326.3		192.4	
Travel Time (s)		16.4	14.7		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	21	816	1057	91	203	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	816	1057	91	203	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)	3.6	3.6	3.6	3.6	3.6	3.6
Link Offset(m)	0.0	0.0	0.0	0.0	0.0	0.0
Crosswalk Width(m)	4.8	4.8	4.8	4.8	4.8	4.8
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2			6		4
Minimum Split (s)	24.5	24.5	24.5	24.5	27.5	27.5
Total Split (s)	42.0	42.0	42.0	42.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	15.0	15.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	36.5	36.5	36.5	36.5	22.5	22.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32

Lanes, Volumes, Timings
11: Biggar Rd & Hospital East Access

Future Total_2041<PM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.12	0.49	0.63	0.11	0.39	0.18
Control Delay	10.6	12.0	14.0	2.6	21.1	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	12.0	14.0	2.6	21.1	7.5
LOS	B	B	B	A	C	A
Approach Delay		12.0	13.1		16.9	
Approach LOS		B	B		B	
Queue Length 50th (m)	1.4	35.2	50.6	0.0	21.4	1.8
Queue Length 95th (m)	5.2	49.5	69.8	6.1	38.8	11.2
Internal Link Dist (m)		341.4	302.3		168.4	
Turn Bay Length (m)	30.0			50.0		
Base Capacity (vph)	178	1667	1683	803	523	518
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.49	0.63	0.11	0.39	0.18

Intersection Summary

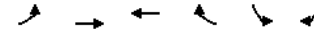
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 13.2 Intersection LOS: B
 Intersection Capacity Utilization 49.6% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 11: Biggar Rd & Hospital East Access



Lanes, Volumes, Timings
12: Biggar Rd & Hospital West Access

Future Total_2041<PM>
01-31-2023



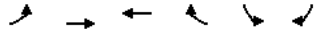
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↓	↑↑	↑↑		↑↑	↓
Traffic Volume (vph)	7	727	1038	19	43	42
Future Volume (vph)	7	727	1038	19	43	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.997		0.933	
Fit Protected	0.950				0.975	
Satd. Flow (prot)	1630	3197	3219	0	1561	0
Fit Permitted	0.950				0.975	
Satd. Flow (perm)	1630	3197	3219	0	1561	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		74.2	365.4		157.5	
Travel Time (s)		3.3	16.4		11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	8	790	1128	21	47	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	790	1149	0	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)		25		15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 43.9% ICU Level of Service A
 Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
12: Biggar Rd & Hospital West Access

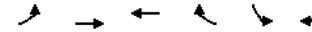
Future Total_2041<PM>
01-31-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	
Traffic Volume (veh/h)	7	727	1038	19	43	42
Future Volume (Veh/h)	7	727	1038	19	43	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)	8	790	1128	21	47	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)			365			
pX, platoon unblocked	0.78			0.78	0.78	
vC, conflicting volume	1149			1550	574	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	625			1139	0	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			69	95	
cM capacity (veh/h)	742			150	845	
Direction_Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	395	395	752	397	93
Volume Left	8	0	0	0	0	47
Volume Right	0	0	0	0	21	46
cSH	742	1700	1700	1700	1700	253
Volume to Capacity	0.01	0.23	0.23	0.44	0.23	0.37
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	12.9
Control Delay (s)	9.9	0.0	0.0	0.0	0.0	27.2
Lane LOS	A					D
Approach Delay (s)	0.1			0.0		27.2
Approach LOS						D
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			43.9%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041<PM>
01-31-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	
Traffic Volume (vph)	179	285	511	570	450	117
Future Volume (vph)	179	285	511	570	450	117
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.950				0.962	
Satd. Flow (perm)	1630	1683	1699	1458	1604	0
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	195	310	555	620	489	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	310	555	620	616	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 84.8%				ICU Level of Service E		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
13: Biggar Rd & Street A

Future Total_2041<PM>
01-31-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↔	↔
Traffic Volume (veh/h)	179	285	511	570	450	117
Future Volume (Veh/h)	179	285	511	570	450	117
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)	195	310	555	620	489	127
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	1175				1255	555
vC1, stage 1 conf vol					1255	555
vC2, stage 2 conf vol					1255	555
vCu, unblocked vol	1175				1255	555
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	67				0	76
cM capacity (veh/h)	594				127	531
Direction_Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	195	310	555	620	616	
Volume Left	195	0	0	0	489	
Volume Right	0	0	0	620	127	
cSH	594	1700	1700	1700	151	
Volume to Capacity	0.33	0.18	0.33	0.36	4.08	
Queue Length 95th (m)	11.4	0.0	0.0	0.0	Err	
Control Delay (s)	14.0	0.0	0.0	0.0	Err	
Lane LOS	B		F			
Approach Delay (s)	5.4		0.0		Err	
Approach LOS			F			
Intersection Summary						
Average Delay	2683.8					
Intersection Capacity Utilization	84.8%		ICU Level of Service		E	
Analysis Period (min)	15					

Lanes, Volumes, Timings
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2041<PM>
01-31-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Future Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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
Fit							0.973	0.929				
Fit Protected							0.974	0.992		0.981		
Satd. Flow (prot)	0	1716	0	0	1626	0	0	1581	0	0	1683	0
Fit Permitted							0.974	0.992		0.981		
Satd. Flow (perm)	0	1716	0	0	1626	0	0	1581	0	0	1683	0
Link Speed (k/h)				40			50			50		
Link Distance (m)	277.4			1391.9			855.1			76.8		
Travel Time (s)	25.0			125.3			61.6			5.5		
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
Adj. Flow (vph)	0	29	0	122	58	46	32	64	107	26	40	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	29	0	0	226	0	0	203	0	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6			3.6			0.0			0.0		
Link Offset(m)	0.0			0.0			0.0			0.0		
Crosswalk Width(m)	4.8			4.8			4.8			4.8		
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15		25		15		25		15	
Sign Control	Stop				Stop		Stop				Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	38.3%			ICU Level of Service A								
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
14: Street A & Street Q (Grassy Brook Rd)

Future Total_2041<PM>
01-31-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	0
Future Volume (vph)	0	27	0	112	53	42	29	59	98	24	37	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	29	0	122	58	46	32	64	107	26	40	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	29	226	203	66								
Volume Left (vph)	0	122	32	26								
Volume Right (vph)	0	46	107	0								
Hadj (s)	0.03	0.02	-0.25	0.11								
Departure Headway (s)	4.9	4.6	4.4	4.9								
Degree Utilization, x	0.04	0.29	0.25	0.09								
Capacity (veh/h)	679	741	782	685								
Control Delay (s)	8.0	9.4	8.8	8.4								
Approach Delay (s)	8.0	9.4	8.8	8.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	9.0											
Level of Service	A											
Intersection Capacity Utilization	38.3%			ICU Level of Service	A							
Analysis Period (min)	15											

Lanes, Volumes, Timings
15: Street A & Street HH

Future Total_2041<PM>
01-31-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Volume (vph)	132	28	331	84	7	220
Future Volume (vph)	132	28	331	84	7	220
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.977	0.973				
Flt Protected	0.960			0.998		
Satd. Flow (prot)	1609	0	1669	0	0	1712
Flt Permitted	0.960			0.998		
Satd. Flow (perm)	1609	0	1669	0	0	1712
Link Speed (k/h)	50	50		50		
Link Distance (m)	1017.7	238.9		855.1		
Travel Time (s)	73.3	17.2		61.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	30	360	91	8	239
Shared Lane Traffic (%)						
Lane Group Flow (vph)	173	0	451	0	0	247
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
Link Offset(m)	0.0	0.0		0.0		
Crosswalk Width(m)	4.8	4.8		4.8		
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	15	25		
Sign Control	Stop	Free		Free		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	40.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
15: Street A & Street HH

Future Total_2041<PM>
01-31-2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	132	28	331	84	7	220
Future Volume (Veh/h)	132	28	331	84	7	220
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)	143	30	360	91	8	239
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	660	406			451	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	406			451	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	95			99	
cM capacity (veh/h)	425	645			1109	
Direction_Lane #	WB 1	NB 1	SB 1			
Volume Total	173	451	247			
Volume Left	143	0	8			
Volume Right	30	91	0			
cSH	451	1700	1109			
Volume to Capacity	0.38	0.27	0.01			
Queue Length 95th (m)	14.2	0.0	0.2			
Control Delay (s)	17.8	0.0	0.3			
Lane LOS	C		A			
Approach Delay (s)	17.8	0.0	0.3			
Approach LOS	C					
Intersection Summary						
Average Delay		3.6				
Intersection Capacity Utilization		40.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2041<PM>
01-31-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	47	30	34	688	1042	79
Future Volume (vph)	47	30	34	688	1042	79
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.989	
Fit Protected	0.971			0.998		
Satd. Flow (prot)	1578	0	0	3223	3224	0
Fit Permitted	0.971			0.998		
Satd. Flow (perm)	1578	0	0	3223	3224	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	51	33	37	748	1133	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	785	1219	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	59.4%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2041<PM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑ ↓↓					
Traffic Volume (veh/h)	47	30	34	688	1042	79
Future Volume (Veh/h)	47	30	34	688	1042	79
Sign Control	Stop			Free		
Grade	0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	33	37	748	1133	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	1624	610	1219			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1624	610	1219			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	42	92	93			
cM capacity (veh/h)	87	438	568			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	84	286	499	755	464	
Volume Left	51	37	0	0	0	
Volume Right	33	0	0	0	86	
cSH	127	568	1700	1700	1700	
Volume to Capacity	0.66	0.07	0.29	0.44	0.27	
Queue Length 95th (m)	28.2	1.7	0.0	0.0	0.0	
Control Delay (s)	76.2	2.3	0.0	0.0	0.0	
Lane LOS	F	A				
Approach Delay (s)	76.2	0.8		0.0		
Approach LOS	F					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			59.4%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↘	↙
Traffic Volume (vph)	58	51	51	803	1290	60
Future Volume (vph)	58	51	51	803	1290	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0	15.0			80.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.993	
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1614	1261	1614	3260	3196	0
Fit Permitted	0.950		0.108			
Satd. Flow (perm)	1614	1261	183	3260	3196	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		30			10	
Link Speed (k/h)	50			50	60	
Link Distance (m)	512.1			425.4	384.0	
Travel Time (s)	36.9			30.6	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	18%	3%	2%	3%	10%
Adj. Flow (vph)	63	55	55	873	1402	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	55	55	873	1467	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	
Total Split (s)	27.5	27.5	42.5	42.5	42.5	
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	

Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

4: Montrose Rd & Chippawa Creek Rd

01-31-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.12	0.13	0.57	0.51	0.87	
Control Delay	18.0	11.0	44.1	17.0	21.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.0	11.0	44.1	17.0	21.4	
LOS	B	B	D	B	C	
Approach Delay	14.8			18.6	21.4	
Approach LOS	B			B	C	
Queue Length 50th (m)	6.1	2.4	6.0	49.6	85.0	
Queue Length 95th (m)	14.4	9.9	m12.0	69.3	#123.7	
Internal Link Dist (m)	488.1			401.4	360.0	
Turn Bay Length (m)	35.0		15.0			
Base Capacity (vph)	507	416	96	1723	1694	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.12	0.13	0.57	0.51	0.87	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 65

Control Type: Pretimed

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 20.1 Intersection LOS: C

Intersection Capacity Utilization 61.8% ICU Level of Service B

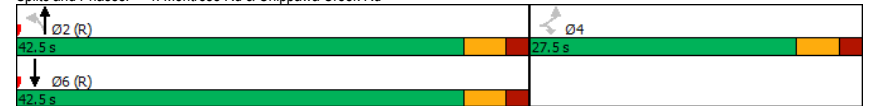
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Montrose Rd & Chippawa Creek Rd



Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	224	146	89	646	977	495
Future Volume (vph)	224	146	89	646	977	495
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	125.0	0.0	15.0			40.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1662	1190	1662	3137	3197	1488
Fit Permitted	0.950		0.201			
Satd. Flow (perm)	1662	1190	352	3137	3197	1488
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		75				538
Link Speed (k/h)	40			70	70	
Link Distance (m)	1391.9			256.2	493.4	
Travel Time (s)	125.3			13.2	25.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	25%	0%	6%	4%	0%
Adj. Flow (vph)	243	159	97	702	1062	538
Shared Lane Traffic (%)						
Lane Group Flow (vph)	243	159	97	702	1062	538
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Minimum Split (s)	27.5	27.5	24.5	24.5	24.5	24.5
Total Split (s)	27.5	27.5	42.5	42.5	42.5	42.5
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	22.0	22.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31	0.53	0.53	0.53	0.53

Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

6: Montrose Rd & Street Q (Grassy Brook Rd)

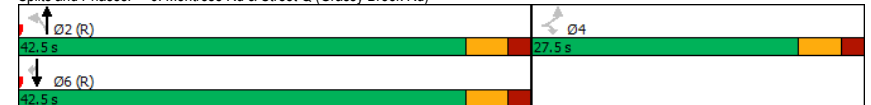
01-31-2023

	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.47	0.37	0.52	0.42	0.63	0.52
Control Delay	22.9	13.3	30.7	14.7	16.9	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	13.3	30.7	14.7	16.9	6.3
LOS	C	B	C	B	B	A
Approach Delay	19.1			16.7	13.3	
Approach LOS	B			B	B	
Queue Length 50th (m)	26.6	8.4	8.7	31.2	55.5	13.6
Queue Length 95th (m)	46.6	23.3	#26.9	48.5	75.8	m32.6
Internal Link Dist (m)	1367.9			232.2	469.4	
Turn Bay Length (m)	125.0		15.0			40.0
Base Capacity (vph)	522	425	186	1658	1689	1040
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.37	0.52	0.42	0.63	0.52

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Pretimed
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 15.1 Intersection LOS: B
 Intersection Capacity Utilization 64.9% ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Montrose Rd & Street Q (Grassy Brook Rd)



Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖			↘	↘	↖	↖		↖	↖	↖
Traffic Volume (vph)	116	0	117	3	0	3	104	579	3	3	834	249
Future Volume (vph)	116	0	117	3	0	3	104	579	3	3	834	249
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	15.0		0.0	0.0		0.0	15.0		0.0	15.0		30.0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (m)	15.0			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850					0.932			0.999		0.850
Fit Protected	0.950				0.976		0.950			0.950		
Satd. Flow (prot)	1630	1458	0	0	1592	0	1630	3225	0	1662	3260	1458
Fit Permitted	0.754				0.914		0.260			0.390		
Satd. Flow (perm)	1294	1458	0	0	1491	0	446	3225	0	682	3260	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		113			39			1				271
Link Speed (k/h)		50			50			80				70
Link Distance (m)		118.9			332.1			226.1				371.6
Travel Time (s)		8.6			23.9			10.2				19.1
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
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	3%	0%	0%	2%	2%
Adj. Flow (vph)	126	0	127	3	0	3	113	629	3	3	907	271
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	127	0	0	6	0	113	632	0	3	907	271
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	27.5	27.5		27.5	27.5		24.5	24.5		24.5	24.5	24.5
Total Split (s)	27.5	27.5		27.5	27.5		42.5	42.5		42.5	42.5	42.5
Total Split (%)	39.3%	39.3%		39.3%	39.3%		60.7%	60.7%		60.7%	60.7%	60.7%
Maximum Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		12.0	12.0		12.0	12.0	12.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	22.0	22.0		22.0	22.0		37.0	37.0		37.0	37.0	37.0
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.53	0.53		0.53	0.53	0.53

Lanes, Volumes, Timings

Future Total_2041 Improved <PM>

7: Montrose Rd & Street HH/Reixinger Road

01-31-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.31	0.24			0.01		0.48	0.37		0.01	0.53	0.30
Control Delay	20.5	5.8			0.0		19.1	10.4		15.0	20.1	7.7
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	20.5	5.8			0.0		19.1	10.4		15.0	20.1	7.7
LOS	C	A			A		B	B		B	C	A
Approach Delay		13.1						11.8				17.2
Approach LOS		B						B				B
Queue Length 50th (m)	12.7	1.1			0.0		9.1	24.8		0.3	57.6	7.2
Queue Length 95th (m)	m21.2	m8.2			0.0		24.7	35.6		m0.6	76.2	28.8
Internal Link Dist (m)		94.9			308.1			202.1			347.6	
Turn Bay Length (m)	15.0						15.0			15.0		30.0
Base Capacity (vph)	406	535			495		235	1705		360	1723	898
Starvation Cap Reductn	0	0			0		0	0		0	0	0
Spillback Cap Reductn	0	0			0		0	0		0	0	0
Storage Cap Reductn	0	0			0		0	0		0	0	0
Reduced v/c Ratio	0.31	0.24			0.01		0.48	0.37		0.01	0.53	0.30

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.53

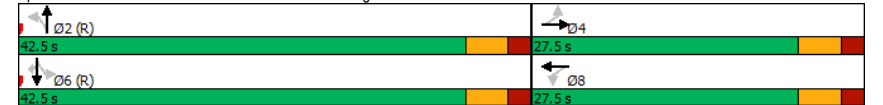
Intersection Signal Delay: 14.8 Intersection LOS: B

Intersection Capacity Utilization 59.4% ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Montrose Rd & Street HH/Reixinger Road



Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041 Improved <PM>
01-31-2023

	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	179	285	511	570	450	117
Future Volume (vph)	179	285	511	570	450	117
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0			60.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.972	
Fit Protected	0.950				0.962	
Satd. Flow (prot)	1630	1683	1699	1458	1604	0
Fit Permitted	0.275				0.962	
Satd. Flow (perm)	472	1683	1699	1458	1604	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				620	23	
Link Speed (k/h)		80	80		50	
Link Distance (m)		208.5	131.1		190.1	
Travel Time (s)		9.4	5.9		13.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	2%
Adj. Flow (vph)	195	310	555	620	489	127
Shared Lane Traffic (%)						
Lane Group Flow (vph)	195	310	555	620	616	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.0	10.0	10.0	2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6	2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		CI+Ex	CI+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	

Lanes, Volumes, Timings
13: Biggar Rd & Street A

Future Total_2041 Improved <PM>
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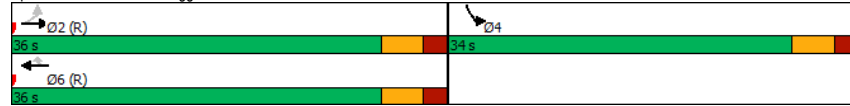
	↖	→	←	↗	↘	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Permitted Phases	2			6		
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.5	24.5	24.5	24.5	24.5	
Total Split (s)	36.0	36.0	36.0	36.0	34.0	
Total Split (%)	51.4%	51.4%	51.4%	51.4%	48.6%	
Maximum Green (s)	30.5	30.5	30.5	30.5	28.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	30.5	30.5	30.5	30.5	28.5	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.41	
v/c Ratio	0.95	0.42	0.75	0.63	0.92	
Control Delay	76.5	15.9	32.5	14.0	42.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	76.5	15.9	32.5	14.0	42.2	
LOS	E	B	C	B	D	
Approach Delay		39.3	22.7		42.2	
Approach LOS		D	C		D	
Queue Length 50th (m)	24.8	28.4	64.2	36.8	75.6	
Queue Length 95th (m)	#64.9	48.0	#96.3	63.0	#141.5	
Internal Link Dist (m)		184.5	107.1		166.1	
Turn Bay Length (m)	30.0			60.0		
Base Capacity (vph)	205	733	740	985	666	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.42	0.75	0.63	0.92	
Intersection Summary						
Area Type:	Other					
Cycle Length:	70					
Actuated Cycle Length:	70					
Offset:	1 (1%), Referenced to phase 2:EBTL and 6:WBT, Start of Green					
Natural Cycle:	75					
Control Type:	Actuated-Coordinated					
Maximum v/c Ratio:	0.95					
Intersection Signal Delay:	31.6		Intersection LOS: C			
Intersection Capacity Utilization	88.5%		ICU Level of Service E			
Analysis Period (min)	15					

Lanes, Volumes, Timings
13: Biggar Rd & Street A

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

Splits and Phases: 13: Biggar Rd & Street A



Lanes, Volumes, Timings

Future Total_2041 Improved <PM>
01-31-2023

16: Montrose Rd & Mixed-used block 93 Driveway



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Traffic Volume (vph)	47	30	34	688	1042	79
Future Volume (vph)	47	30	34	688	1042	79
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		15.0			
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.947				0.989	
Flt Protected	0.971			0.998		
Satd. Flow (prot)	1578	0	0	3223	3224	0
Flt Permitted	0.971			0.998		
Satd. Flow (perm)	1578	0	0	3223	3224	0
Link Speed (k/h)	50			70	70	
Link Distance (m)	105.1			371.6	256.2	
Travel Time (s)	7.6			19.1	13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%
Adj. Flow (vph)	51	33	37	748	1133	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	785	1219	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	59.4%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 16: Montrose Rd & Mixed-used block 93 Driveway

Future Total_2041 Improved <PM>
 01-31-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (veh/h)	47	30	34	688	1042	79
Future Volume (Veh/h)	47	30	34	688	1042	79
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)	51	33	37	748	1133	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)				372	256	
pX, platoon unblocked	0.81	0.78	0.78			
vC, conflicting volume	1624	610	1219			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	948	0	705			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	96	95			
cM capacity (veh/h)	198	841	690			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	84	286	499	755	464	
Volume Left	51	37	0	0	0	
Volume Right	33	0	0	0	86	
cSH	283	690	1700	1700	1700	
Volume to Capacity	0.30	0.05	0.29	0.44	0.27	
Queue Length 95th (m)	9.7	1.4	0.0	0.0	0.0	
Control Delay (s)	23.0	1.9	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	23.0	0.7		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			59.4%	ICU Level of Service	B	
Analysis Period (min)			15			