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South Fergus MESP & Secondary Plan

TRANSPORTATION PLAN

South Fergus Landowners Group

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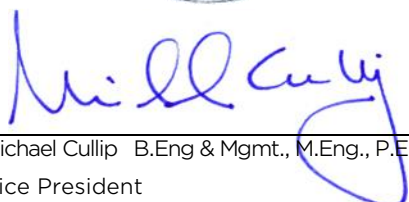
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1 Introduction

Tatham Engineering Limited has been retained by the South Fergus Landowners Group to provide engineering support in the development of a Master Environmental Servicing Study (MESP) and Secondary Plan outlining the objectives, constraints, design criteria, development concept and implementation plan for a proposed mixed-use development in the South Fergus Secondary Plan area within the Township of Centre Wellington.

1.1 SECONDARY PLAN AREA

The South Fergus Secondary Plan Area (Study Area) consists of approximately 147.5 ha of undeveloped land in the south end of Fergus, Township of Centre Wellington, County of Wellington. It is generally bound by Second Line to the south, Guelph Street to the west, McQueen Boulevard to the north and Scotland Street to the east, as evident in Figure 1 and illustrated on the Preferred Land Use Plan in Appendix A.

The Study Area consists of properties both east and west of Tower Street South (Highway 6) as follows:

- 925 and 935 Scotland Street;
- 200 McQueen Boulevard;
- 7856 and 7872 2nd Line;
- 963 and 1000 Tower Street South; and
- 936 Guelph Street.

1.2 STUDY PURPOSE

The purpose of the Transportation Plan is to assess the existing road network, the traffic volumes to result from the Secondary Plan development and the impacts of such on the future road network. Key elements of the Transportation Plan are as follows:

1. Identify and inventory the surrounding external road system and their respective intersections. The inventory addresses jurisdiction, number of lanes, cross-sections, speed limits, intersection configurations, etc.
2. Compile traffic data from the appropriate road jurisdictions for the subject road sections and intersections.
3. Conduct additional traffic counts to address data gaps and ensure traffic data represents current conditions.

4. Complete an assessment of the existing road system traffic operations and establish any system needs based on existing conditions.
5. Establish traffic projections for the future horizon years (to correspond to full build-out and 10 years beyond build-out). In addition to historic growth, consideration has been given to other development in the immediate and surrounding areas that could have a bearing on future traffic volumes.
6. Identify the future road system, considering any planned road improvements or developments that would otherwise occur independent of the Secondary Plan.
7. Complete an assessment of the future road system traffic operations (prior to consideration for the Secondary Plan development) and establish any system needs based on future background conditions. This includes road widenings, provision of turn lanes, traffic signals and/or roundabout control, etc.
8. Establish and review potential road system connection points to the existing system and related receiving system capacities, including consideration for any growth-related upgrades planned or underway.

This report builds on the *South Fergus MESP & Secondary Plan: Transportation Plan – Existing Conditions* report¹, addressing the needs of the road network to accommodate the future conditions associated with the development of the Secondary Plan area.

¹ *South Fergus MESP & Secondary Plan: Transportation Plan – Existing Conditions*. Tatham Engineering. July 26, 2021.

2 Existing Conditions

This chapter will discuss the existing conditions within the project area, namely the current road network, transit services, traffic volumes, and traffic operations.

2.1 ROAD NETWORK

The existing road network to be addressed by this study consists of the following:

- Tower Street South (Highway 6);
- McQueen Boulevard;
- Guelph Street;
- Scotland Street;
- 2nd Line; and
- respective intersections of the above.

Mapping and photographs of the road network are provided in Figure 2 through Figure 4, with further details provided below.

2.1.1 Key Road Sections

Tower Street South (Highway 6)

Key elements/characteristics of Tower Street South (Highway 6), which bisects the Secondary Plan area, are as follows:

- Class 2B Arterial under the jurisdiction of MTO (MTO jurisdiction extends approximately 200 metres north of McQueen Boulevard, following which the road reverts to the Township through the built area of Fergus);
- designated an arterial road under the *Township of Centre Wellington Transportation Master Plan*²;
- oriented north-south through the project area;
- from 2nd Line to the south limits of the Skyline Retail Plaza (approximately 400 metres south of McQueen Boulevard), it has 1 travel lane per direction within a rural cross-section;

² *Township of Centre Wellington Transportation Master Plan*. WSP. January 2019.

- from the south limits of the Skyline Retail Plaza to McQueen Boulevard, it has 2 northbound lanes, 1 southbound lane and select left turn lanes with an urban cross-section along the east side and rural cross-section on the west side;
- sidewalk on the east side of the road through the urban area (i.e. from the south limits of the Skyline Retail Plaza to McQueen Boulevard);
- posted speed limit of 80 km/h, decreasing to 60 km/h approximately 710 metres south of McQueen Boulevard upon entry into the built area with a further reduction to 50 km/h approximately 210 metres south of McQueen Boulevard;
- relatively straight and flat alignment albeit there is a slight horizontal curve in the area of the signalized commercial access to the Skyline Retail Plaza; and
- planning capacity of 1000 vehicles per hour per lane (vphpl) as per the *Transportation Master Plan* reflective of its highway designation.

McQueen Boulevard

McQueen Boulevard is detailed as follows:

- under the jurisdiction of the Township of Centre Wellington;
- designated a collector road under the *Transportation Master Plan*;
- oriented east-west through the project area;
- urban cross-section;
- from Tower Street South (Highway 6) to its westerly terminus (cul-de-sac approximately 275 metres to the west), it has a 14 metre paved road width which accommodates 2 lanes of travel per direction, albeit the road is currently configured (via pavement markings) to provide only 1 lane of travel per direction;
- from Tower Street South (Highway 6) to Millburn Boulevard (230 metres), it has a similar 14 metre width configured to provide 1 travel lane per direction;
- from McTavish Street to Scotland Street (320 metres), it has a 10.5 metre paved surface providing 1 lane of travel per direction;
- sidewalks are provided on both sides of the road through all of the noted sections;
- a westerly extension to Guelph Street and an extension from Millburn Boulevard to McTavish Street are planned in conjunction with the development of the South Fergus Secondary Plan area,

- unposted speed limit of 50 km/h, reflective of the urban area (i.e. 50 km/h unless otherwise posted);
- relatively flat alignment albeit there are horizontal curves both west and east of Tower Street South; and
- assumed planning capacity of 700 vehicles per hour per lane (vphpl) reflective of its urban collector road designation, as per the *Transportation Master Plan*.

Guelph Street

Guelph Street, which serves as the west development boundary, is characterized as follows:

- local road under the jurisdiction of the Township of Centre Wellington;
- oriented north-south through the project area;
- rural cross-section with a 6.0 to 7.0 metre paved surface and minimal gravel shoulders, providing 1 travel lane per direction;
- paved surface is in relatively poor condition with significant alligator and longitudinal cracking throughout;
- posted speed limit of 50 km/h;
- relatively straight horizontal alignment with a number of relatively minor vertical curves; and
- planning capacity of 500 vehicles per hour per lane (vphpl) as per the *Transportation Master Plan* reflective of its rural local road designation.

Scotland Street

Scotland Street, which serves as the east development boundary, is characterized as follows:

- local road under the jurisdiction of the Township of Centre Wellington;
- oriented north-south through the project area;
- from 2nd Line to the south limit of the Centre Wellington District High School, the road has a rural cross-section with an 8.5 to 9.0 metre paved surface and minimal gravel shoulders, providing 1 travel lane per direction;
- from the high school to the north, the road has an urban cross-section with a 10.25 metre paved surface providing 1 lane per direction and a sidewalk on the west side;
- the paved surface through the rural section is in relatively poor condition with alligator and longitudinal cracking, and rutting throughout;

- posted speed limit of 80 km/h which transitions to 50 km/h just south of the Centre Wellington District High School reflective of the residential nature of the surroundings;
- relatively straight horizontal alignment and consistent vertical alignment; and
- planning capacity of 500 vehicles per hour per lane (vphpl) as per the *Transportation Master Plan* reflective of its rural/urban local road designation.

2nd Line

2nd Line is the south boundary of the Secondary Plan area, details of which are as follows:

- local road under the jurisdiction of the Township of Centre Wellington;
- oriented east-west through the project area;
- to the west of Tower Street South (Highway 6), the road has a rural cross-section with a 9.0 metre platform which accommodates a 7.0 metre paved surface (1 lane per direction) with gravel shoulders;
- to the east of Tower Street South (Highway 6), the road has a rural cross-section with an approximate 10 metre platform width accommodating an 8 metre surface treated road (1 lane per direction) with gravel shoulders;
- there is a 5 tonne per axle posted load limit in effect from March 1 to April 30;
- posted speed limit of 80 km/h;
- relatively straight horizontal alignment and with some minor vertical curves; and
- planning capacity of 500 vehicles per hour per lane (vphpl) as per the *Transportation Master Plan* reflective of its rural local road designation.

2.1.2 Key Intersections

The following key intersections will be considered in the transportation study:

- Tower Street South (Highway 6) with McQueen Boulevard – signalized;
- Tower Street South (Highway 6) with Skyline Retail Plaza access – signalized;
- Tower Street South (Highway 6) with 2nd Line – stop controlled on 2nd Line;
- Guelph Street with 2nd Line – stop controlled on Guelph Street;
- Scotland Street with McQueen Boulevard – stop controlled on McQueen Boulevard; and
- Scotland Street with 2nd Line – stop controlled on 2nd Line.

The configurations of the above noted intersections are illustrated in Figure 5. As evident, all of the intersections have single lane, shared approaches except the Tower Street South intersections which are summarized below.

Tower Street South (Highway 6) with McQueen Boulevard

- NB: left turn lane + through lane + through-right lane
- SB: left turn lane + through lane + through-right lane
- WB: left turn lane + through lane + right turn lane
- EB: left turn lane + through-right lane

Tower Street South (Highway 6) with Skyline Access

- NB: through lane + through-right lane
- SB: left turn lane + through lane
- WB: left turn lane + right turn lane

Tower Street South (Highway 6) with 2nd Line

- NB: left turn lane + through-right lane
- SB: left turn lane + through-right lane
- WB: left-through-right lane
- EB: left-through-right lane

2.2 ACTIVE TRANSPORTATION NETWORK

As noted in the previous section, the following sidewalks are currently provided:

- east side of Tower Street South (Highway 6) from the south limit of the Skyline Retail Plaza to McQueen Street (and extending further north beyond the project area);
- both sides of all sections of McQueen Boulevard; and
- west side of Scotland Street across the frontage of the Centre Wellington District High School (and extending further north beyond McQueen Boulevard).

An inventory of existing trails within the project area and immediate surroundings is provided in Figure 6.

2.3 TRANSIT NETWORK

The Township of Centre Wellington does not currently provide a public transit service, however, the *Transportation Master Plan* states that the Township intends to explore public transportation options for implementation in the future. These options include:

- subsidized rideshare/taxi programs;
- fixed/flexible bus routes operated by the Township; and
- service expansions from existing local/regional transit services:
 - Grand River Transit (operating in Kitchener and Waterloo);
 - Guelph Transit (operating in Guelph); and
 - GO Transit (operating in the Greater Golden Horseshoe).

While the Township has indicated its intention to explore public transportation options, the implementation of service is not anticipated for the foreseeable future. As such, the assessment contained herein has not given consideration to the provision of public transit within the Fergus area. This is not to preclude the implementation of public transit within the Secondary Plan Area, only to note that reductions associated with public transit service have not been applied to future traffic projections.

2.4 TRAFFIC VOLUMES

2.4.1 Traffic Counts

To establish existing conditions on the road network, traffic counts were conducted on October 28, 2021, from 7:00 to 9:00 and 16:00 to 18:00 at the following project area intersections:

- Tower Street South (Highway 6) with McQueen Boulevard;
- Tower Street South (Highway 6) with Skyline Retail Plaza access;
- Tower Street South (Highway 6) with 2nd Line;
- Guelph Street with 2nd Line;
- Scotland Street/Jones Baseline with 2nd Line; and
- Scotland Street with McQueen Boulevard.

Detailed traffic count sheets are provided in Appendix B.

2.4.2 Factors & Adjustments

It is recognized that the traffic counts were conducted during the COVID-19 pandemic; however, public health and travel restrictions were greatly reduced at the time as compared to the start of the pandemic (i.e. capacity limits on restaurants and commercial/retail establishments had been lifted). As such, it has been assumed that the counts reflect typical peak conditions.

2.4.3 Adjusted Traffic Volumes

The 2021 volumes were increased by a background growth rate of 1% to reflect 2022 volumes (see Section 3.2.1 for discussion on background growth) and are illustrated in Figure 7.

2.5 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations can be assessed. The operational assessment of existing conditions has considered the following:

- operations at the key intersections;
- vehicle queue operations; and
- midblock capacity.

2.5.1 Intersection Operations

The capacity, and hence operations, of a road system is effectively dictated by its intersections, recognizing that intersections reflect pinch points in the road network. The analysis is based on the 2022 traffic volumes, the existing intersection configuration and control, and procedures outlined in the *2000 Highway Capacity Manual*³ (using Synchro v.11 software). For signalized intersections, the analysis considers the following for each signalized movement:

- average delay (in seconds);
- level of service (LOS); and
- and volume to capacity (v/c).

For unsignalized intersections, the analysis considers the same metrics but focuses on critical movements only, namely stop controlled movements on the minor road and the left turn movements from the major road to the minor road.

³ *Highway Capacity Manual*. Transportation Research Board. Washington DC, 2000.

With respect to the noted metrics:

- level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (additional details regarding Level of Service definitions are provided in Appendix C); and
- a v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

A summary of operations for the intersections is provided in Table 1. Detailed worksheets are provided in Appendix D.

Table 1: Intersection Operations – 2022 Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	12s	B	0.03	0s	A	0.00
	NB L	free	0	A	0.00	0	A	0.00
Tower Street & McQueen Boulevard	EB L	signal	19	B	0.06	21	C	0.19
	EB T	signal	19	B	0.05	19	B	0.15
	EB R	signal	19	B	0.04	19	B	0.01
	WB L	signal	22	B	0.42	22	C	0.42
	WB TR	signal	19	B	0.08	19	B	0.08
	NB L	signal	7	B	0.02	8	A	0.12
	NB TR	signal	8	B	0.26	9	A	0.51
	SB L	signal	3	A	0.07	6	A	0.32
	SB TR	signal	3	A	0.25	3	A	0.23
	overall	signal	8	A	0.30	9	A	0.47
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.06	9	A	0.04
	NB L	free	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access	WB LR	signal	24	C	0.33	19	B	0.33
	NB TR	signal	5	A	0.21	9	A	0.50
	SB L	signal	2	A	0.11	4	A	0.27
	SB T	signal	4	A	0.45	5	A	0.41
	overall	signal	5	A	0.48	9	A	0.47

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Tower Street S/Highway 6 & 2 nd Line	EB LTR	stop	28	D	0.29	83	F	0.62
	WB LTR	stop	22	C	0.09	38	E	0.27
	NB L	free	9	A	0.02	9	A	0.02
	SB L	free	9	A	0.00	9	A	0.00
Guelph Street & 2 nd Line	EB L	free	2	A	0.01	4	A	0.04
	WB L	free	1	A	0.00	0	A	0.00
	NB LTR	stop	9	A	0.01	11	B	0.01
	SB LTR	stop	9	A	0.03	9	A	0.04

As indicated, the project area intersections are currently providing good overall operations (LOS C or better) with average delays. The exception being the intersection of Tower Street South with 2nd Line, which is experiencing poor operations (LOS F on the eastbound approach) during the PM peak hour. The poor operating conditions are a result of the significant volumes on Tower Street South. Despite the poor operating conditions, the volumes do not warrant the implementation of traffic signals recognizing that the volumes on 2nd Line are relatively low (in the order of 70 vehicles or less on eastbound approach and 40 vehicles on the westbound approach).

2.5.2 Queue Operations

The presence of traffic queues at the subject intersections was considered where exclusive turn lanes exist to ensure they are appropriately sized. The queueing analysis was conducted using *SimTraffic*, the traffic simulation module that accompanies the Synchro traffic modelling software. As per industry guidelines, the queueing assessment considers the average results of 5 simulation runs, with each simulation consisting of a 15-minute seed time and 60-minute run time. The resulting 50th and 95th percentile queues and the existing storage lengths are summarized in Table 2, with detailed worksheets provided in Appendix D. The 50th percentile queues reflect the average queue lengths and thus will be exceeded 50% of the time, whereas the 95th percentile queues will only be exceeded 5% of the time. The existing storage lengths have been determined from the existing lane configurations and measurements (which reflect the storage + parallel lane lengths), with consideration for applicable standards with respect to parallel lane lengths. Queues which exceed the available storage are bolded in the summary table.

Table 2: Queue Operations – 2022 Conditions

INTERSECTION & MOVEMENTS		STORAGE LENGTH (M)	WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
			50 th	95 th	50 th	95 th
Tower Street & McQueen Boulevard	EB L	75m	3m	9m	7m	15m
	EB R	75	9	15	5	12
	WB L	30	12	20	12	21
	NB L	30	2	7	8	17
	SB L	50	6	14	14	24
Tower Street S & Skyline Plaza Access	WB L	30	16	28	11	21
	WB R	30	5	11	8	16
	SB L	130	8	16	12	21
Tower Street S/Highway 6 & 2 nd Line	NB L	100	3	8	1	2
	SB L	100	1	4	1	2

As noted, all of the existing dedicated turn lanes are of sufficient length to accommodate the 50th and 95th percentile queues under the existing conditions.

2.5.3 Mid-Block Operations

Mid-block operations assess the peak hour directional volumes on the subject road sections in consideration of the assumed lane capacity of the road. The capacity thresholds contained herein reflect those provided in the Township's *TMP*. A summary of the volume to capacity ratios (i.e. the degree to which the available capacity is utilized) is provided in Table 3 for the existing conditions. A volume-to-capacity (v/c) ratio below 1.0 indicates there is available capacity on the road network, whereas a v/c ratio at or above 1.0 indicates that road capacity has been reached or surpassed. As the v/c approaches 1.0, congestion is more likely to occur. Any road segments operating near or over capacity ($v/c \geq 0.95$) have been bolded in the summary tables.

As indicated, the project area road network is operating at 88% capacity or less ($v/c \leq 0.88$). It is noted that the greatest v/c is experienced on Tower Street South, south of the Skyline Retail Plaza access where the road reduces to a two-lane cross-section (1 travel lane per direction). The remaining roads are operating at 62% of capacity or less ($v/c \leq 0.62$).

Table 3: Mid-Block Operations – 2022 Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL) ¹	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	500	0.00	0.05	0.00	0.06
	N of 2 nd Line	500	0.04	0.06	0.16	0.06
	S of 2 nd Line	500	0.01	0.02	0.01	0.02
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.22	0.33	0.43	0.36
	S of McQueen Blvd	1000	0.22	0.73	0.45	0.63
	S of Skyline Retail	1000	0.46	0.68	0.88	0.59
	S of 2 nd Line	1000	0.45	0.66	0.86	0.56
McQueen Blvd	W of Guelph St	700	0.00	0.00	0.00	0.00
	W of Tower St S	700	0.12	0.03	0.12	0.10
	E of Tower St S	700	0.13	0.15	0.42	0.24
Scotland St	N of McQueen Blvd	500	0.39	0.62	0.37	0.17
	S of McQueen Blvd	500	0.36	0.62	0.37	0.17
	S of 2 nd Line	500	0.16	0.14	0.31	0.13
2 nd Line	W of Guelph St	500	0.15	0.19	0.25	0.18
	W of Highway 6	500	0.14	0.15	0.14	0.18
	E of Highway 6	500	0.06	0.04	0.06	0.08

¹ Capacity is denoted as vehicles per hour per lane

2.5.4 Operational Summary

Based on the results of the above analyses, the existing weekday AM and PM peak hour volumes are readily accommodated by the current configuration of the project area road network. Therefore, no improvements to the network are required to accommodate the existing conditions.

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2025, 2031, 2039, and 2049. The 2025 and 2031 horizons have been adopted to reflect the proposed phasing of developments within the project areas (as detailed in Section 4.3). The 2039 horizon has been adopted to reflect a full build-out of the subject lands, while the 2049 horizon will address longer-term impacts of the development (10 years beyond build-out).

3.1 ROAD NETWORK

The Township's *Development Charges Background Study*⁴ comprehensively lists all planned road/intersection works within the Township and assigns each a completion timeline. The upgrades are based on those identified in the Township TMP's preferred road network alternative (Alternative 3, see Figure 8). The planned upgrades which will affect the project area road network are detailed below. With exception of the upgrades planned for the intersection of Highway 6 and 2nd Line (which are planned for completion between 2032 and 2041), all noted road/intersection works are planned for completion between 2024 and 2031. For the purpose of this report, all upgrades are assumed will be in place by the 2031 horizon, with exception of the following two upgrades:

- eastern extension of McQueen Boulevard, assumed complete by the 2025 horizon to serve Study Area Phase 1 development; and
- signalization of the intersection of 2nd Line with Tower Street South/Highway 6, assumed complete by the 2025 horizon to address poor operations experienced under 2022 conditions.

3.1.1 Road Improvements

Guelph Street

Guelph Street is currently a local road with an unbuilt road allowance between Union Street West and Elora Street, thus it cannot be used as a through road between 2nd Line and Union Street West. The TMP states an intention to extend Guelph Street through this road allowance and upgrade it to a collector road between Union Street West and 2nd Line. The road will maintain a 2-lane cross-section after the upgrade.

⁴ *Township of Centre Wellington Development Charges Background Study*. Watson & Associates Economists Ltd. December 23, 2020.

Highway 6

The section of Highway 6 between the existing Fergus south limits and 2nd Line is to be adopted as a connecting link, with MTO transferring planning, maintenance and operations responsibilities to the Township.

Scotland Street

Scotland Street will be upgraded to a collector road through the project area. It will maintain a 2-lane cross-section.

McQueen Boulevard

McQueen Boulevard currently exists in two segments stretching from Aberdeen Street to Milburn Boulevard in the west and from McTavish Street to Scotland Street in the east. The Township plans to extend McQueen Boulevard both eastward and westward to provide a continuous collector road between Guelph Street and Scotland Street. Additionally, McQueen Boulevard will be extended approximately 200 metres further west beyond Guelph Street to connect to the planned southward extension of Beatty Line North.

2nd Line

2nd Line is planned to be upgraded to an arterial road between Guelph Street and Scotland Street. The road will maintain a 2-lane cross-section.

Beatty Line North

The most significant upgrade to the area road network is the planned southward extension of Beatty Line North to intersect with the McQueen Boulevard western extension. This will see construction of a new bridge across the Grand River, providing a new north-south connection in western Fergus – no connection across the Grand River currently exists in western Fergus. This new link is expected to draw a significant amount of traffic and will provide a much faster and more direct travel route between Highway 6 and the neighbouring communities of Elora and Salem. Traffic bound between the Study Area and Elora/Salem has been assumed to use this link exclusively.

EMME modelling within the TMP shows the new Beatty Line extension significantly reducing traffic through downtown Fergus, but only moderately affecting trips along Highway 6 through the project area. From the modelling data, it is estimated that the new extension will divert approximately 20% of southbound weekday AM peak trips from Highway 6 between McQueen Boulevard and 2nd Line. Similarly, approximately 20% of northbound weekday PM peak trips will

be diverted from the same stretch of Highway 6. These trips have been distributed evenly between 2nd Line and McQueen Boulevard.

3.1.2 Intersection Improvements

Tower Street South/Highway 6 & 2nd Line

The intersection of Tower Street South/Highway 6 and 2nd Line is planned to be reconstructed. This may include additional dedicated turning lanes and/or installation of traffic signals, or conversion to a roundabout configuration.

Further to the above Township consideration, the MTO is currently undertaking the Preliminary Design and Class Environmental Assessment (Class EA) for the intersection of Highway 6 and 2nd Line (recognizing that Highway 6 is under MTO jurisdiction). As per the Notice of Study Commencement, the project is being undertaken primarily to address safety concerns at the intersection and will include new traffic signals, provision of turning lanes and pavement resurfacing. Timing of construction is subject to funding and approvals and thus has yet to be confirmed.

For the purposes of this study, a signalized intersection configuration was assumed for the future background conditions, with consideration for roundabout control under the future total conditions given the opportunity for the roundabout to serve as a gateway feature to the project area (additional details regarding roundabout operations are provided in Section 5.2.4).

Guelph Street & McQueen Boulevard

In conjunction with the planned extensions of McQueen Boulevard, a new intersection will be constructed at Guelph Street. The Township's TMP does not state what the planned configuration of the intersection is (i.e. stop-controlled, signalized, etc.). Given the modest volumes forecast by the EMME macro modelling conducted within the TMP, the intersection has been assumed to operate as a two-way stop-controlled intersection, with McQueen Boulevard serving as the through road and Guelph Street operating under stop control.

3.2 TRAFFIC VOLUMES

Background traffic volumes for the 2025, 2031, 2039 and 2049 horizons have been determined based on the existing traffic volumes, projected growth, and growth from additional developments (other than the subject development).

3.2.1 Background Growth

According to census data, the population of Fergus increased from 20,928 persons in 2016 to 23,209 persons in 2021, translating to an annual growth rate of approximately 2% per annum. This

is somewhat lower than the projected growth rate of approximately 3.3% per annum forecast between 2016 and 2036 in the *County of Wellington Official Plan*⁵. Given that the projections provided in the County's Official Plan were established approximately 25 years ago, the growth rate reflected in the census data is considered reflective of current growth patterns. Moreover, major developments within Fergus are being considered independently of the general background growth (see Section 3.2.2). Therefore, a background growth rate of 1% has been applied to the existing volumes within the project area.

3.2.2 Background Development

Northwest Fergus Secondary Plan Area

The Northwest Fergus Secondary Plan Area (NWFSPA) is a 3-phase mixed-use development currently under construction. It consists of approximately 1,300 residential units constructed in varying densities (predominantly low and medium density), a 400-student elementary school, and 3,000 m² (32,300 ft²) of commercial space. The *Northwest Fergus Secondary Plan Traffic Impact Study (Phases 2 & 3)*⁶ is a comprehensive study that considered the traffic impacts associated with the development of the NWFSPA along with several other developments surrounding the secondary plan area. Based on the trip generation estimates provided in the *Northwest Fergus Secondary Plan Traffic Impact Study*, the NWFSPA and developments within the surrounding area are expected to generate approximately 2,050 trips during the weekday AM peak hour, and 2,500 trips during the weekday PM peak hour.

The phasing assumed for the NWFSPA and surrounding developments, as assumed in the *Northwest Fergus Secondary Plan Traffic Impact Study*, is summarized in Table 4.

In reviewing existing development levels, all those developments considered as built-out by the 2018 horizon, including Phase 1 of the NWFSPA, are considered to be built-out. The exception being the Keating Subdivision which is partially built-out. For the purpose of this study, the remaining developments identified for build-out by 2023 and 2028 have been considered as completed by the 2025 and 2031 horizons, respectively.

⁵ *County of Wellington Official Plan*. County of Wellington. September 24, 1998.

⁶ *Northwest Fergus Secondary Plan Traffic Impact Study (Phase 2 & 3)*. R.J. Burnside & Associates Ltd. 2018.

Table 4: Northwest Fergus Secondary Plan - Phasing

DEVELOPMENT	DESCRIPTION	BUILD-OUT		
		2018	2023	2028
Northwest Fergus Secondary Plan Area				
Phase 1	218 residential units 400 student elementary school	100%	100%	100%
Phase 2	535 residential units	0%	100%	100%
Phase 3	552 residential units 3,000 m² of commercial space	0%	0%	100%
Other Development Lands				
Groves Hospital	new hospital	100%	100%	100%
Medical Arts Offices	7,432 ft² medical office space	100%	100%	100%
Keating S/D	143 unit residential subdivision	100%	100%	100%
Bonaire S/D	223 unit residential subdivision	100%	100%	100%
Mod-Aire/Orsite S/D	15 unit residential infill	100%	100%	100%
Keating (Millage Lane)	6 unit residential infill	100%	100%	100%
Keating (Beatty Line)	12 unit residential infill	100%	100%	100%
County Institutional Campus	176 units of supportive housing, gov't offices and community college	0%	50%	100%
Richardson Farm	144 unit residential subdivision	0%	0%	100%

Based on the trip generation provided in the *Northwest Fergus Secondary Plan Traffic Impact Study* and the distribution assumptions, the remaining lands identified for development are expected to contribute approximately 300 AM trips and 380 PM trips through the project area during the weekday.

Other Developments

Upon review of the County's active development map, there are no other developments within the surrounding areas that would contribute any meaningful volumes to the road network.

3.2.3 Background Traffic Volumes

The resulting 2025, 2031, 2039, and 2049 background traffic volumes are illustrated in Figure 9 through Figure 12. The background volumes reflect the 2022 volumes, noted background growth rate, and additional volume generated by the Northwest Fergus Secondary Plan Area and the surrounding developments identified in the *Northwest Fergus Secondary Plan Traffic Impact Study*. To reflect the completion of the eastern extension of McQueen Boulevard (and subsequent use as an east-west link between Tower Street and Scotland Street), a small amount of traffic has been assigned to each movement at the intersection with Scotland Street.

3.3 TRAFFIC OPERATIONS

Analysis of the operations of the key intersections and assessment of mid-block capacity was reviewed at each horizon year. Vehicle queueing at key intersections was reviewed again under the 2039 and 2049 background conditions, as these are the most critical horizons.

3.3.1 Intersection Operations

Analysis of the operations of the key intersections present under 2025, 2031, 2039 and 2049 background conditions was conducted. Results of the analysis are summarized in Table 5 through Table 8 with detailed worksheets provided in Appendix E.

Signal phasing at each signalized intersection was optimized at each horizon as necessary to ensure optimal performance of each intersection. A protected left movement for northbound traffic at the intersection of Tower Street South and McQueen Boulevard was added at the 2049 horizon.

As indicated, all intersections operate well (LOS C or better) under future background conditions. The addition of traffic signals at the intersection of Tower Street South and 2nd Line has seen delays on 2nd Line decrease significantly (as much as 55 seconds) despite the increased traffic on both roads. It is recognized that some intersections along McQueen Boulevard (namely at Guelph Street and Scotland Street) will likely be much busier than the background analysis suggests due to the redistribution of traffic through the network following completion of the Beatty Line North and McQueen Boulevard extensions. Monitoring of these intersection may be necessary to ensure that adequate operations are maintained.

Table 5: Intersection Operations – 2025 Background Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	12s	B	0.05	9s	A	0.02
	NB L	free	1	A	0.01	1	A	0.01
Tower Street & McQueen Boulevard	EB L	signal	19	B	0.06	21	C	0.20
	EB T	signal	19	B	0.05	19	B	0.15
	EB R	signal	19	B	0.04	19	B	0.02
	WB L	signal	23	C	0.44	23	C	0.44
	WB TR	signal	19	B	0.08	19	B	0.08
	NB L	signal	7	B	0.03	8	A	0.14
	NB TR	signal	9	B	0.30	11	B	0.60
	SB L	signal	3	A	0.08	7	A	0.37
	SB TR	signal	4	A	0.30	4	A	0.27
	overall	signal	8	A	0.35	9	A	0.53
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.06	9	A	0.04
	NB L	free	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access	WB LR	signal	24	C	0.33	19	B	0.33
	NB TR	signal	5	A	0.24	11	B	0.58
	SB L	signal	2	A	0.11	5	A	0.30
	SB T	signal	5	A	0.53	6	A	0.48
	overall	signal	5	A	0.56	9	A	0.53
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	28	C	0.33	28	C	0.45
	WB LTR	signal	26	C	0.10	26	C	0.19
	NB L	signal	3	A	0.04	3	A	0.05
	NB TR	signal	5	A	0.38	9	A	0.75
	SB L	signal	3	A	0.01	3	A	0.00
	SB TR	signal	7	A	0.61	6	A	0.53
	overall	signal	8	A	0.57	9	A	0.71
Guelph Street & 2 nd Line	EB L	free	2	A	0.01	4	A	0.04
	WB L	free	1	A	0.00	0	A	0.00
	NB LTR	stop	10	A	0.01	11	B	0.01
	SB LTR	stop	9	A	0.03	9	A	0.04

Table 6: Intersection Operations – 2031 Background Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	12s	B	0.05	9s	A	0.03
	NB L	stop	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	18	B	0.05	21	B	0.21
	EB T	signal	18	B	0.04	19	B	0.16
	EB R	signal	19	B	0.17	19	B	0.02
	WB L	signal	19	B	0.32	23	C	0.46
	WB TR	signal	18	B	0.07	19	B	0.09
	NB L	signal	9	A	0.03	9	B	0.16
	NB TR	signal	11	B	0.39	11	B	0.60
	SB L	signal	4	A	0.09	7	A	0.40
	SB TR	signal	5	A	0.32	4	A	0.31
	overall	signal	9	A	0.37	9	A	0.55
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.07	10	A	0.04
	NB L	stop	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access	WB LR	signal	25	C	0.34	22	C	0.34
	NB TR	signal	6	A	0.29	12	B	0.58
	SB L	signal	3	A	0.12	6	A	0.32
	SB T	signal	5	A	0.55	8	A	0.59
	overall	signal	7	A	0.58	11	B	0.60
Guelph Street & McQueen Boulevard	NB LTR	stop	9	A	0.02	9	A	0.09
	SB LTR	stop	9	A	0.03	9	A	0.04
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	22	B	0.42	23	C	0.49
	WB LTR	signal	19	B	0.14	21	C	0.26
	NB L	signal	3	A	0.04	3	A	0.07
	NB TR	signal	4	A	0.45	9	A	0.74
	SB L	signal	2	A	0.01	2	A	0.00
	SB TR	signal	6	A	0.62	6	A	0.62
	overall	signal	6	A	0.60	8	A	0.72
Guelph Street & 2 nd Line	EB L	stop	2	A	0.01	4	A	0.04
	WB L	stop	1	A	0.00	0	A	0.00
	NB LTR	stop	11	B	0.01	12	B	0.01
	SB LTR	stop	9	A	0.03	9	A	0.04

Table 7: Intersection Operations – 2039 Background Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	13s	B	0.06	9s	A	0.03
	NB L	stop	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	18	B	0.05	19	B	0.19
	EB T	signal	18	B	0.04	19	B	0.13
	EB R	signal	19	B	0.33	19	B	0.02
	WB L	signal	19	B	0.33	21	C	0.41
	WB TR	signal	18	B	0.07	19	B	0.08
	NB L	signal	9	A	0.04	14	B	0.43
	NB TR	signal	12	B	0.42	12	B	0.57
	SB L	signal	5	A	0.11	8	A	0.43
	SB TR	signal	5	A	0.29	5	A	0.35
	overall	signal	11	B	0.39	9	A	0.52
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.07	11	B	0.05
	NB L	stop	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access	WB LR	signal	25	C	0.34	22	C	0.34
	NB TR	signal	7	A	0.31	11	B	0.57
	SB L	signal	3	A	0.13	5	A	0.32
	SB T	signal	5	A	0.54	8	A	0.63
	overall	signal	7	A	0.57	11	B	0.63
Guelph Street & McQueen Boulevard	NB LTR	stop	9	A	0.02	11	B	0.19
	SB LTR	stop	9	A	0.04	9	A	0.04
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	19	B	0.40	24	C	0.53
	WB LTR	signal	18	B	0.11	21	C	0.28
	NB L	signal	3	A	0.05	5	A	0.28
	NB TR	signal	5	A	0.51	8	A	0.73
	SB L	signal	3	A	0.01	2	A	0.00
	SB TR	signal	7	A	0.64	7	A	0.66
	overall	signal	8	A	0.61	8	A	0.71
Guelph Street & 2 nd Line	EB L	stop	2	A	0.01	4	A	0.05
	WB L	stop	1	A	0.00	0	A	0.00
	NB LTR	stop	11	B	0.01	13	B	0.01
	SB LTR	stop	11	B	0.11	11	B	0.05

Table 8: Intersection Operations – 2049 Background Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	13s	B	0.07	10s	B	0.04
	NB L	stop	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	19	B	0.06	19	B	0.22
	EB T	signal	19	B	0.04	19	B	0.14
	EB R	signal	19	B	0.20	19	B	0.02
	WB L	signal	21	C	0.38	22	C	0.46
	WB TR	signal	19	B	0.08	19	B	0.09
	NB L	signal	8	A	0.03	7	B	0.34
	NB TR	signal	11	B	0.41	13	B	0.64
	SB L	signal	5	A	0.12	9	A	0.48
	SB TR	signal	8	A	0.36	9	A	0.50
overall		signal	12	B	0.37	12	B	0.57
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	10	A	0.08	11	B	0.05
	NB L	stop	2	A	0.02	2	A	0.02
Tower Street S & Skyline Plaza Access	WB LR	signal	25	C	0.36	22	C	0.37
	NB TR	signal	7	A	0.34	12	B	0.62
	SB L	signal	3	A	0.15	6	A	0.38
	SB T	signal	6	A	0.58	9	A	0.68
	overall	signal	7	A	0.61	12	B	0.69
Guelph Street & McQueen Boulevard	NB LTR	stop	9	A	0.03	11	B	0.21
	SB LTR	stop	9	A	0.04	9	A	0.05
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	19	B	0.44	28	C	0.60
	WB LTR	signal	18	B	0.12	21	C	0.31
	NB L	signal	3	A	0.06	6	A	0.37
	NB TR	signal	6	A	0.55	9	A	0.79
	SB L	signal	3	A	0.02	2	A	0.00
	SB TR	signal	8	A	0.69	8	A	0.72
	overall	signal	8	A	0.66	9	A	0.77
Guelph Street & 2 nd Line	EB L	stop	2	A	0.01	4	A	0.06
	WB L	stop	1	A	0.00	0	A	0.00
	NB LTR	stop	11	B	0.01	13	B	0.01
	SB LTR	stop	11	B	0.13	11	B	0.06

3.3.2 Queue Operations

Once again, a queueing analysis was conducted using the average of five, 60-minute SimTraffic simulations for each peak hour. Results of the queueing analyses for the horizon years under future background conditions are provided in Table 9 and Table 10 with detailed worksheets provided in Appendix E.

As indicated, the length of storage lanes within the network remains satisfactory, with nearly all queue lengths shorter than the provided storage length. Movements with queues exceeding storage lengths are not expected to cause serious delays, as the 95th percentile lengths exceed available storage lengths by less than 10 metres.

Table 9: Queue Operations – 2039 Background Conditions

INTERSECTION & MOVEMENTS		STORAGE LENGTH	WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
			50 th	95 th	50 th	95 th
Tower Street & McQueen Boulevard	EB L	50m	2m	8m	6m	15m
	EB R	50	21	35	6	14
	WB L	30	13	25	13	24
	NB L	30	3	9	21	40
	SB L	30	7	16	16	27
Tower Street S & Skyline Plaza Access	WB LR	N/A	12	21	17	23
	SB L	N/A	8	17	14	26
Tower Street S/Highway 6 & 2 nd Line	EB LTR	N/A	17	28	12	22
	WB LTR	N/A	5	12	8	16
	NB L	100	4	10	18	42
	SB L	100	2	6	1	2

Table 10: Queue Operations – 2049 Background Conditions

INTERSECTION & MOVEMENTS		STORAGE LENGTH	WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
			50 th	95 th	50 th	95 th
Tower Street & McQueen Boulevard	EB L	50m	3m	9m	7m	18m
	EB R	50	26	46	6	14
	WB L	30	14	26	14	24
	NB L	30	3	8	19	36
	SB L	30	8	17	20	34
Tower Street S & Skyline Plaza Access	WB LR	N/A	12	21	17	22
	SB L	N/A	8	18	17	30
Tower Street S/Highway 6 & 2 nd Line	EB LTR	N/A	18	33	13	24
	WB LTR	N/A	5	12	7	15
	NB L	100	5	12	24	62
	SB L	100	2	7	1	2

3.3.3 Mid-Block Operations

Mid-block operations were assessed under the future background conditions and are summarized in Table 11 through Table 14. As indicated, most roads (excluding Tower Street South) experienced minimal changes in the resulting volume to capacity ratios through to the 2049 horizon despite increased volumes. This is largely due to the upgrading of local roads to collector roads and the corresponding increases to the road capacities (capacity increases from 500 vphpl to 700 vphpl) thus accommodating increased volumes on each road.

The sections of Tower Street South south of the Skyline Retail Plaza access operate at/over capacity (v/c of 0.99 to 1.02) in the northbound direction during the weekday PM peak hour by the 2025 and 2031 horizons. The southbound direction (over the same road segments) operates with significant capacity remaining at the 2031 horizon (v/c of 0.77 to 0.79) and begins to operate close to capacity (v/c of 0.90 to 0.91) by the 2049 horizon.

Results of the analyses of intersection operations, queueing operations, and SimTraffic simulations demonstrate that the operations of the network remain satisfactory on Tower Street South/Highway 6 despite the volume exceeding road capacity. However, upgrading Tower

Street South to a 4-lane configuration (i.e. 2 through lanes per direction) between the Skyline Retail Plaza access and 2nd Line is still warranted to increase road capacity by the 2031 horizon.

Table 11: Mid-Block Operations – 2025 Background Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	500	0.00	0.05	0.00	0.06
	N of 2 nd Line	500	0.04	0.06	0.17	0.07
	S of 2 nd Line	500	0.01	0.02	0.01	0.02
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.26	0.38	0.50	0.40
	S of McQueen Blvd	1000	0.26	0.42	0.52	0.36
	S of Skyline Retail	1000	0.53	0.80	1.02	0.68
	S of 2 nd Line	1000	0.52	0.78	1.00	0.66
McQueen Blvd	W of Guelph St	700	0.00	0.00	0.00	0.00
	W of Tower St S	700	0.12	0.03	0.12	0.10
	E of Tower St S	700	0.13	0.16	0.44	0.25
Scotland St	N of McQueen Blvd	500	0.40	0.66	0.40	0.20
	S of McQueen Blvd	500	0.39	0.66	0.40	0.20
	S of 2 nd Line	500	0.16	0.14	0.32	0.13
2 nd Line	W of Guelph St	500	0.16	0.19	0.26	0.18
	W of Highway 6	500	0.14	0.16	0.14	0.18
	E of Highway 6	500	0.06	0.05	0.06	0.09

Table 12: Mid-Block Operations – 2031 Background Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.00	0.04	0.00	0.05
	N of 2 nd Line	700	0.03	0.04	0.13	0.05
	S of 2 nd Line	700	0.01	0.01	0.01	0.01
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.30	0.39	0.51	0.47
	S of McQueen Blvd	1000	0.30	0.49	0.53	0.42
	S of Skyline Retail	1000	0.61	0.79	1.01	0.79
	S of 2 nd Line	1000	0.60	0.77	0.99	0.77
McQueen Blvd	W of Guelph St	700	0.00	0.00	0.00	0.00
	W of Tower St S	700	0.32	0.03	0.13	0.11
	E of Tower St S	700	0.14	0.17	0.46	0.26
Scotland St	N of McQueen Blvd	700	0.30	0.50	0.30	0.15
	S of McQueen Blvd	700	0.29	0.50	0.30	0.15
	S of 2 nd Line	500	0.17	0.15	0.34	0.14
2 nd Line	W of Guelph St	500	0.17	0.20	0.27	0.19
	W of Highway 6	700	0.11	0.12	0.11	0.14
	E of Highway 6	700	0.05	0.03	0.04	0.07

Table 13: Mid-Block Operations – 2039 Background Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.00	0.04	0.20	0.05
	N of 2 nd Line	700	0.03	0.13	0.24	0.05
	S of 2 nd Line	700	0.01	0.01	0.01	0.02
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.32	0.35	0.47	0.50
	S of McQueen Blvd	1000	0.32	0.50	0.53	0.45
	S of Skyline Retail	1000	0.65	0.78	0.99	0.84
	S of 2 nd Line	1000	0.64	0.82	1.05	0.82
McQueen Blvd	W of Guelph St	700	0.16	0.00	0.00	0.20
	W of Tower St S	700	0.43	0.04	0.14	0.22
	E of Tower St S	700	0.15	0.18	0.50	0.28
Scotland St	N of McQueen Blvd	700	0.33	0.54	0.33	0.16
	S of McQueen Blvd	700	0.32	0.54	0.33	0.16
	S of 2 nd Line	500	0.19	0.17	0.37	0.15
2 nd Line	W of Guelph St	500	0.18	0.22	0.29	0.21
	W of Highway 6	700	0.20	0.13	0.12	0.25
	E of Highway 6	700	0.05	0.04	0.05	0.07

Table 14: Mid-Block Operations – 2049 Background Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.00	0.05	0.22	0.05
	N of 2 nd Line	700	0.04	0.14	0.26	0.06
	S of 2 nd Line	700	0.01	0.02	0.01	0.02
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.34	0.38	0.51	0.54
	S of McQueen Blvd	1000	0.34	0.54	0.57	0.49
	S of Skyline Retail	1000	0.70	0.84	1.07	0.91
	S of 2 nd Line	1000	0.70	0.88	1.13	0.89
McQueen Blvd	W of Guelph St	700	0.18	0.00	0.00	0.22
	W of Tower St S	700	0.47	0.04	0.15	0.24
	E of Tower St S	700	0.16	0.20	0.56	0.31
Scotland St	N of McQueen Blvd	700	0.36	0.60	0.36	0.18
	S of McQueen Blvd	700	0.35	0.60	0.36	0.18
	S of 2 nd Line	500	0.21	0.18	0.41	0.17
2 nd Line	W of Guelph St	500	0.20	0.24	0.33	0.23
	W of Highway 6	700	0.22	0.14	0.13	0.28
	E of Highway 6	700	0.06	0.04	0.05	0.08

3.3.4 Operational Summary

Based on the results of the analyses of intersection, queueing, and mid-block operations, and applying the network upgrades proposed in the Township TMP, the network will provide adequate operations through the 2049 horizon under future background conditions. Minor changes were required to the timing plan at the intersection of Tower Street South and McQueen Boulevard to accommodate increased northbound left turn volumes.

Consideration should be given to increasing the capacity of Tower Street South between the Skyline Retail Plaza access and 2nd Line by adding an additional through lane in each direction by the 2031 horizon. No additional changes are required to accommodate the future background conditions.

4 Proposed Development

This chapter will cover the location, proposed land-use, access, and traffic generated by the South Fergus Secondary Plan development.

4.1 SITE LOCATION

As previously indicated and illustrated in Figure 1, the South Fergus Secondary Plan Area (Study Area) is generally bound by McQueen Boulevard to the north, 2nd Line to the south, Scotland Street to the east and Guelph Street to the west. It is bisected into an eastern portion and western portion by Tower Street South/Highway 6.

4.2 LAND-USE

The Study Area is predominantly a residential development, with provisions to include commercial areas within the development as mixed-use with residential units. As illustrated in Figure 13, the development has been divided into 16 development zones (Zones A through P). The corresponding land areas, unit counts and commercial floor areas are summarized in Table 15; the adjusted areas represent 78% of the gross area, allowing for internal roads, stormwater management ponds, etc.

As shown, the total development size is nearly 113 ha, leaving approximately 35 ha unclaimed. This unclaimed land represents approximately 32 ha of natural heritage features (areas to be left undeveloped due to historical/environmental significance) and 3.1 ha which will be allocated to parkland (the precise amount to be determined in future Plan of Subdivision applications).

With respect to development levels, the development will include:

- 953 low density residential units;
- 871 medium density residential units;
- 1106 mixed use commercial/corridor residential units;
- 158 gateway commercial residential units; and
- 3088 total residential units.

In addition, the following will also be provided:

- approximately 35,800 m² (385,000 ft²) of commercial gross floor area within the gateway commercial and mixed-use corridor zones; and
- an elementary school with an assumed 400 student enrolment.

Table 15: Study Area Land-Uses by Development Zone

ZONE & LAND USE		LAND AREA		DEVELOPMENT SIZE	
		Gross (ha)	Adjusted (ha)	Units	GFA (m ²)
A	medium-density residential	2.79	2.18	95	-
B	low-density residential	17.20	13.42	267	-
C	mixed-use corridor	12.32	9.61	721	19,220
D	low-density residential	8.23	6.42	128	-
E	medium-density residential	3.52	2.75	119	-
F	gateway commercial	1.71	1.33	-	3335
G	mixed-use corridor	2.33	1.82	136	3635
H	mixed-use corridor	4.25	3.32	249	6630
I	gateway commercial	1.89	1.47	83	2950
J	medium-density residential	2.03	1.58	69	-
K	low-density residential	14.90	11.62	232	-
L	medium-density residential	5.99	4.67	203	-
M	low-density residential	9.75	7.61	152	-
N	low-density residential	11.08	8.64	173	-
O	institutional (school)	3.36	2.62		-
P	medium-density residential	11.34	8.85	385	-
Total		112.69	87.90	3088	35,770

4.3 PHASING

The build-out date of the site was determined based on the number of residential units present within the development and rate of construction. Assuming a unit uptake rate in the order of 180 units per year (approximate historical uptake rate in the Elora/Fergus area), the nearly 3,100 residential units proposed for the Study Area will be fully built-out in approximately 17 years (2039 completion). Other construction (such as standalone commercial buildings, the new school, etc.) are assumed to be built in parallel with the residential development thus do not affect the build-out year.

Based on communications with the developers, the following development phasing has been established (as illustrated in Figure 14):

- Phase 1 – Zone P;
- Phase 2 – Zones A, B, and C;
- Phase 3 – Zones E to O; and
- Phase 4 – Zone D.

In consideration of the assumed uptake rate of 180 residential units per year, the following horizon years have been considered:

- 2025 – completion of Phase 1;
- 2031 – completion of Phase 2;
- 2039 – completion of Phases 3 and 4.

4.4 SITE ACCESS

4.4.1 Access Arrangement

Collector Road Access

Access to the Study Area will be provided by the existing road network and by two new collector roads built within the eastern portion of the Study Area as illustrated in Figure 13.

- The first collector will be built in an east-west alignment between Tower Street South and Scotland Street, approximately 350 metres north of their respective intersections with 2nd Line.
- The second collector will be built in a north-south alignment between McQueen Boulevard and 2nd Line, aligning with McTavish Street to the north.

It has been assumed these roads will be built to the appropriate municipal standards with 2-lane cross-sections. Construction of these roads is assumed to coincide with the start of Phase 3 developments (i.e. 2031 or later), as they will be required to provide access to said developments.

Highway 6 Commercial Access

Direct access to Highway 6 for mixed-use and/or highway commercial blocks will be considered as part of future development plans; it is assumed that access will be reflective of that which is currently on the east side of Highway 6, including a new access opposite the Skyline Retail Plaza access (thus creating a 4th leg at this signalized intersection).

Local Road Access

Access to the remaining zones has been assumed to be provided by new local roads/public accesses built off the collector network. These access points are assumed will also be built to the appropriate municipal standards.

4.4.2 Access Spacing

To ensure that interruptions to through traffic are minimized, both MTO and Transportation Association of Canada (TAC) recommend minimum separation distances between intersections along a road. The relevant intersection spacing standards are as follows:

- MTO
 - Class 2B Arterial (i.e. Highway 6) – 1600 metres desired, 800 metres minimum
 - Class 3 Collector – 800 metres desired, 400 metres minimum
 - Class 4 Local – 400 metres minimum
- TAC
 - arterials (i.e. Tower Street) – 400 metres desired between signalized intersections; 200 metres minimum
 - collectors and local roads at 4-legged intersections – 60 metres minimum
 - local roads at 3-legged intersections – 40 metres minimum

Recognizing that management of Highway 6 within the project area will transfer to the Township (as detailed in Section 3.1.1) and all other roads within the project area are/will be under jurisdiction of the Township, intersection spacing standards as defined by TAC are considered appropriate to apply.

With regard to the east-west collector, it will be located between two signalized intersections along Highway 6 – approximately 350 metres north of 2nd Line intersection and 520 metres south of the Skyline Retail intersection. While the 350 metre spacing from 2nd Line is somewhat less than the recommended 400 metre spacing, such is not considered problematic given that the new access intersection with Tower Street will be a T intersection with no west leg and hence no northbound left turn lane. The 400 metre spacing is typically desired to ensure that there is no overlap between back-to-back left lanes (which in this case would be between the southbound left turn at 2nd Line and the northbound left turn at the new access intersection). It is noted that the location of the east-west collector respects the existing watercourse and required buffers.

With regard to the new north-south collector, the southern terminus on 2nd Line will be located more than 200 metres away from the intersections at Scotland Street and Highway 6, thus the spacing between intersections is considered appropriate.

Local roads/private accesses connecting individual zones to the arterial/collector network will adhere to the minimum spacing requirements set forth by TAC (noted above) – 200 metres between intersections on an arterial road (i.e. connecting to Tower Street/Highway 6 or 2nd Line) and 60 metres between intersections on a collector road (Guelph Street, McQueen Boulevard, Scotland Street, or the new north/south or east/west collectors).

4.5 SITE TRAFFIC

4.5.1 Trip Generation

The number of vehicle trips expected to be generated by the Study Area during the weekday AM and PM peak hours has been developed based on the type of use, the size of each internal zone and associated trip generation rates per the ITE *Trip Generation Manual*⁷. The trip rates for each identified land-use are summarized in Table 16, with the associated trip estimates for each zone summarized in Table 17.

Table 16: Study Area Trip Rates

ITE LAND USE	SFSPA LAND USE	ITE CODE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
				In	Out	Total	In	Out	Total
single family detached	low-density residential	210	units	0.19	0.56	0.74	0.62	0.37	0.99
multifamily housing (low-rise)	med-density residential	220	units	0.11	0.35	0.46	0.35	0.21	0.56
multifamily housing (mid-rise)	high-density residential	221	units	0.09	0.27	0.36	0.27	0.17	0.44
elementary school (KG-6)	institutional – school	520	students	0.36	0.31	0.67	0.08	0.09	0.17
shopping centre	commercial	820	1000 ft ² GLA	0.58	0.36	0.94	1.83	1.98	3.81

⁷ *Trip Generation Manual, 10th Edition*. Institute of Transportation Engineers. September 2017.

Table 17: Study Area Trip Generation

ZONE	LAND USE	ITE CODE	SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
				In	Out	Total	In	Out	Total
A	med-density residential	220	95 units	10	34	44	33	20	53
B	low-density residential	210	267 units	49	148	198	167	98	265
C	mixed-use corridor	221	721 units	67	192	260	194	124	317
		820	206,874 ft ²	121	74	194	378	410	788
D	low-density residential	210	128 units	24	71	95	80	47	127
E	med-density residential	220	119 units	13	42	55	42	25	67
F	gateway commercial	221	75 units	7	20	27	20	13	33
		820	35,892 ft ²	21	13	34	66	71	137
G	mixed-use corridor	221	136 units	13	36	49	37	23	60
		820	39,125 ft ²	23	14	37	72	78	149
H	mixed-use corridor	221	249 units	23	66	90	67	43	109
		820	71,365 ft ²	42	25	67	131	141	272
I	gateway commercial	221	83 units	8	22	30	22	14	36
		820	31,736 ft ²	18	11	30	58	63	121
J	med-density residential	220	69 units	7	24	32	24	14	39
K	low-density residential	210	232 units	43	129	172	145	85	230
L	med-density residential	220	203 units	22	72	93	72	42	114
M	low-density residential	210	152 units	28	84	113	95	56	151
N	low-density residential	210	173 units	32	96	128	108	63	171
O	institutional (school)	520	400 students	145	123	268	33	35	68
P	med-density residential	220	385 units	41	136	177	136	80	215
Total				756	1,435	2,191	1,978	1,545	3,522

In lieu of more detailed information, it has been assumed that 20% of the adjusted area of any mixed-use zones (i.e. both residential space and commercial space present in the same zone)

will be developed as commercial space and use the *shopping center* ITE land-use. This land-use provides an average generation rate for commercial spaces.

Given the proximity of *Zone O* (the proposed school) to the existing Centre Wellington District High School, it was assumed that the zone would be developed into a new elementary school. The Fergus area currently has 5 operational elementary schools, ranging in size from 212 to 633 students (median 256, average 339). Based on this, the new elementary school was assumed to have a capacity of 400 students and service primarily residents of the Study Area. It is recognized that the ITE land-use assumes the school serves students up to grade 6. The Upper Grand District School Board does not operate middle schools (typically serving grades 7 and 8), thus the new school is assumed to serve junior kindergarten to grade 8. The *middle school* land-use (ITE code 522) has lower trip generation rates than the *elementary school* land-use – using the *elementary school* land-use provided a higher (thus more conservative) trip generation rate.

When fully built out, the Study Area is expected to generate in the order of 2,190 trips during the weekday AM peak hour and 3,520 trips during the weekday PM peak hour. These trips are the combined total of inbound and outbound trips.

It is recognized that a portion of these trips will not be new trips, but rather consist of both internal trips and pass-by trips.

- Internal trips occur when both the origin and destination of the trip are either within the same zone or same area within the development. The trip can be completed without ever entering the external road network (i.e. without travelling along or crossing any of the roads outlined in Section 2.1 and 3.1). For example, a motorist may live in Zone C and travel to a shop within Zone C via internal roads, never needing to travel along Tower Street South thus generating an internal trip.
- Pass-by trips occur when the origin and destination of the trip are outside of an intermediate location, but the trip will stop at the intermediate location while travelling. For example, a motorist may live in northern Fergus and, while travelling to their place of work in Guelph, will stop at a coffee shop in Zone C thus generating a pass-by trip in Zone C.

While it is certain that applying internal and pass-by reductions would reduce the total number of new trips generated, not applying these reductions offers a worst-case scenario for the adjacent road network. It is also noted that these reductions only typically affect commercial land-uses – residential land-uses are not expected to generate significant internal or pass-by trips. Therefore, internal and pass-by trips are largely only applicable to the mixed-use developments along Tower Street South. It is possible that zones adjacent to the mixed-use zones may generate internal trips if internal connections are available. The internal

interconnectivity of adjacent zones is not yet final, affecting the number of internal trips possible. Therefore, no reductions have been applied for internal and pass-by trips within the network.

4.5.2 Trip Distribution & Assignment

Distribution of new trips to the network is based on observed travel patterns through the project area road network evident in the 2021 counts, proximity to nearby build-up areas, and travel patterns observed by the *2016 Transportation Tomorrow Survey* (TTS). The TTS is a comprehensive survey of travel patterns in the Greater Golden Horseshoe conducted every 5 years, with the most recent data available being from the 2016 survey. The TTS allows for the trips of a numbered traffic zone (or group of traffic zones) to be traced from trip origin to trip destination, both inbound and outbound from the zone(s) of interest. Based on these observations, the following distribution has been applied, with the intended trip origin/destination provided in parentheses:

- to/from the north (Fergus): 40%
- to/from the south (Guelph): 40%
- to/from the west (Elora/Salem): 20%

Trips from each development zone were distributed to the nearest adjacent road(s) within the road network, then moved through the remaining network based on their assigned travel direction and expected travel route. The resulting site-generated traffic volumes at each horizon and their distribution to the network are illustrated in Figure 15 through Figure 18 for Phases 1 through 4 respectively.

5 Future Total Conditions

This chapter will address the resulting impacts of the South Fergus Secondary Plan Area on the adjacent road system at each identified horizon year. The following areas will be addressed:

- operations of the road network including;
 - operations of the key intersections;
 - vehicle queueing at each key intersection;
 - mid-block capacity assessment;
 - roundabout feasibility; and
- potential improvements to the project area road network, if necessary.

5.1 TRAFFIC VOLUMES

To assess the impacts of the Study Area on the local road network, the site-generated volumes have been added to the future background volumes for each horizon year (2025, 2031, 2039 and 2049). Additionally, a minimum volume of 10 vehicles was applied to each movement within the network. This ensures a conservative assessment at each intersection. The resulting future total volumes are illustrated in Figure 19 through Figure 22.

5.2 TRAFFIC OPERATIONS

Analysis of the operations of the key intersections and midblock capacity was assessed again at each future horizon to assess the impact of the Study Area. Vehicle queueing at key was reviewed under the 2039 and 2049 total conditions, as these represent the ultimate traffic conditions and thus worst-case scenario on the road network.

5.2.1 Intersection Operations

The operations of the key intersections were analyzed a final time at each horizon under future total conditions. Results of the analyses are summarized in Table 20 and Table 21 with detailed worksheets provided in Appendix F.

It is noted that improvements are required at several intersections within the Tower Street South corridor to ensure acceptable intersection operations due to significant increases in traffic volume (which have been considered in the intersection operating conditions noted). These improvements include the addition of exclusive left and/or right turn lanes, the addition of another through lane and/or adjustment to timing plans (more detail is provided in Section 5.3 as to the specific improvements). Outside of the Tower Street South corridor, the remaining

intersections performed well in their background condition configuration and thus no further improvements are required to accommodate future total conditions.

Table 18: Intersection Operations – 2025 Total Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	13s	B	0.11	11s	B	0.05
	NB L	free	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	25	C	0.04	27	C	0.15
	EB T	signal	25	C	0.06	28	C	0.19
	EB R	signal	25	C	0.04	27	C	0.02
	WB L	signal	31	C	0.56	33	C	0.58
	WB TR	signal	26	C	0.18	28	C	0.18
	NB L	signal	7	A	0.02	9	A	0.12
	NB TR	signal	8	A	0.26	13	B	0.56
	SB L	signal	4	A	0.10	7	A	0.47
	SB TR	signal	5	A	0.29	5	A	0.26
	overall	signal	10	A	0.37	13	B	0.56
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.06	9	A	0.04
	NB L	stop	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access	WB L	signal	38	D	0.36	33	C	0.36
	WB R	signal	34	C	0.02	31	C	0.08
	NB TR	signal	6	A	0.24	9	A	0.51
	SB L	signal	3	A	0.11	5	A	0.31
	SB T	signal	6	A	0.56	6	A	0.47
	overall	signal	7	A	0.57	9	A	0.50
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	36	D	0.36	36	D	0.45
	WB LTR	signal	34	C	0.12	33	C	0.18
	NB L	signal	2	A	0.04	3	A	0.05
	NB TR	signal	4	A	0.36	8	A	0.72
	SB L	signal	2	A	0.01	3	A	0.02
	SB TR	signal	6	A	0.59	5	A	0.51
	overall	signal	7	A	0.57	9	A	0.69
Guelph Street & 2 nd Line	EB L	free	2	A	0.01	4	A	0.04
	WB L	free	1	A	0.00	1	A	0.00
	NB LTR	stop	9	A	0.02	9	A	0.02
	SB LTR	stop	9	A	0.04	9	A	0.04

Table 19: Intersection Operations – 2031 Total Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	13s	B	0.12	11s	B	0.06
	NB L	free	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	27	C	0.40	39	D	0.56
	EB T	signal	24	C	0.06	34	C	0.24
	EB R	signal	26	C	0.26	33	C	0.09
	WB L	signal	30	C	0.56	37	D	0.53
	WB TR	signal	25	C	0.18	34	C	0.23
	NB L	signal	9	A	0.18	19	B	0.55
	NB TR	signal	9	A	0.35	14	B	0.63
	SB L	signal	4	A	0.13	12	B	0.61
	SB T	signal	5	A	0.34	6	A	0.43
	overall	signal	12	B	0.41	15	B	0.62
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.07	9	A	0.05
	NB L	free	2	A	0.01	2	A	0.02
Tower Street S & Skyline Plaza Access/Zone C Access	EB L	signal	39	D	0.66	58	E	0.90
	EB TR	signal	29	B	0.10	24	C	0.16
	WB L	signal	30	B	0.22	25	C	0.23
	WB TR	signal	28	B	0.05	23	C	0.10
	NB L	signal	7	A	0.19	27	C	0.74
	NB TR	signal	11	B	0.32	19	C	0.65
	SB L	signal	7	A	0.14	16	B	0.46
	SB TR	signal	12	B	0.47	27	C	0.77
	overall	signal	15	B	0.49	27	C	0.82
Guelph Street & McQueen Boulevard	EB L	free	8	A	0.01	8	A	0.01
	WB L	free	8	A	0.02	8	A	0.06
	NB LTR	stop	9	A	0.14	13	B	0.24
	SB LTR	stop	11	B	0.07	12	B	0.09
Tower Street S/Highway 6 & 2 nd Line	EB LTR	signal	34	C	0.34	38	D	0.46
	WB LTR	signal	32	C	0.14	34	C	0.16
	NB L	signal	3	A	0.10	7	A	0.32
	NB TR	signal	3	A	0.25	6	A	0.48
	SB L	signal	3	A	0.02	4	A	0.04
	SB TR	signal	4	A	0.36	5	A	0.41
	overall	signal	7	A	0.36	8	A	0.48

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Guelph Street & 2 nd Line	EB L	free	2	A	0.01	4	A	0.05
	WB L	free	1	A	0.01	1	A	0.01
	NB LTR	stop	9	A	0.04	11	B	0.04
	SB LTR	stop	11	B	0.14	11	B	0.12

Table 20: Intersection Operations – 2039 Total Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	15s	B	0.17	12s	B	0.07
	NB L	free	1	A	0.01	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	19	B	0.26	43	D	0.40
	EB T	signal	23	C	0.09	47	D	0.34
	EB R	signal	24	C	0.23	46	D	0.19
	WB L	signal	21	C	0.39	41	D	0.51
	WB TR	signal	24	C	0.27	47	D	0.43
	NB L	signal	11	B	0.54	54	D	0.87
	NB T	signal	17	B	0.63	19	B	0.65
	NB R	signal	11	B	0.03	13	B	0.18
	SB L	signal	12	B	0.25	17	B	0.64
	SB T	signal	19	B	0.69	29	C	0.82
	SB R	signal	13	B	0.02	16	B	0.06
	overall	signal	19	B	0.57	29	C	0.83
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.07	11	B	0.05
	NB L	free	2	A	0.01	2	A	0.02
Future N/S Collector & Future E/W Collector	EB LTR	stop	8	A	0.03	8	A	0.05
	WB LTR	stop	8	A	0.05	8	A	0.05
	NB LTR	stop	8	A	0.07	8	A	0.05
	SB LTR	stop	8	A	0.05	8	A	0.03
Tower Street S & Skyline Plaza Access/Zone C Access	EB L	signal	26	C	0.65	74	E	0.93
	EB TR	signal	18	B	0.10	29	C	0.16
	WB L	signal	19	B	0.21	30	C	0.25
	WB TR	signal	18	B	0.05	28	C	0.10

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Tower Street S & Skyline Plaza Access/Zone C Access	NB L	signal	7	A	0.23	49	D	0.83
	NB TR	signal	12	B	0.59	26	C	0.81
	SB L	signal	7	A	0.23	23	C	0.60
	SB T	signal	12	B	0.58	28	C	0.78
	SB R	signal	8	A	0.07	19	B	0.30
	overall	signal	13	B	0.57	31	C	0.88
Tower Street S & Future E/W Collector	WB L	signal	21	C	0.46	63	E	0.76
	WB R	signal	19	B	0.18	46	D	0.19
	NB T	signal	13	B	0.53	25	C	0.76
	NB R	signal	9	A	0.06	15	B	0.20
	SB L	signal	6	A	0.31	51	D	0.86
	SB T	signal	6	A	0.45	5	A	0.43
Guelph Street & McQueen Boulevard	EB L	free	8	A	0.01	8	A	0.01
	WB L	free	8	A	0.03	9	A	0.07
	NB LTR	stop	12	B	0.22	26	D	0.63
	SB LTR	stop	12	B	0.08	15	C	0.13
Tower Street S/Highway 6 & 2 nd Line	EB L	signal	26	C	0.27	30	C	0.44
	EB TR	signal	29	C	0.21	34	C	0.16
	WB L	signal	26	C	0.52	30	C	0.38
	WB TR	signal	27	C	0.10	34	C	0.23
	NB L	signal	9	A	0.37	34	C	0.80
	NB TR	signal	12	B	0.45	17	B	0.78
	SB L	signal	9	A	0.05	13	B	0.22
	SB TR	signal	18	B	0.70	21	C	0.79
Guelph Street & 2 nd Line	overall	signal	17	B	0.63	21	C	0.75
	EB L	free	2	A	0.01	4	A	0.06
	WB L	free	1	A	0.01	1	A	0.01
	NB LTR	stop	9	A	0.04	11	B	0.05
	SB LTR	stop	12	B	0.30	13	B	0.28

Table 21: Intersection Operations – 2049 Total Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Scotland Street & McQueen Boulevard	EB LR	stop	17s	C	0.21	12s	B	0.09
	NB L	free	1	A	0.02	1	A	0.01
Tower Street S & McQueen Boulevard	EB L	signal	19	B	0.26	43	D	0.42
	EB T	signal	23	C	0.09	48	D	0.35
	EB R	signal	25	C	0.37	47	D	0.19
	WB L	signal	21	C	0.39	42	D	0.54
	WB TR	signal	24	C	0.27	48	D	0.46
	NB L	signal	13	B	0.57	62	E	0.90
	NB T	signal	18	B	0.67	19	B	0.68
	NB R	signal	12	B	0.04	13	B	0.19
	SB L	signal	13	B	0.30	23	C	0.72
	SB T	signal	22	C	0.73	32	C	0.85
	SB R	signal	14	B	0.02	16	B	0.06
	overall	signal	19	B	0.60	31	C	0.86
Scotland Street/ Jones Baseline & 2 nd Line	EB LR	stop	9	A	0.09	11	B	0.07
	NB L	free	2	A	0.02	2	A	0.02
Future N/S Collector & Future E/W Collector	EB LTR	stop	8	A	0.07	8	A	0.07
	WB LTR	stop	8	A	0.07	8	A	0.07
	NB LTR	stop	8	A	0.09	8	A	0.07
	SB LTR	stop	8	A	0.07	8	A	0.07
Tower Street S & Skyline Plaza Access/Zone C Access	EB L	signal	26	C	0.65	76	E	0.93
	EB TR	signal	19	B	0.13	30	C	0.19
	WB L	signal	19	B	0.23	31	C	0.26
	WB TR	signal	18	B	0.08	29	C	0.13
	NB L	signal	7	A	0.25	62	E	0.87
	NB TR	signal	12	B	0.63	31	C	0.86
	SB L	signal	7	A	0.27	34	C	0.70
	SB T	signal	12	B	0.61	33	C	0.84
	SB R	signal	8	A	0.07	21	C	0.33
	overall	signal	13	B	0.60	36	D	0.91

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Tower Street S & Future E/W Collector	WB L	signal	21	C	0.46	63	E	0.76
	WB R	signal	19	B	0.18	46	D	0.19
	NB T	signal	13	B	0.56	27	C	0.81
	NB R	signal	9	A	0.06	15	B	0.21
	SB L	signal	6	A	0.32	59	E	0.89
	SB T	signal	7	A	0.48	5	A	0.46
	overall	signal	11	B	0.54	26	C	0.89
Guelph Street & McQueen Boulevard	EB L	free	8	A	0.02	8	A	0.02
	WB L	free	8	A	0.03	9	A	0.07
	NB LTR	stop	13	B	0.23	32	D	0.70
	SB LTR	stop	12	B	0.12	16	C	0.19
Tower Street S/Highway 6 & 2 nd Line	EB L	signal	26	C	0.29	30	C	0.46
	EB TR	signal	29	C	0.23	34	C	0.20
	WB L	signal	26	C	0.51	30	C	0.40
	WB TR	signal	27	C	0.10	34	C	0.24
	NB L	signal	11	B	0.41	39	D	0.83
	NB TR	signal	12	B	0.48	18	C	0.82
	SB L	signal	9	A	0.07	13	B	0.23
	SB TR	signal	19	B	0.74	24	C	0.84
	overall	signal	18	B	0.66	23	C	0.78
Guelph Street & 2 nd Line	EB L	free	2	A	0.01	4	A	0.07
	WB L	free	1	A	0.01	1	A	0.01
	NB LTR	stop	11	B	0.08	12	B	0.10
	SB LTR	stop	13	B	0.35	14	B	0.33

5.2.2 Queue Operations

A final queueing analysis was conducted using the average of five 60-minute SimTraffic simulations for each peak hour. Results of the queueing analyses for the 2039 and 2049 horizon years under future total conditions are provided in Table 22 and Table 23, with detailed worksheets provided in Appendix F.

Table 22: Queue Operations – 2039 Total Conditions

INTERSECTION & MOVEMENTS		STORAGE LENGTH (METRES)		WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
		EXISTING	REQUIRED	50 TH	95 TH	50 TH	95 TH
Scotland Street & McQueen Blvd	EB LR	N/A	N/A	10m	18m	8m	16m
Tower Street & McQueen Boulevard	EB L	50	50	13	25	19	43
	EB R	50	50	31	51	45	75
	WB L	30	30	19	32	31	53
	NB L	50	50	25	44	66	89
	NB R	N/A	50	8	29	31	69
	SB L	50	75	11	20	62	120
	SB R	N/A	30	8	29	23	59
Scotland Street & 2 nd Line	EB LR	N/A	N/A	8	13	6	12
Future N/S Collector & Future E/W Collector	EB LTR	N/A	N/A	6	13	7	14
	WB LTR	N/A	N/A	7	14	8	14
	NB LTR	N/A	N/A	9	14	8	14
	SB LTR	N/A	N/A	8	15	6	14
Tower Street S & Skyline Plaza Access/New Collector Road	EB L	N/A	50	20	34	54	80
	WB L	N/A	N/A	9	18	11	22
	NB L	N/A	100	11	21	47	92
	SB L	>100	75	10	18	30	73
	SB R	N/A	50	9	19	43	89
Tower Street S & Future E/W Collector	WB L	N/A	50	20	34	45	75
	WB R	N/A	N/A	21	37	51	91
	NB R	N/A	75	9	19	57	123
	SB L	N/A	100	17	29	71	118
Tower Street S/Highway 6 & 2 nd Line	EB L	N/A	50	13	25	21	38
	WB L	N/A	30	18	31	16	30
	NB L	100	100	15	25	40	72
	SB L	100	100	5	13	8	17
Guelph Street & 2 nd Line	EB LTR	N/A	N/A	1	5	6	16
	WB LTR	N/A	N/A	1	4	1	7
	NB LTR	N/A	N/A	3	9	6	14
	SB LTR	N/A	N/A	18	30	17	27

Table 23: Queue Operations – 2049 Total Conditions

INTERSECTION & MOVEMENTS		STORAGE LENGTH (METRES)		WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
		EXISTING	REQUIRED	50 TH	95 TH	50 TH	95 TH
Scotland Street & McQueen Blvd	EB LR	N/A	N/A	11m	18m	9m	16m
Tower Street & McQueen Boulevard	EB L	50	50	12	24	21	44
	EB R	50	50	34	55	49	76
	WB L	30	30	20	35	37	60
	NB L	50	50	28	54	72	86
	NB R	N/A	50	14	46	37	74
	SB L	50	75	14	35	78	126
	SB R	N/A	30	8	31	25	63
Scotland Street & 2 nd Line	EB LR	N/A	N/A	8	14	7	13
Future N/S Collector & Future E/W Collector	EB LTR	N/A	N/A	9	15	9	15
	WB LTR	N/A	N/A	9	14	9	15
	NB LTR	N/A	N/A	9	15	9	14
	SB LTR	N/A	N/A	9	15	8	14
Tower Street S & Skyline Plaza Access/New Collector Road	EB L	N/A	50	20	34	58	80
	WB L	N/A	N/A	10	19	12	23
	NB L	N/A	100	11	21	69	134
	SB L	>100	75	11	22	44	101
	SB R	N/A	50	9	22	52	98
Tower Street S & Future E/W Collector	WB L	N/A	50	19	32	46	78
	WB R	N/A	N/A	21	38	57	116
	NB R	N/A	75	9	18	61	128
	SB L	N/A	100	16	26	82	125
Tower Street S/Highway 6 & 2 nd Line	EB L	N/A	50	13	28	23	41
	WB L	N/A	30	20	33	17	30
	NB L	100	100	14	25	43	75
	SB L	100	100	4	12	9	27
Guelph Street & 2 nd Line	EB LTR	N/A	N/A	1	6	8	19
	WB LTR	N/A	N/A	1	5	3	10
	NB LTR	N/A	N/A	8	15	9	16
	SB LTR	N/A	N/A	18	29	18	28

The sizing of storage lanes for exclusive turns within the network is generally sufficient to accommodate expected queues during the AM peak hour through the 2049 horizon. Due to the substantial increase in volumes along the Tower Street South/Highway 6 corridor, the size of storage lanes for the exclusive turn lanes along said corridor is nearly entirely insufficient during the PM peak hour through the 2049 horizon. This is the result of the combined effect of increased turning volumes (increasing the accumulation rate of vehicles) and increased cycle lengths at signalized intersections (necessitating more storage to hold vehicle queues between green signals).

This deficiency is only partially mitigated by lengthening existing storage lanes, as through traffic queues (particularly during the weekday PM peak hour) often block access to the storage lanes. Moreover, geometric constraints at some intersections prevent or limit lengthening of storage lanes as doing so would interfere with access to existing developments along Tower Street South. The recommended turn lane storage length (considering the noted practical and geometric constraints) at each approach has been provided in the summary tables above.

5.2.3 Mid-Block Operations

Mid-block operations were assessed under the future background conditions and are summarized in Table 24 through Table 27. As recommended under background conditions, the addition of a second through lane per direction along the southern sections of Tower Street South was required by the 2031 horizon to accommodate the additional volumes generated by the Study Area developments. It is noted that the new east/west collector road operates close to capacity (v/c of 0.97) during the PM peak hour in the eastbound direction immediately east of Tower Street South. This is due to the assumptions made regarding cross-section of the road (1 through lane per direction) and assignment of trips generated by the development. The remaining roads in the network are expected to operate under capacity through the 2049 horizon.

Table 24: Mid-Block Operations – 2025 Total Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	500	0.04	0.05	0.15	0.06
	N of 2 nd Line	500	0.04	0.06	0.17	0.07
	S of 2 nd Line	500	0.03	0.03	0.03	0.04
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.27	0.39	0.51	0.42
	S of McQueen Blvd	1000	0.27	0.45	0.55	0.38
	S of Skyline Retail	1000	0.55	0.86	1.08	0.72
	S of 2 nd Line	1000	0.54	0.84	1.06	0.69
McQueen Blvd	W of Guelph St	700	0.01	0.04	0.04	0.03
	W of Tower St S	700	0.14	0.08	0.16	0.13
	E of Tower St S	700	0.18	0.33	0.61	0.35
Scotland St	N of McQueen Blvd	500	0.46	0.68	0.43	0.26
	S of McQueen Blvd	500	0.39	0.66	0.40	0.20
	S of 2 nd Line	500	0.16	0.14	0.32	0.13
2 nd Line	W of Guelph St	500	0.16	0.20	0.27	0.19
	W of Highway 6	500	0.15	0.17	0.15	0.19
	E of Highway 6	500	0.06	0.05	0.07	0.09

Table 25: Mid-Block Operations – 2031 Total Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.06	0.07	0.14	0.07
	N of 2 nd Line	700	0.07	0.17	0.26	0.12
	S of 2 nd Line	700	0.06	0.06	0.06	0.06
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.40	0.44	0.65	0.64
	S of McQueen Blvd	1000	0.39	0.58	0.72	0.61
	S of Skyline Retail	1000	0.35	0.48	0.65	0.52
	S of 2 nd Line	1000	0.36	0.51	0.68	0.54
McQueen Blvd	W of Guelph St	700	0.10	0.19	0.28	0.23
	W of Tower St S	700	0.50	0.19	0.41	0.41
	E of Tower St S	500	0.19	0.34	0.63	0.36
Scotland St	N of McQueen Blvd	700	0.35	0.51	0.33	0.19
	S of McQueen Blvd	700	0.29	0.50	0.30	0.15
	S of 2 nd Line	700	0.17	0.15	0.34	0.15
2 nd Line	W of Guelph St	500	0.17	0.22	0.29	0.21
	W of Highway 6	700	0.23	0.17	0.19	0.27
	E of Highway 6	700	0.06	0.05	0.06	0.07

Table 26: Mid-Block Operations – 2039 Total Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.06	0.07	0.15	0.08
	N of 2 nd Line	700	0.18	0.33	0.49	0.26
	S of 2 nd Line	700	0.06	0.06	0.06	0.06
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.54	0.48	0.76	0.86
	S of McQueen Blvd	1000	0.58	0.68	0.92	0.90
	S of Skyline Retail	1000	0.54	0.57	0.84	0.80
	S of 2 nd Line	1000	0.46	0.69	0.92	0.73
McQueen Blvd	W of Guelph St	700	0.39	0.42	0.59	0.67
	W of Tower St S	700	0.68	0.38	0.65	0.69
	E of Tower St S	500	0.21	0.39	0.68	0.39
Scotland St	N of McQueen Blvd	700	0.47	0.59	0.41	0.30
	S of McQueen Blvd	700	0.40	0.57	0.38	0.26
	S of 2 nd Line	700	0.19	0.17	0.37	0.16
2 nd Line	W of Guelph St	500	0.19	0.24	0.31	0.23
	W of Highway 6	700	0.40	0.28	0.33	0.50
	E of Highway 6	700	0.12	0.23	0.27	0.26
Future E/W Collector	E of Tower St	700	0.31	0.63	0.97	0.69

Table 27: Mid-Block Operations – 2049 Total Conditions

ROAD SECTION & LOCATION		CAPACITY (VPHPL)	AM PEAK HOUR V/C RATIO		PM PEAK HOUR V/C RATIO	
			NB/EB	SB/WB	NB/EB	SB/WB
Guelph St	N of McQueen Blvd	700	0.09	0.10	0.19	0.11
	N of 2 nd Line	700	0.20	0.36	0.53	0.28
	S of 2 nd Line	700	0.12	0.12	0.12	0.12
Tower St S/Hwy 6	N of McQueen Blvd	1000	0.57	0.51	0.79	0.90
	S of McQueen Blvd	1000	0.60	0.73	0.96	0.94
	S of Skyline Retail	1000	0.57	0.60	0.88	0.83
	S of 2 nd Line	1000	0.49	0.72	0.96	0.76
McQueen Blvd	W of Guelph St	700	0.42	0.43	0.60	0.71
	W of Tower St S	700	0.73	0.39	0.66	0.71
	E of Tower St S	500	0.22	0.41	0.74	0.42
Scotland St	N of McQueen Blvd	700	0.51	0.64	0.44	0.32
	S of McQueen Blvd	700	0.45	0.64	0.43	0.28
	S of 2 nd Line	700	0.21	0.20	0.41	0.19
2 nd Line	W of Guelph St	500	0.24	0.28	0.37	0.27
	W of Highway 6	700	0.43	0.31	0.36	0.55
	E of Highway 6	700	0.13	0.24	0.28	0.27
Future E/W Collector	E of Tower St	700	0.31	0.63	0.97	0.69

5.2.4 Roundabout Operations

As noted in Section 3.1.2, the potential for a roundabout at the intersection of Highway 6 and 2nd Line was identified by the Township and thus has been considered further to the signalized configuration as otherwise assumed. While it is noted that the MTO Class EA study for this intersection is proceeding on the premise of signalization, roundabout control has nonetheless been considered for comparative purposes.

Advantages of Roundabout Control

While traffic signals are the traditional method of improving intersection performance, roundabouts offer a number of advantages over traffic signals including:

- increased safety and reduced incidence of severe accidents due to lower speeds and fewer conflict points;
- greater capacity than traffic signals or all-way stop control intersections for the same level of service;
- environmental benefits due to reduced stop-and-go traffic, reducing emissions, fuel consumption, and noise;
- traffic calming effects;
- reduced travel delays; and
- not affected by power outages.

Disadvantages of Roundabout Control

Roundabouts have disadvantages compared to traffic signals, especially regarding the accessibility and safety of pedestrians, particularly visually impaired pedestrians. They lack the auditory cues and protected pedestrian movements present at signalized intersections. Furthermore:

- multi-lane roundabouts can result in increased accident frequency (albeit non-injury types);
- they do not provide priority options for emergency vehicles; and
- excessive volume on one road/approach may restrict access from the intersecting road/approaches, potentially leading to higher delays than a signalized intersection.

Roundabout vs Signal Intersection Operations

To determine feasibility of a roundabout at this intersection, analyses was conducted using ARCADY roundabout software for the 2049 total conditions as this would impose the highest demand on it. Performance of the intersection in a 2-lane roundabout configuration (determined to be the optimal configuration) was compared to performance of the intersection in the signalized configuration established in Section 5.3.2 (worksheets are provided in Appendix G).

Results of the intersection operations analysis are summarized in Table 28. Each approach of the roundabout does not have strictly defined vehicle movements like a signalized intersection (i.e. left, through, right), therefore the approach delays of the signalized intersection have been listed to provide a more even comparison with the roundabout.

Table 28: Highway 6 & 2nd Line Roundabout vs Traffic Signals – Intersection Operations

INTERSECTION CONTROL & APPROACH		WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		DELAY	LOS	V/C	DELAY	LOS	V/C
Traffic Signal	EB	28	C	0.29	32	C	0.46
	WB	26	C	0.51	32	C	0.40
	NB	12	B	0.48	21	C	0.83
	SB	19	B	0.74	23	C	0.84
	overall	18	B	0.66	23	C	0.78
Roundabout	EB	9	A	0.48	13	B	0.53
	WB	6	A	0.22	17	C	0.48
	NB	5	A	0.56	210	F	1.13
	SB	8	A	0.74	23	C	0.91
	overall	7	A	0.75	115	F	1.14

As shown, the roundabout configuration provides better performance during the weekday AM peak hour with consistently lower delays on all approaches than the signalized configuration. The overall delay at the roundabout is only 7 seconds during the AM peak hour compared to 18 seconds for the traffic signals. This situation is not maintained during the weekday PM peak hour however, as the increased volumes on all approaches (especially the south leg/northbound volume, which is nearly doubled) see delays on the northbound approach to the roundabout reach 210 seconds. This in turn sees the overall delay at the intersection increase from 7 seconds during the AM peak hour to 115 seconds during the PM peak hour. This is an unacceptably long delay – one not experienced by the signalized configuration which provides only slightly worse overall performance (overall delay increases by 5 seconds) during the PM peak hour compared to the AM peak hour.

Roundabout vs Signal Queue Operations

A one-to-one assessment of the queuing operations under each intersection configuration is not possible due to the physical differences in how each intersection operates:

- at a roundabout, movements do not separate until entering the roundabout – there exists only one single mixed queue at each approach; whereas

- at a signalized intersection, dedicated turn lanes and/or multiple through lanes allow for movement segregation and multiple simultaneous queues at each approach.

Nonetheless, queues have been listed for every available movement for each intersection configuration (based on the recommended configuration of the signalized intersection in Section 5.3.2). Results of the queueing analysis are summarized in Table 29. It is noted that the ARCADY queue output is in vehicles (not length), thus the output value has been multiplied by 5.75 metres (one passenger car equivalent length, an input parameter for the ARCADY analysis) to provide the queue length in metres.

Table 29: Highway 6 & 2nd Line Roundabout vs Traffic Signals – Queue Operations

INTERSECTION CONTROL & APPROACH		WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
		50 th	95 th	50 th	95 th
Traffic Signal	EB L	13m	28m	23m	41m
	EB TR	27	49	22	37
	WB L	20	33	17	30
	WB TR	9	18	17	32
	NB L	14	25	43	75
	NB T	30	51	66	106
	NB TR	20	48	73	113
	SB L	4	12	9	27
	SB T	52	88	84	131
	SB TR	58	94	90	138
Roundabout	EB	6	22	7	28
	WB	2	7	6	25
	NB	8	10	746	1,150
	SB	17	37	54	291

As shown, queueing performance is better with shorter queues during the weekday AM peak hour under the roundabout configuration compared to the signalized configuration. This is not unexpected given the roundabout also provides superior intersection operations during the AM peak hour. Likewise, the roundabout configuration provides much worse queueing performance with longer queues (some in excess of 1 km long) compared to the signalized configuration during the weekday PM peak hour. This also aligns with the poorer intersection operations demonstrated by the roundabout during the PM peak hour.

5.2.5 Operational Summary

Based on the results of the operational analyses conducted under future total conditions, several road system improvements will be required within the Tower Street South/Highway 6 corridor to accommodate the developments associated with the Study Area by the 2039 horizon, details of which are provided in Section 5.3. For the remainder of the roads within the network, the upgrades outlined in the Township TMP and applied under background conditions remain sufficient under future total conditions through the 2049 horizon.

With regards to the feasibility of a roundabout at the intersection of Highway 6 and 2nd Line, the roundabout has been shown to provide superior operations during the weekday AM peak hour volumes expected under the 2049 total conditions when compared to the “baseline” signalized configuration. Under weekday PM peak hour volumes at the same horizon however, the roundabout performed significantly worse than the signalized configuration due to the increased northbound volumes expected during the peak hour.

While it is likely the roundabout would perform well under most conditions prior to full build-out of the Study Area, the lengthy delays and excessive queues which would form on Highway 6 during the weekday PM peak hour demonstrate that a conventional signalized intersection using the configuration recommended in Section 5.3.2 is the preferred alternative.

5.3 ROAD NETWORK

As noted in Section 5.2, upgrades are required along the Tower Street South corridor to accommodate the future total conditions. This section summarizes the changes made, and therefore recommended upgrades to the network to accommodate the future total conditions.

5.3.1 Road Improvements

Tower Street South

The section of Tower Street South between the Skyline Retail Plaza access and 2nd Line currently consists of a single through lane per direction. Under future background conditions, accounting for background growth and additional volumes generated by the NWFSPA developments, the noted road section will operate near/over capacity during peak times. Under future total conditions, assuming a single through lane per direction is maintained, the traffic volumes will greatly exceed the road’s directional capacity by 2031. In this regard, this portion of road will have to be upgraded to provide a minimum 4-lane (2 through lanes per direction) cross-section to serve the 2031 planning horizon.

If direct accesses to developments adjacent to Tower Street South are planned, (i.e. not requiring access by an internal road) it is advisable to consider inclusion of a continuous two-way left turn

lane between McQueen Boulevard and 2nd Line. This will serve to boost effective capacity of the road by allowing left turns to exit the through traffic stream.

Highway 6

The section of Highway 6 south of 2nd Line is assumed to still be operated by the MTO through the 2049 horizon. Regardless, it has been assumed that the section of Highway 6 between 2nd Line and Wellington Road 7 will also be upgraded to a 4-lane cross-section by the 2031 horizon. This will provide sufficient through capacity to accommodate increased volumes travelling along this corridor due to the significant developments planned for the Fergus area.

5.3.2 Intersection Improvements

Listed below is each intersection which required improvements from its background condition configuration in order to provide acceptable operations through the 2049 horizon, and the horizon year at which each improvement must be in place to ensure adequate performance of the network is maintained. New intersection construction or addition of new intersection legs are recommended to be in place at the start of the development phase it will serve to ensure the benefits can be realized as the phase is completed and units occupied. General adjustments to signal timing plans were made at each intersection to improve performance (adjusting cycle lengths, phasing, etc.) with unique changes noted.

Tower Street South & McQueen Boulevard

- 2039 (required to serve the 2039 and 2049 horizons)
 - addition of a 50 metre exclusive right turn lane on the north leg
 - addition of a 30 metre exclusive right turn lane on the south leg
 - lengthening of the southbound left turn storage lane to 75 metres
 - addition of protected left turn phases (i.e. advance green) for all left turn movements

Tower Street South & Skyline Retail Plaza

- 2025 (required to serve Phase 2 development which will occur from 2025 to 2031)
 - addition of a west leg to serve the development, containing one shared through/right turn lane and one 50 metre exclusive left turn lane
 - addition of a 75 metre exclusive left turn lane on the north approach (the current left turn lane would be converted to a through lane)
 - addition of a 100 metre exclusive left turn lane on the south leg

- addition of protected left movements to the signal phasing plan for the northbound and southbound left turn movements
- 2039 (required to serve the horizon 2039 to 2049)
 - addition of a 50 metre exclusive right turn lane on the north leg

Tower Street South & E/W Collector Road

- 2031 (required to serve Phase 3 development which will occur from 2031 to 2039)
 - construction of a new signalized T-intersection to serve Phase 3 development, connecting the proposed east/west collector road to Tower Street South with the following configuration:

North Leg: two through lanes and one 100 metre exclusive left turn lane with protected left movement in signal plan

South Leg: two through lanes and one 100 metre exclusive right turn lane

East Leg: one 50 metre exclusive left turn lane and one exclusive right turn lane

Tower Street South/Highway 6 & 2nd Line

- 2039 (required to serve the horizon 2039 to 2049)
 - addition of 30 metre exclusive left turn lane on east leg
 - addition of 50 metre exclusive left turn lane on west leg
 - addition of protected left movements to the signal phasing plans for all left turn movements

6 Summary

This Transportation Plan has addressed the transportation impacts associated with the proposed developments within the South Fergus Secondary Plan area (Study Area).

6.1 PROPOSED DEVELOPMENT

The Study Area consists of approximately 147 hectares of land in the south area of the community of Fergus, Township of Centre Wellington, County of Wellington. When fully built out, the Study Area will contain nearly 3,100 residential units of various types, commercial spaces, and a new elementary school. Upon completion, the developments within the Study Area are expected to generate approximately 2,190 trips during the weekday AM peak hour and 3,520 trips during the weekday PM peak hour.

6.2 TRAFFIC OPERATIONS

In addressing the traffic operations within the immediate area, the existing key intersections were assessed under existing (2022) and future (2025, 2031, 2039, and 2049) horizon periods. In addition, new intersections constructed as a result of network upgrades planned within the *Township of Centre Wellington Transportation Master Plan (TMP)*, *Township of Centre Wellington Development Charges Background Study*, and the Study Area were assessed under the future horizon periods.

6.2.1 Intersection Operations

Under the 2022 horizon, the existing key intersections provided acceptable performance in their current configuration. Under each future horizon, all key intersections performed well under background conditions based on the network upgrades planned within the Township TMP and *Development Charges Study*. Under the total conditions, the key intersections outside of the Tower Street South corridor performed well through the 2049 horizon, thus not requiring additional changes outside of those planned in the TMP.

Along Tower Street South under total conditions, the intersections performed acceptably up to the 2031 horizon and poorly under both the 2039 and 2049 horizons with only TMP-planned upgrades applied. As such, a number of improvements are required to ensure the LOS and delays are acceptable, namely addition/expansion of exclusive left and/or right turn lanes on most approaches, lengthening of signal cycles, provisions for protected left turning signal phases, and addition of a second through lane in both the north and south directions at intersections where such do not already exist.

6.2.2 Queue Operations

Queue operations at each key intersection were also reviewed to ensure that the turn lane configurations are sufficient to accommodate any resulting queues without interference with the through movements. Under the 2039 and 2049 background conditions, the existing turn lanes are sufficient for the expected volumes through the network. Under future total conditions however, the storage lanes were found to be insufficient (i.e. the queue lengths will exceed the available storage lengths) along Tower Street South. Recommended lengths of storage lanes were provided which would be more suitable for the expected storage requirements.

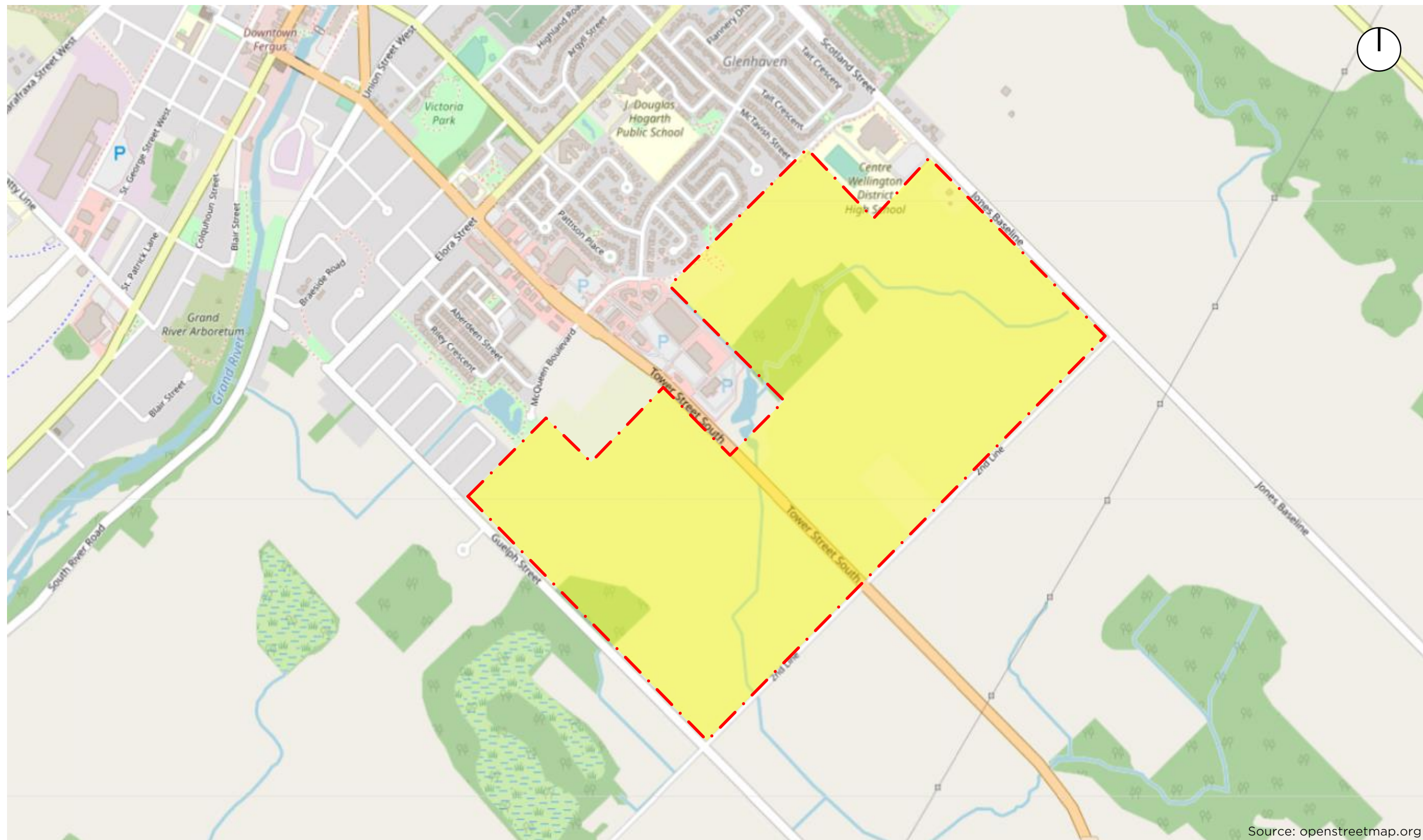
6.2.3 Mid-Block Operations

A review of the volume-to-capacity ratios of the project area roads between key intersections (i.e. the mid-block of the road sections) was conducted to ensure that the road network had sufficient capacity to accommodate existing and future volumes. The existing network was found to be sufficient for existing conditions. Similarly, the future network proposed in the Township TMP was found to be sufficient on all roads excluding Tower Street South through the 2049 horizon under total conditions.

Tower Street South operated close to or over-capacity under the background conditions between the Skyline Retail Plaza and 2nd Line intersections due to the 2-lane cross-section currently present, and the lack of upgrades for this segment of road put forth in the TMP. Under total conditions, the same road segment operated at or close to double its rated capacity. Based on these findings, it is recommended that the noted road segment be upgraded to a minimum 4-lane cross-section with 2 through lanes per direction by the 2031 horizon.

6.2.4 Highway 6 & 2nd Line Roundabout Feasibility

A review of intersection and queueing operations was conducted at the intersection of Highway 6 and 2nd Line under 2049 total conditions with the intersection configured as a 2-lane roundabout. Results of the analysis in this configuration were compared to the intersection and queueing operations of the intersection using the signalized configuration established in the initial future total analyses. The comparison demonstrated that the roundabout configuration was superior during the weekday AM peak hour, whereas the signalized configuration was superior during the weekday PM peak hour. Based on these results, the recommended configuration is a signalized intersection.

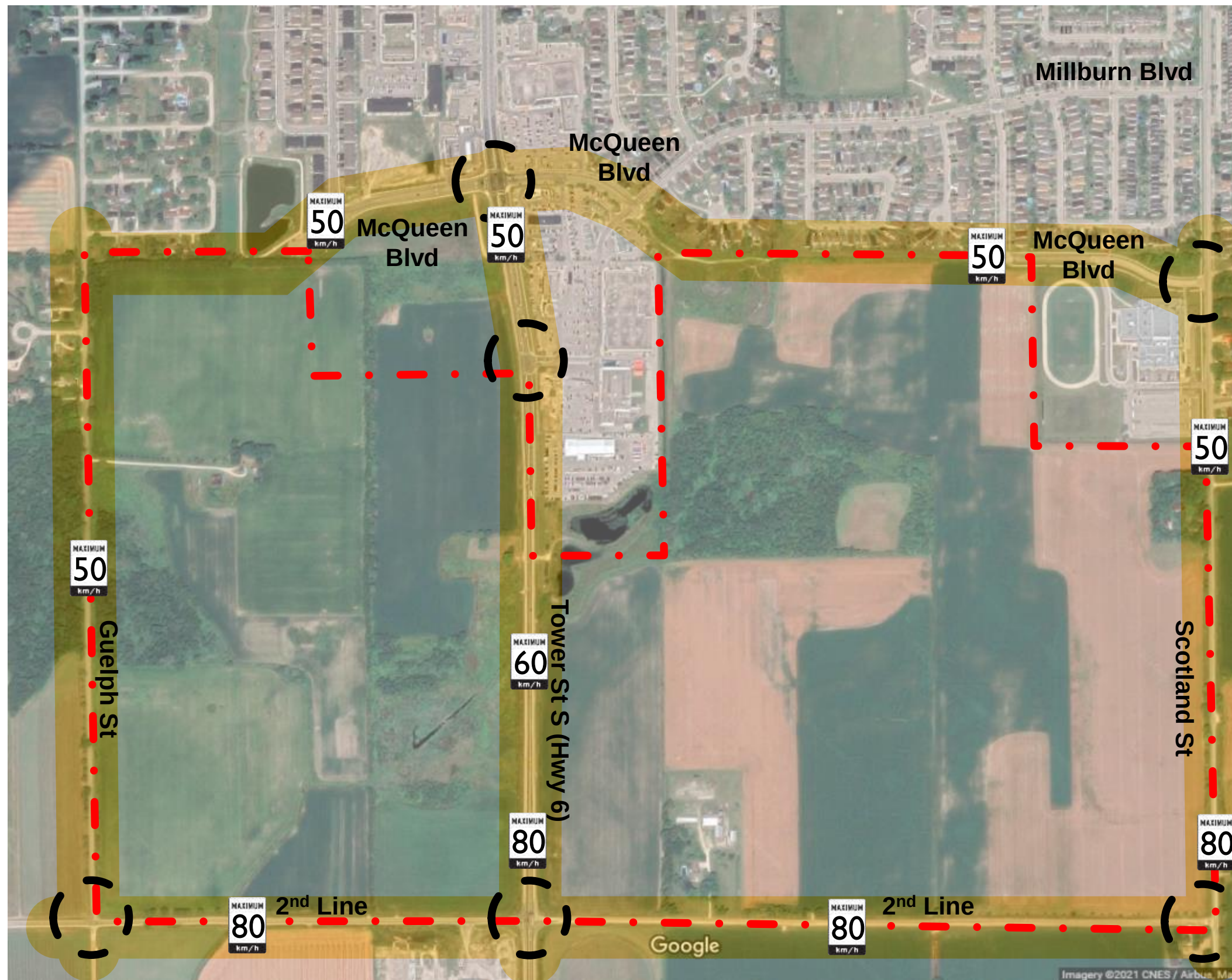


Source: openstreetmap.org

SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 1: Site Location





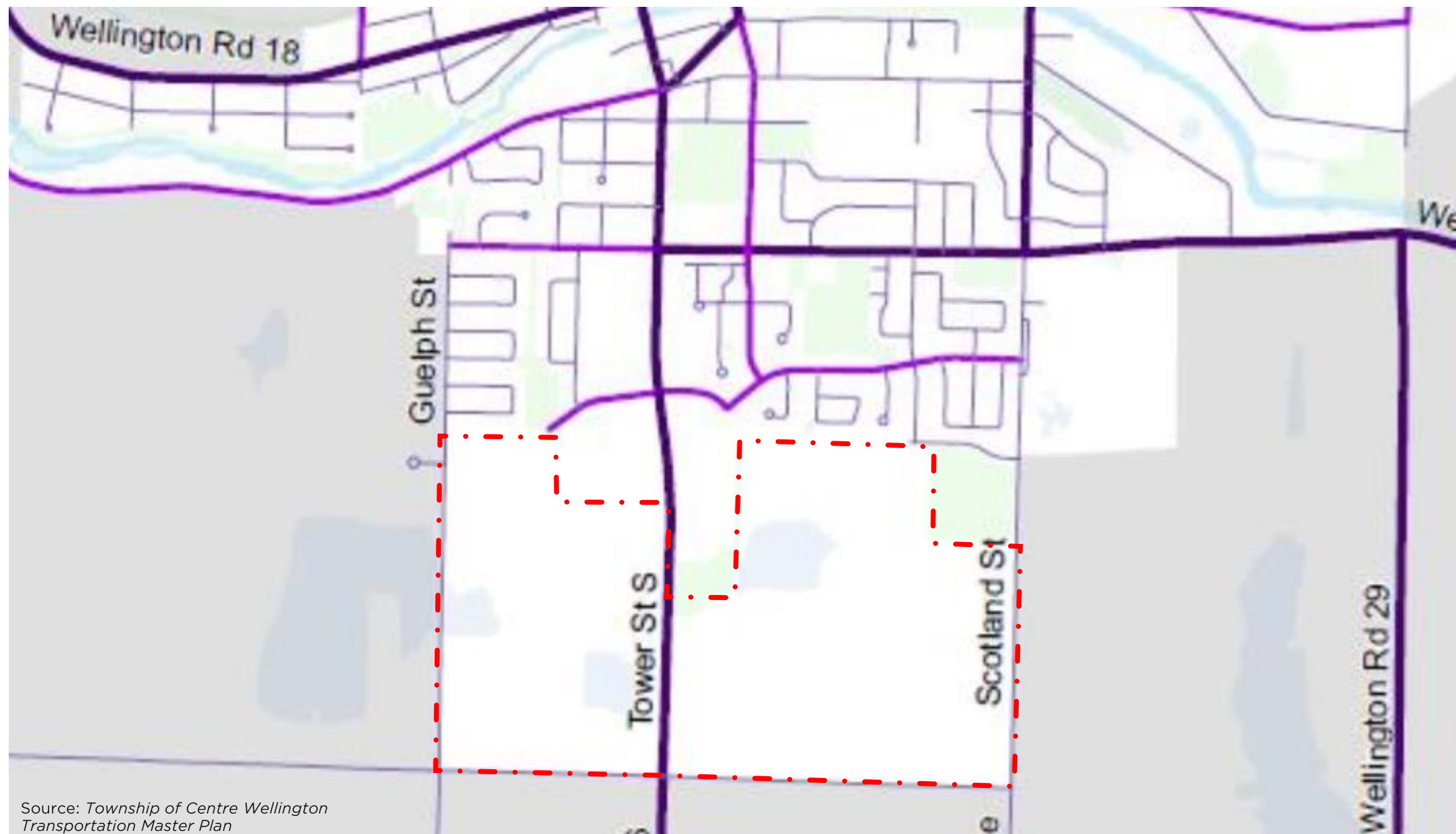
- Key Road Section
- Key Intersection
- Speed Limit

Source: Google Earth

SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 2: Project Area Road Network





- Project Area
- Arterial
- Collector
- Local
- Urban Area



► **Arterial Roadways:** Serve as the major connecting links for inter-urban traffic and generally consist of Provincial highways and County roads.



► **Collector Roadways:** Provide access between local and arterial roads and generally helps to circulate traffic within an individual neighbourhood.



► **Local Roadways:** Connect adjacent properties to collector roads. They are not intended to act as through routes or play a main connecting role in the traffic network.

SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 3: Project Area Road Classification & Hierarchy





Source: Google Streetview

◀ Tower Street South (Highway 6) looking north to McQueen Boulevard



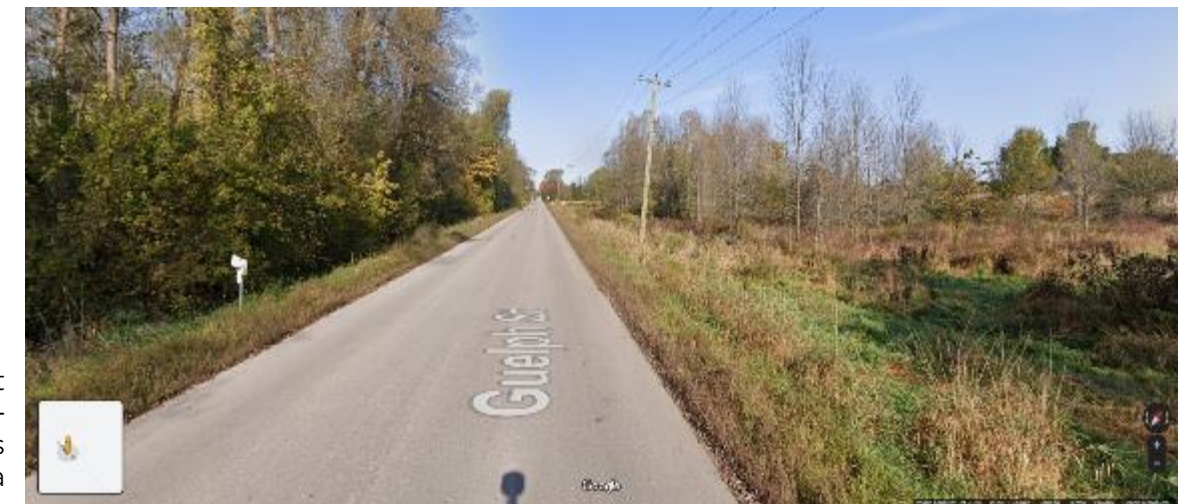
Source: Google Streetview

▶ Guelph Street looking north at north limit of South Fergus Secondary Plan area



Source: Google Streetview

◀ Tower Street South (Highway 6) looking north to Gates of Fergus Access



Source: Google Streetview

▶ Guelph Street looking north at mid-point of South Fergus Secondary Plan area



◀ Tower Street South (Highway 6) looking north at 2nd Line



▶ Guelph Street looking north at 2nd Line

SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 4A: Project Area Road Sections





◀ Scotland Street
looking north to
McQueen Boulevard

Source: Google Streetview



▶ 2nd Line looking east
to Scotland Street

Source: Google Streetview



◀ Scotland Street
looking north to
Centre Wellington
District High School

Source: Google Streetview



▶ 2nd Line looking east
from Tower Street
South (Highway 6)

Source: Google Streetview



◀ Scotland Street
looking north at 2nd
Line

▶ 2nd Line looking
west from Tower
Street South (Highway
6)



SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 4B: Project Area Road Sections





Source: Google Streetview

◀ McQueen Boulevard looking west to West Limits

▶ McQueen Boulevard looking east to Millburn Boulevard



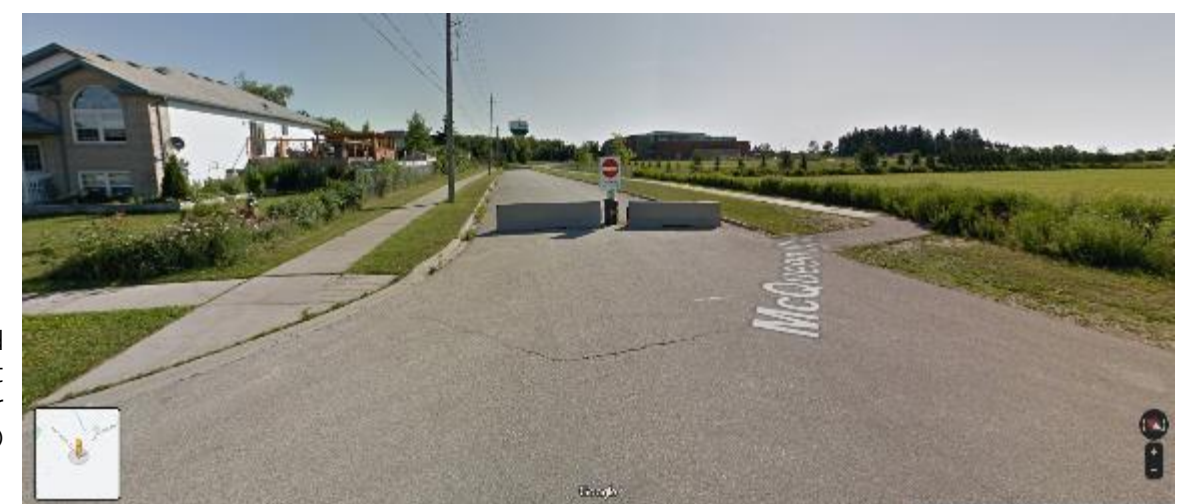
Source: Google Streetview



Source: Google Streetview

◀ McQueen Boulevard looking east to Tower Street South (Highway 6)

▶ McQueen Boulevard looking west at McTavish Street (prior to road opening)

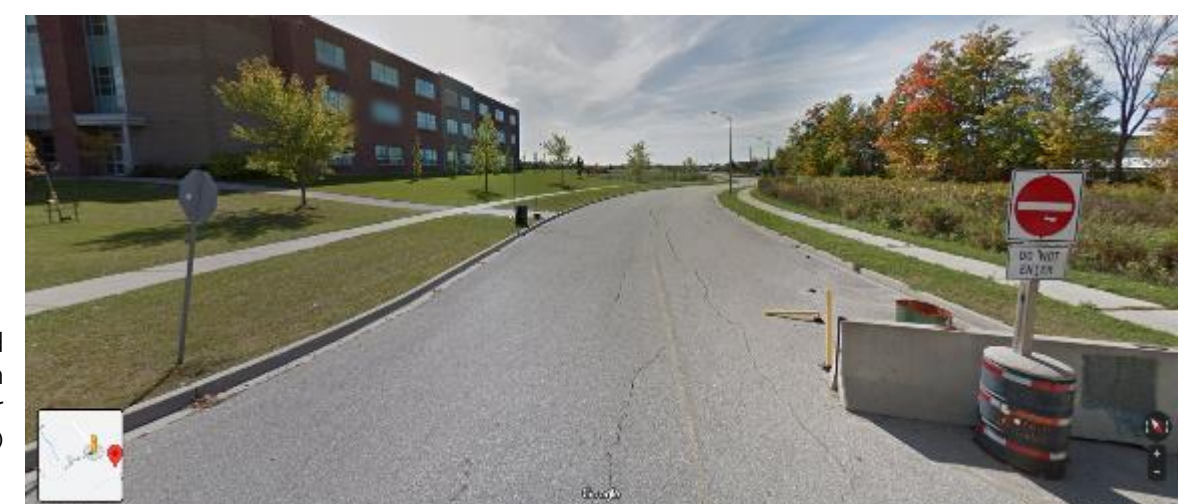


Source: Google Streetview



◀ McQueen Boulevard looking west to Tower Street South (Highway 6)

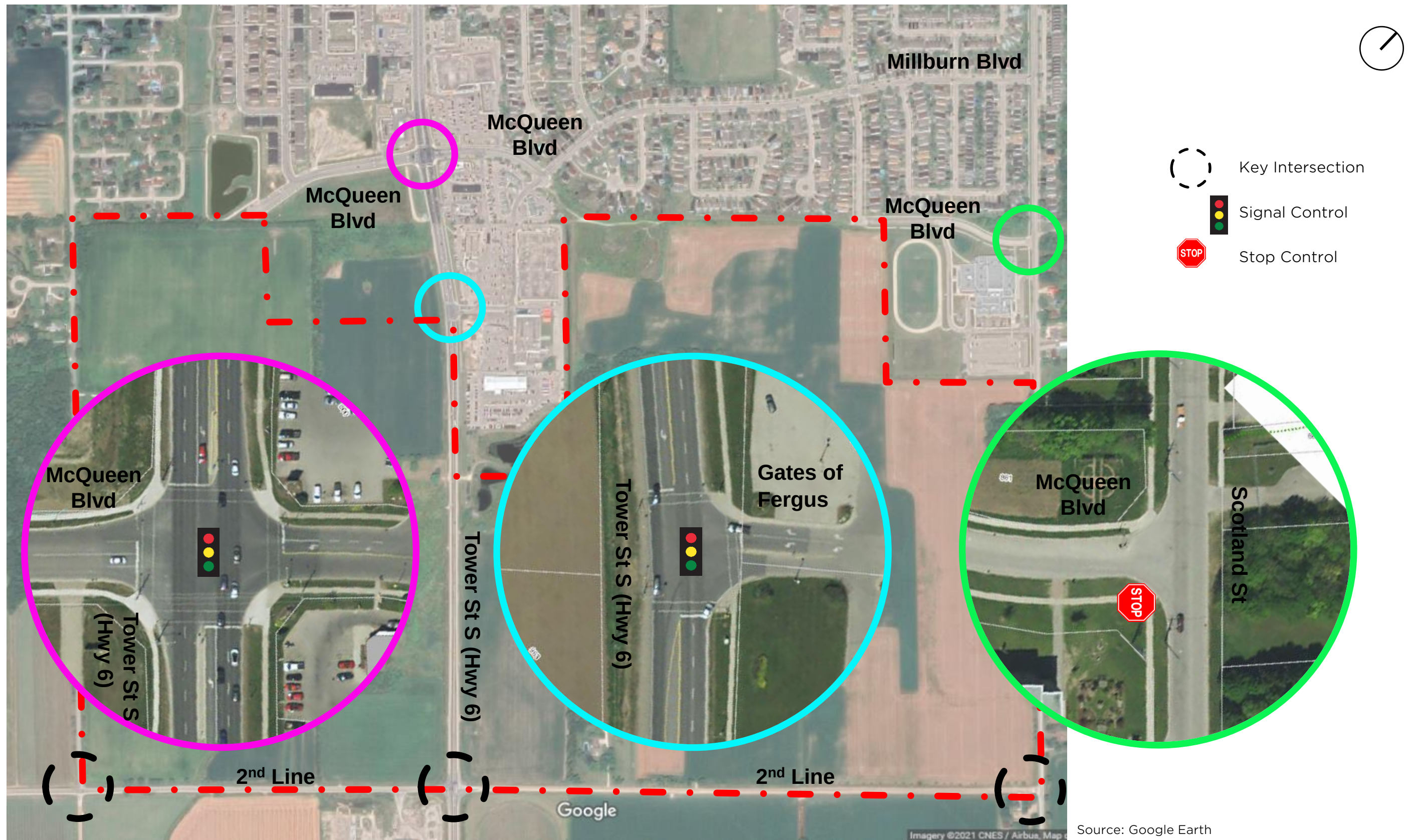
▶ McQueen Boulevard looking west from Scotland Street (prior to road opening)



SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 4C: Project Area Road Sections

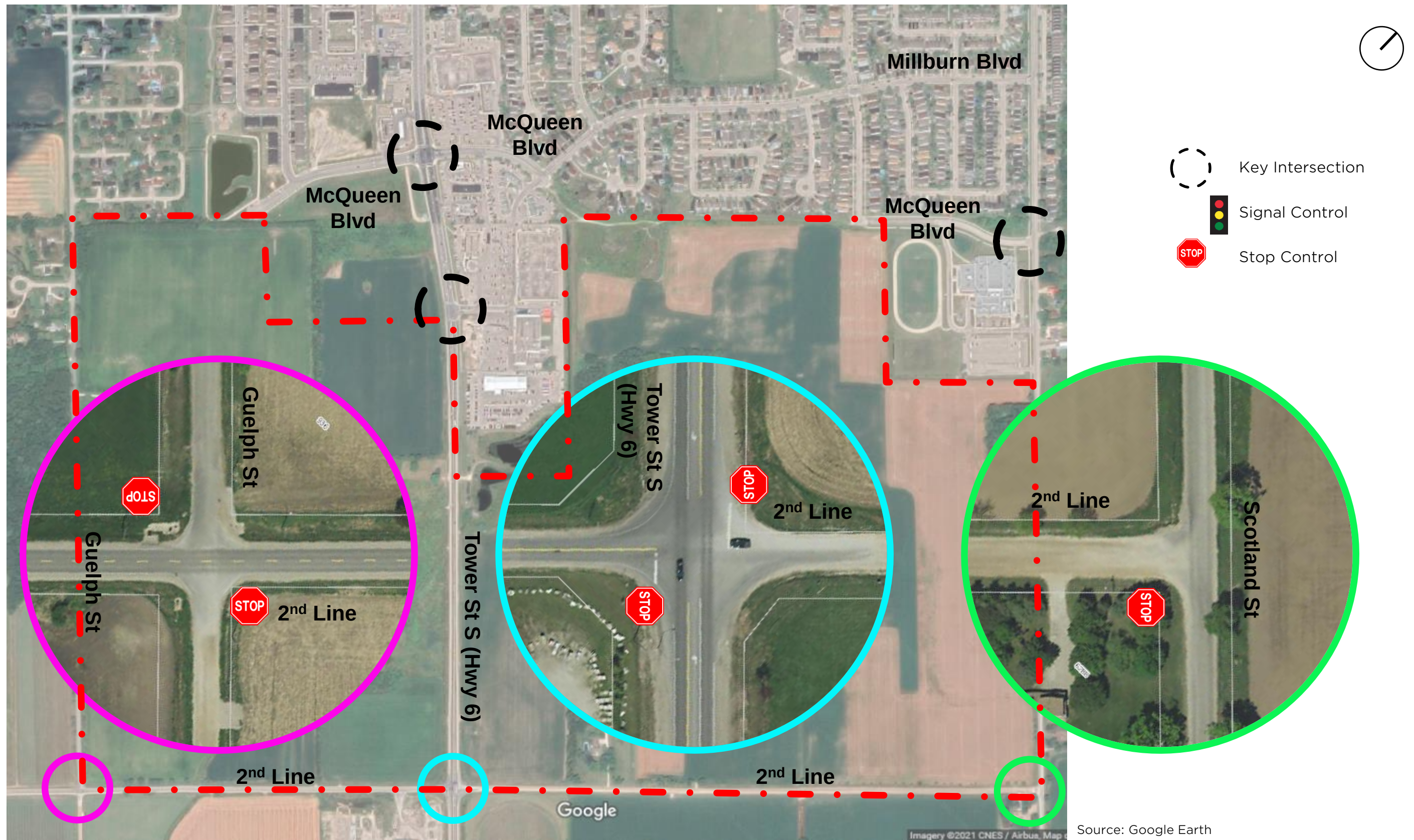




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 5A: Project Area Intersections

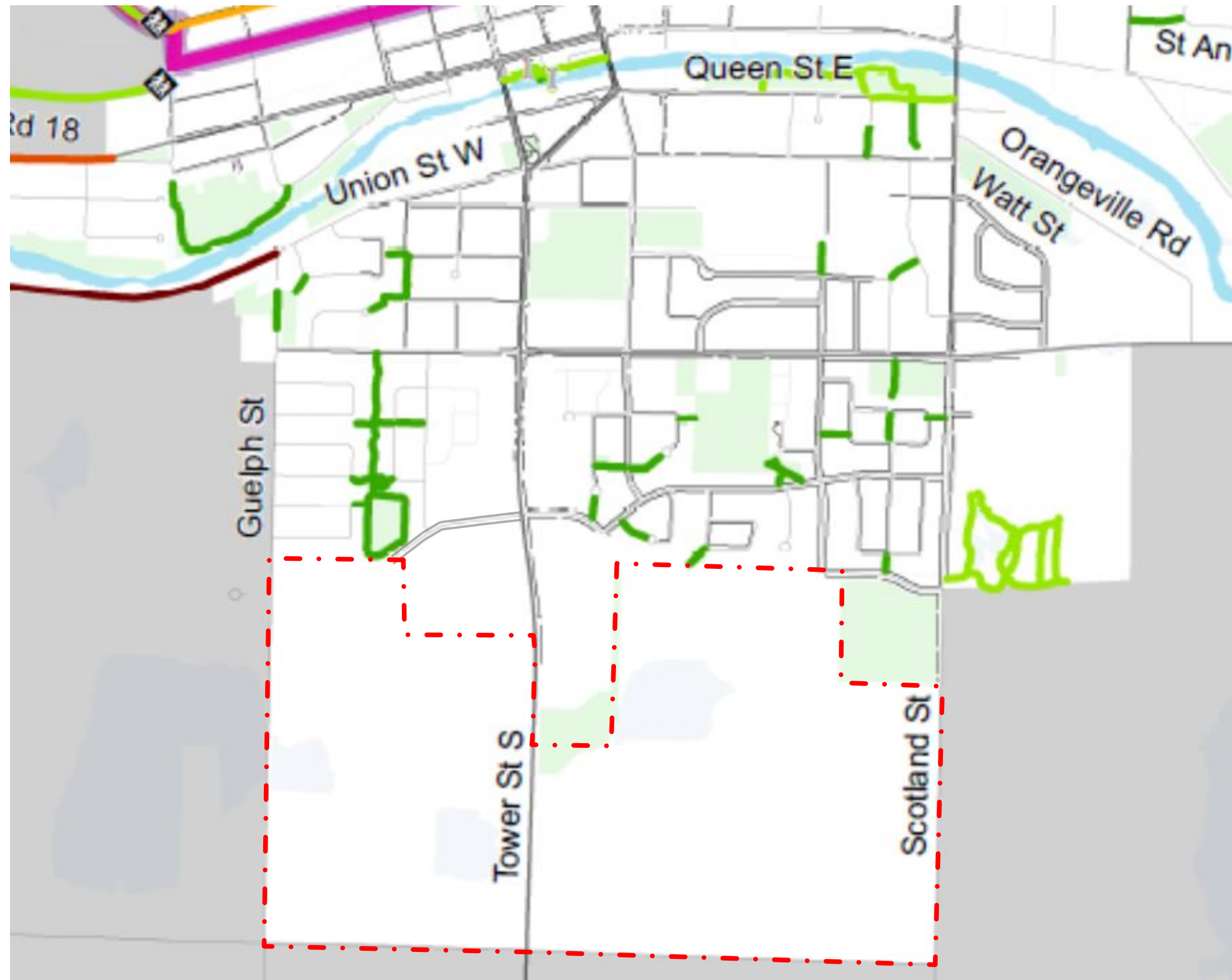




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 5B: Project Area Intersections





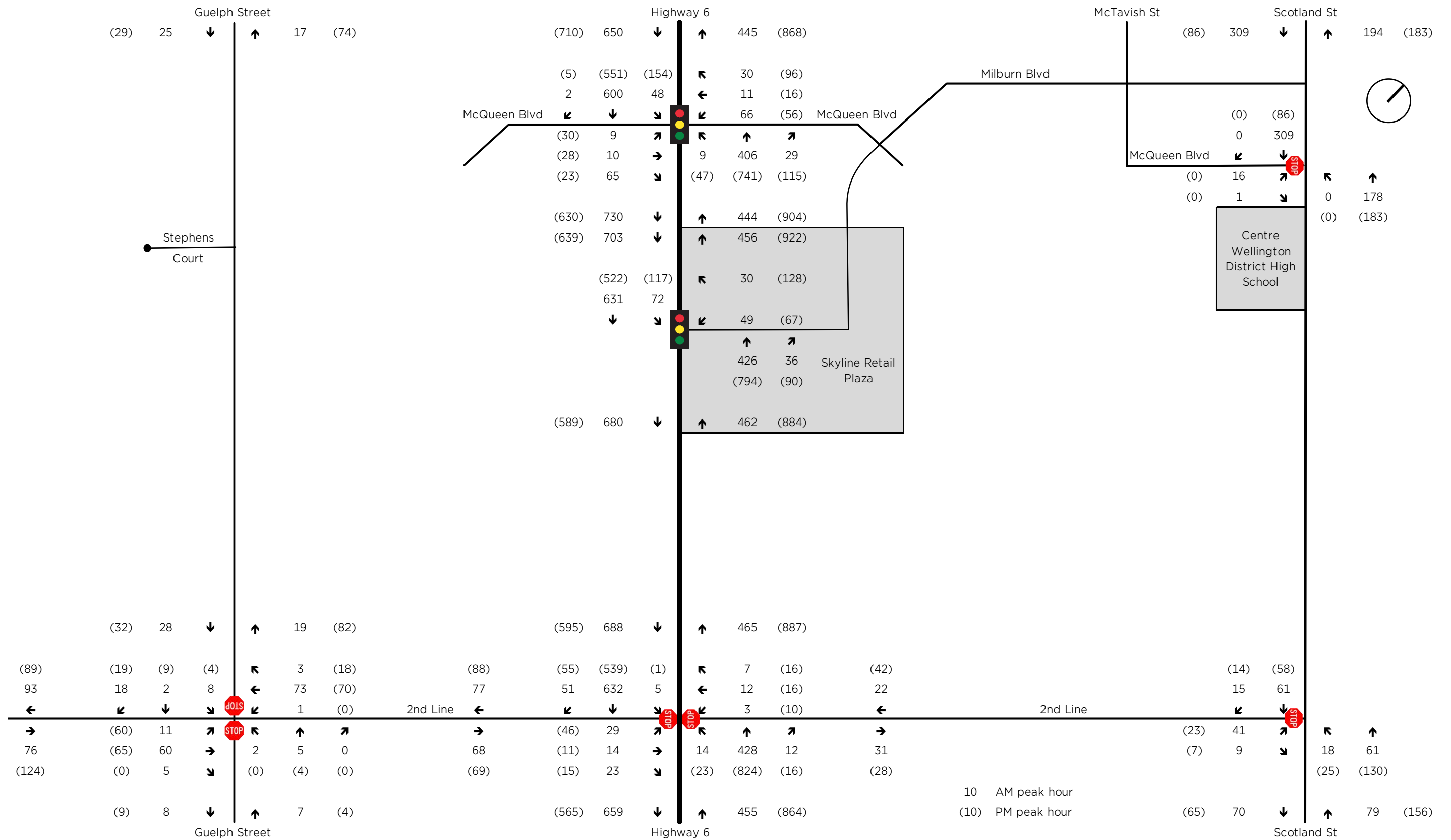
-  Project Area
-  Existing Off-Road Trail (County)
-  Existing Off-Road Trail (Township)
-  Existing Paved Shoulder (County)
-  Existing Paved Shoulder (Township)
-  Existing Signed Route (Township)
-  Sidewalks
-  Elora Cataract Trail
-  Trans Canada Trail
-  Trailhead

Source: Township of Centre Wellington
Transportation Master Plan



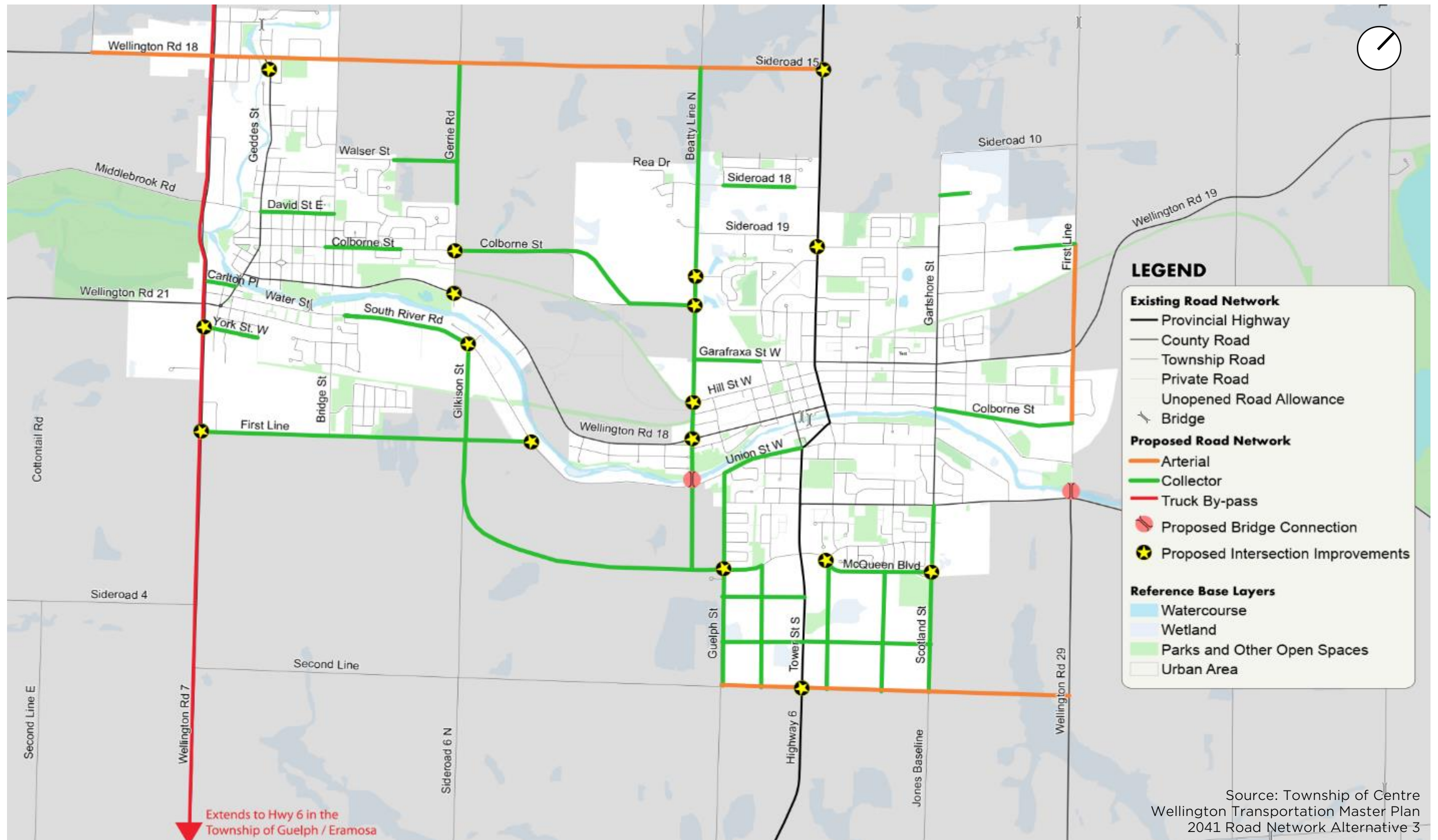
SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 6: Project Area Trail System



SOUTH FERGUSS MESP & SECONDARY PLAN - TRANSPORTATION PLAN
Figure 7: Traffic Volumes – 2022



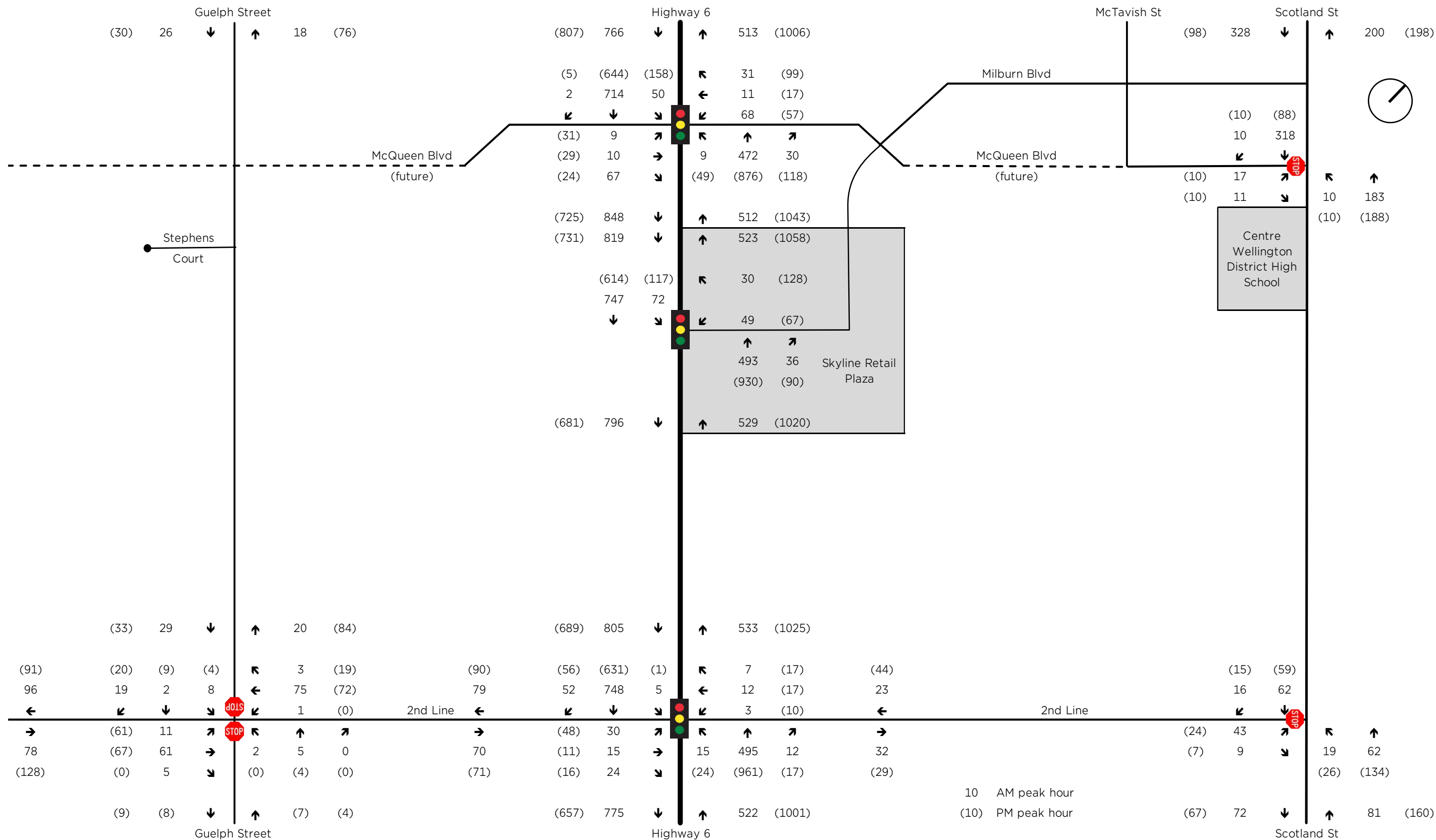


Source: Township of Centre Wellington Transportation Master Plan 2041 Road Network Alternative 3

SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 8: 2041 Road Network

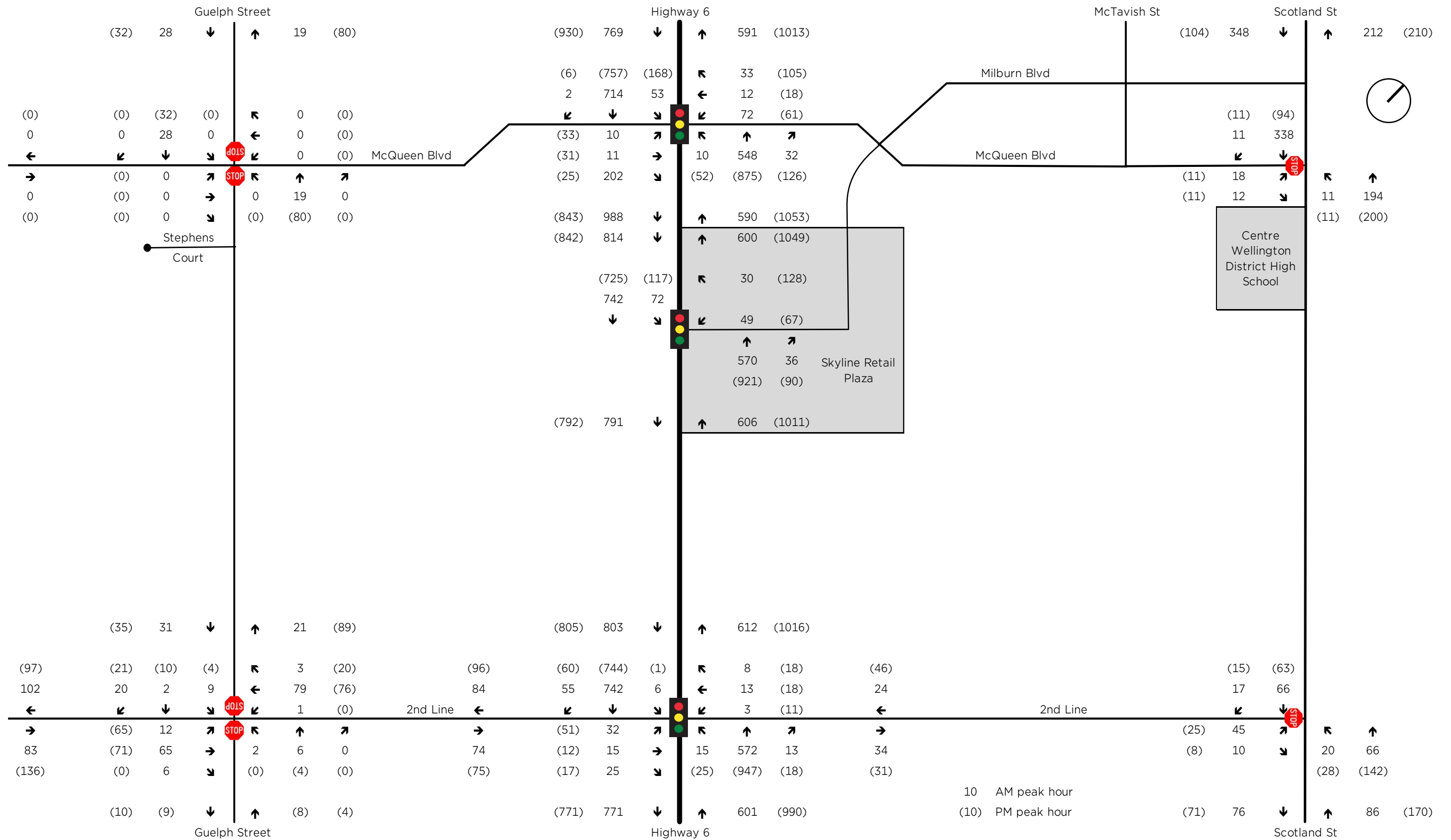




SOUTH FERGUSS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 9: Traffic Volumes – 2025 Background

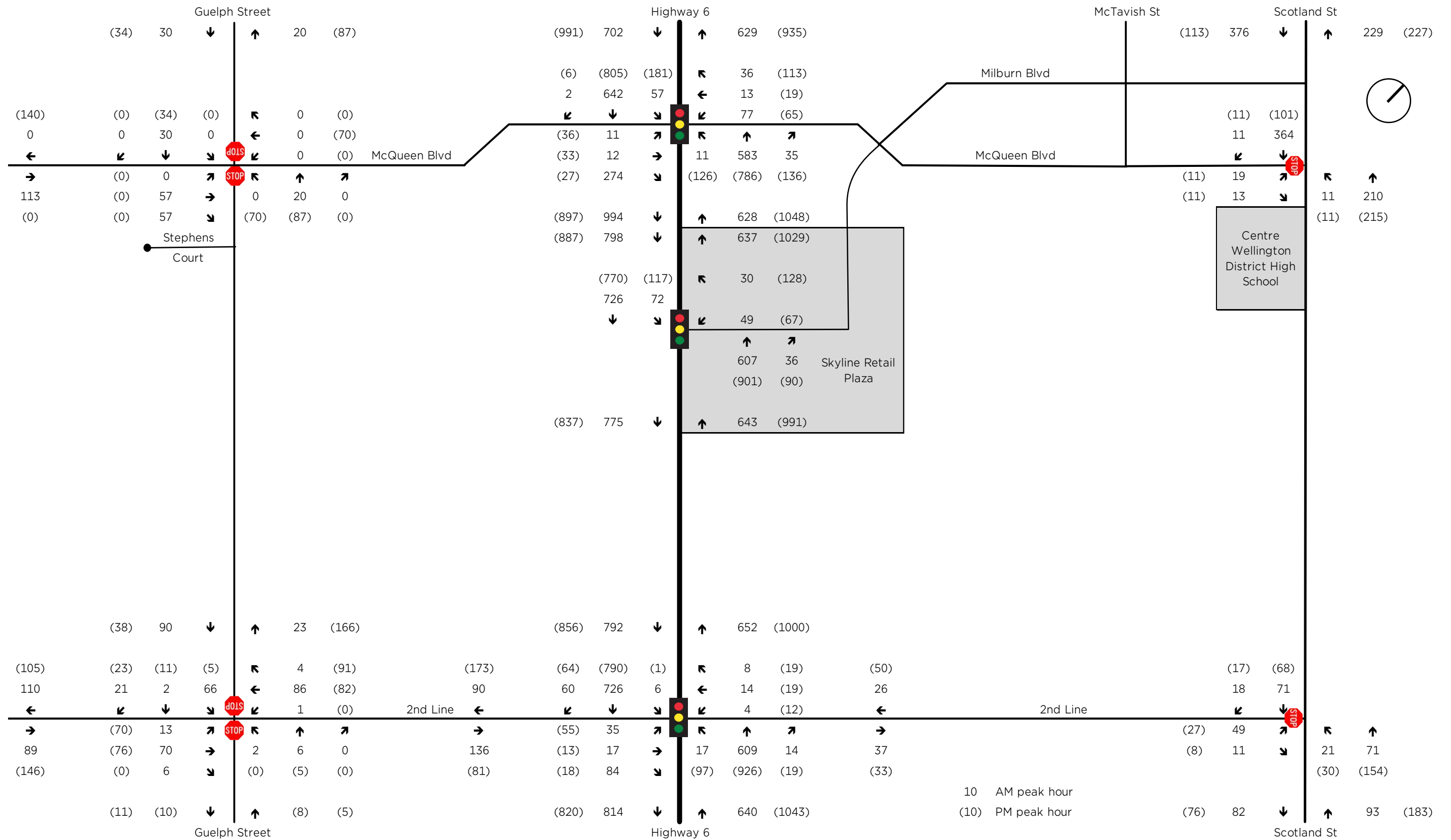




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 10: Traffic Volumes - 2031 Background

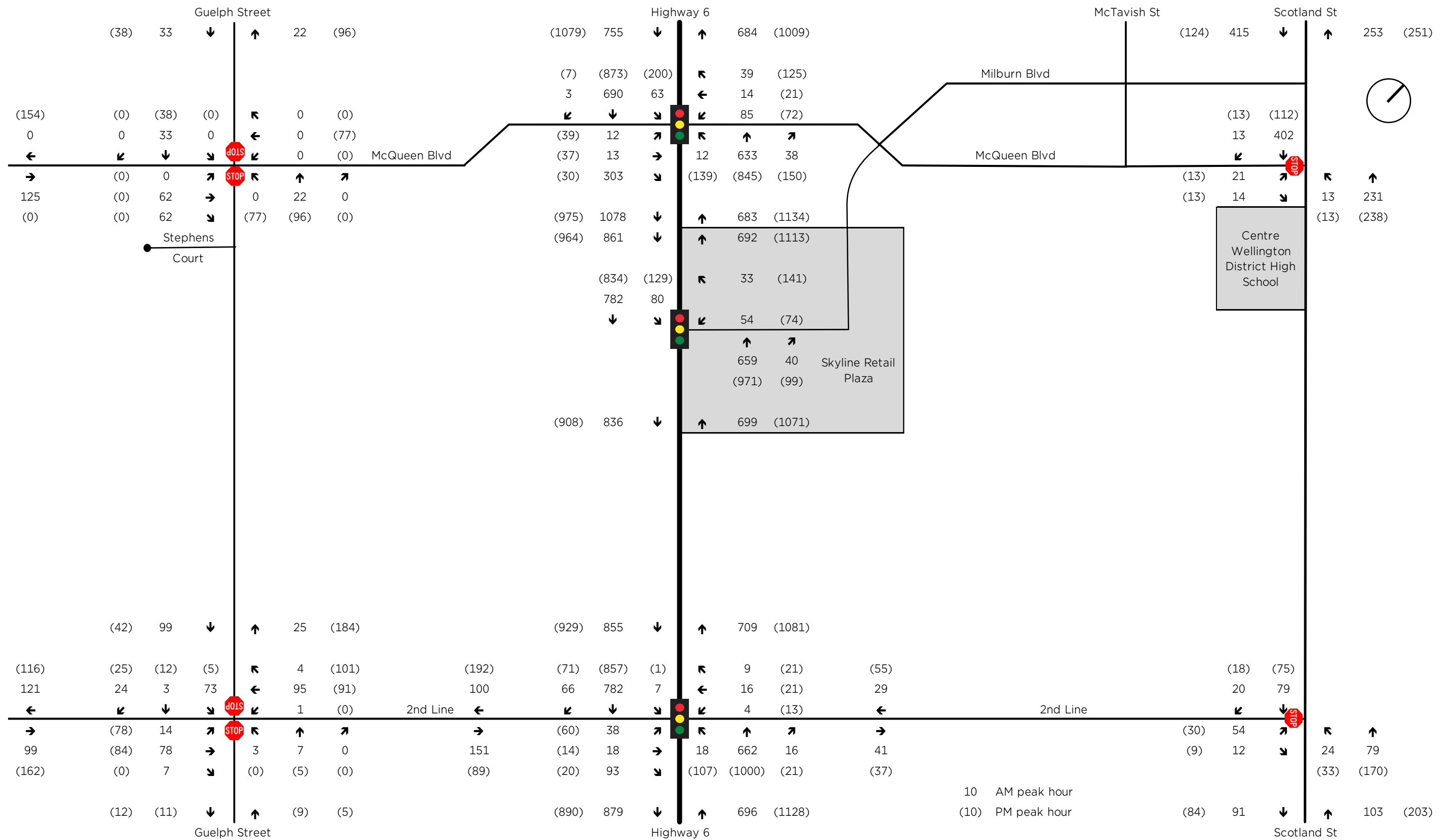




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 11: Traffic Volumes – 2039 Background





SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 12: Traffic Volumes - 2049 Background

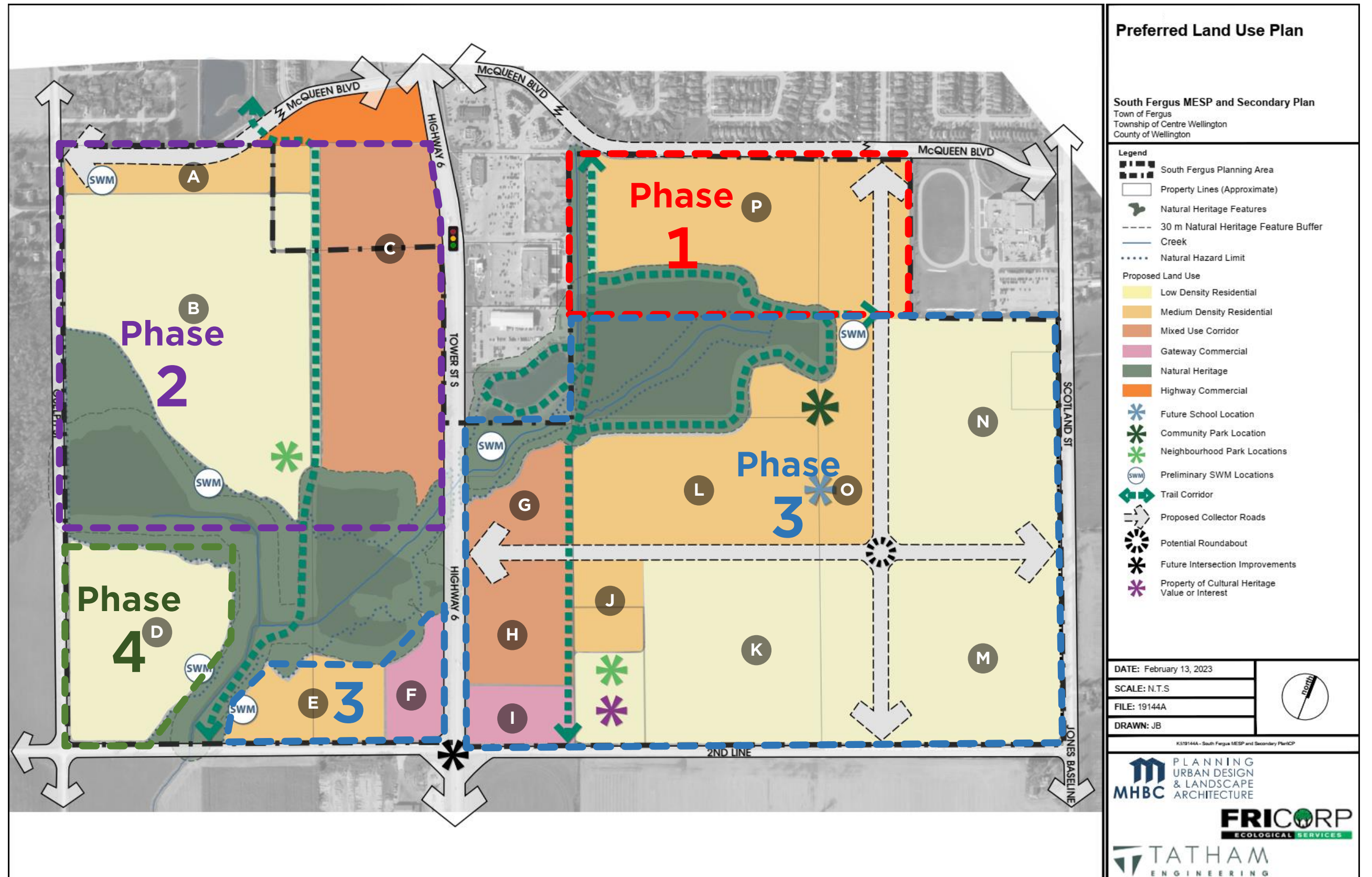




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 13: South Fergus Secondary Plan Area Land Use Plan

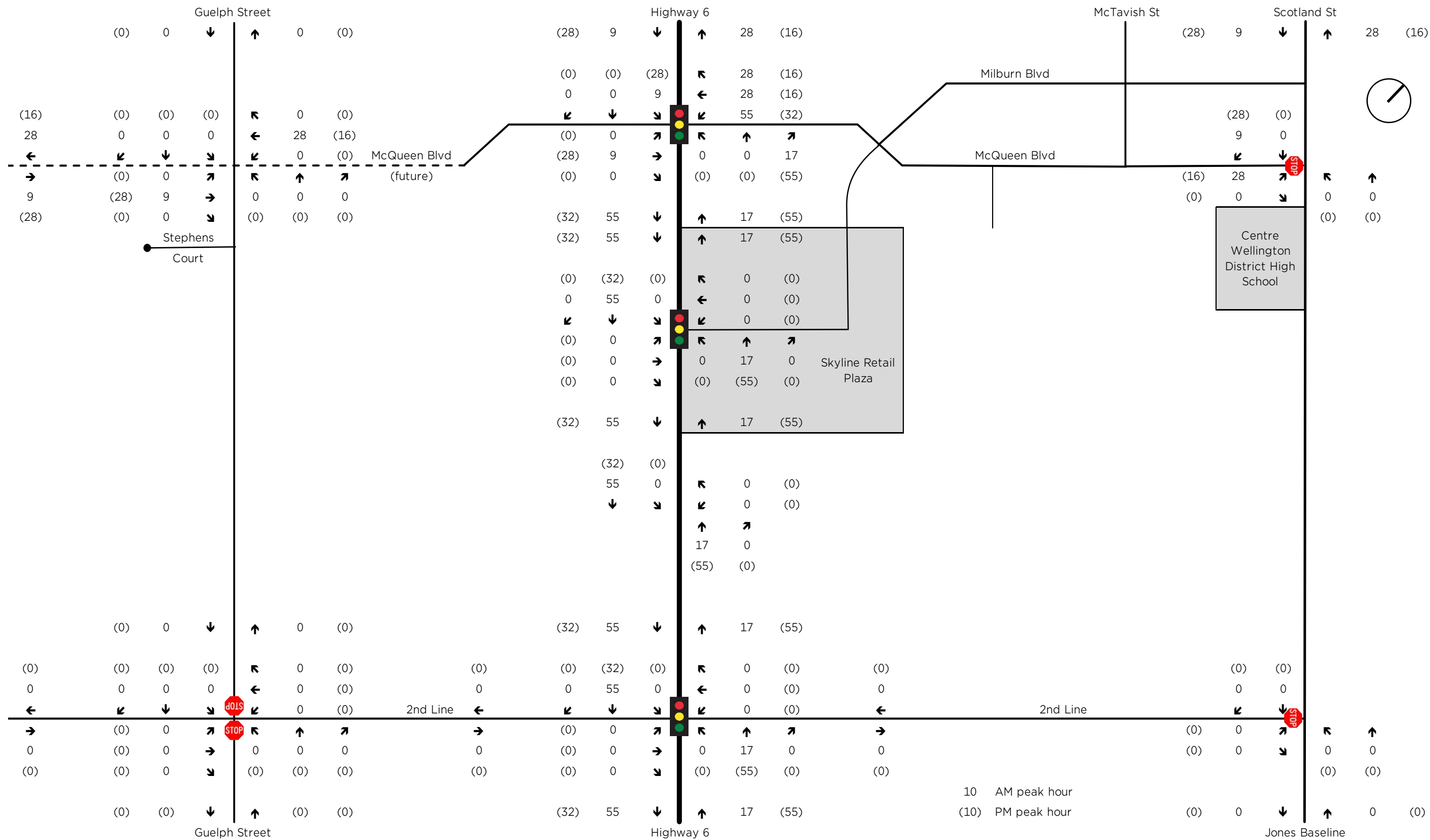




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

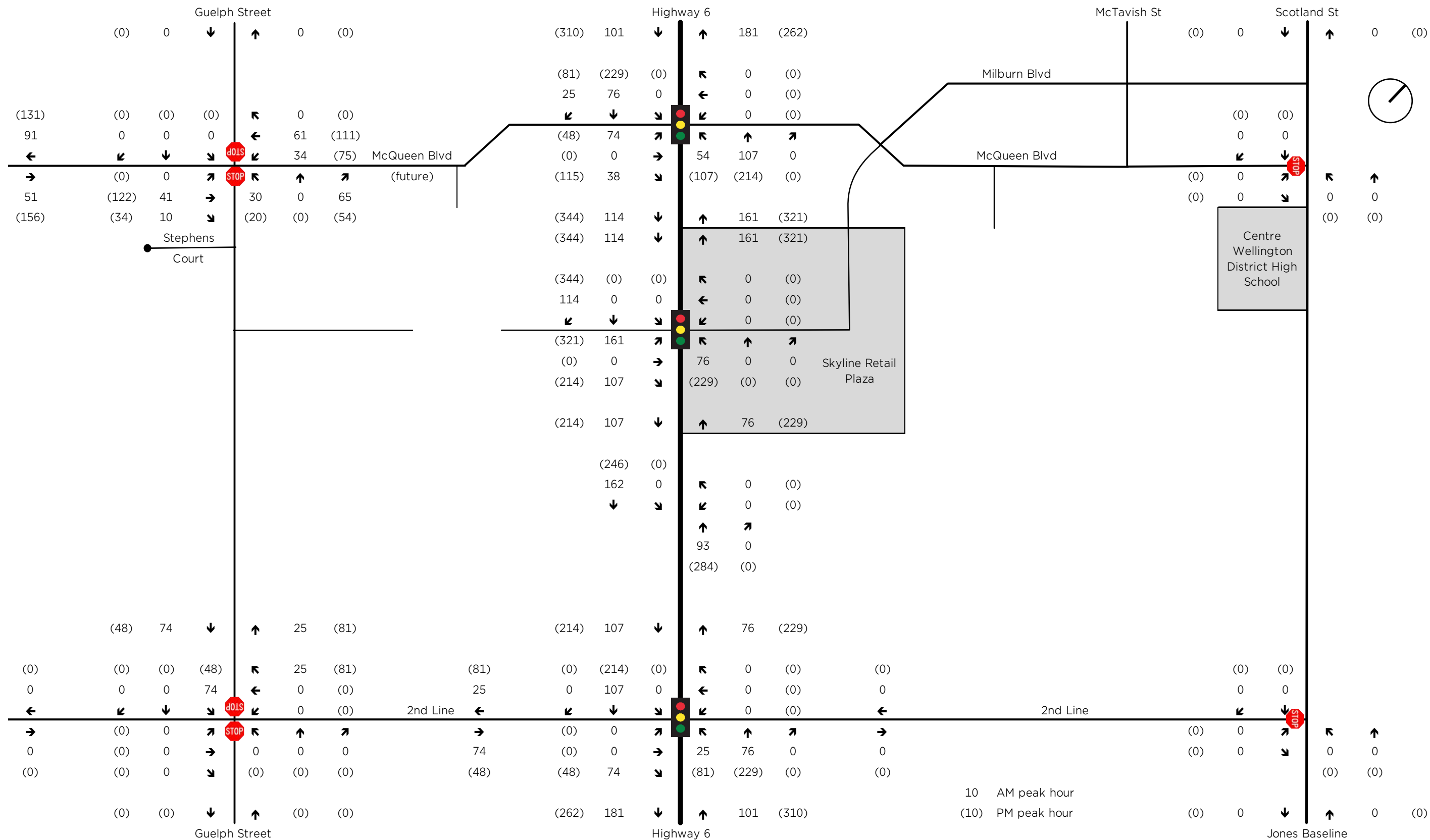
Figure 14: South Fergus Secondary Plan Area Phasing Plan





SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN
 Figure 15: Traffic Volumes – SFSPA Phase 1

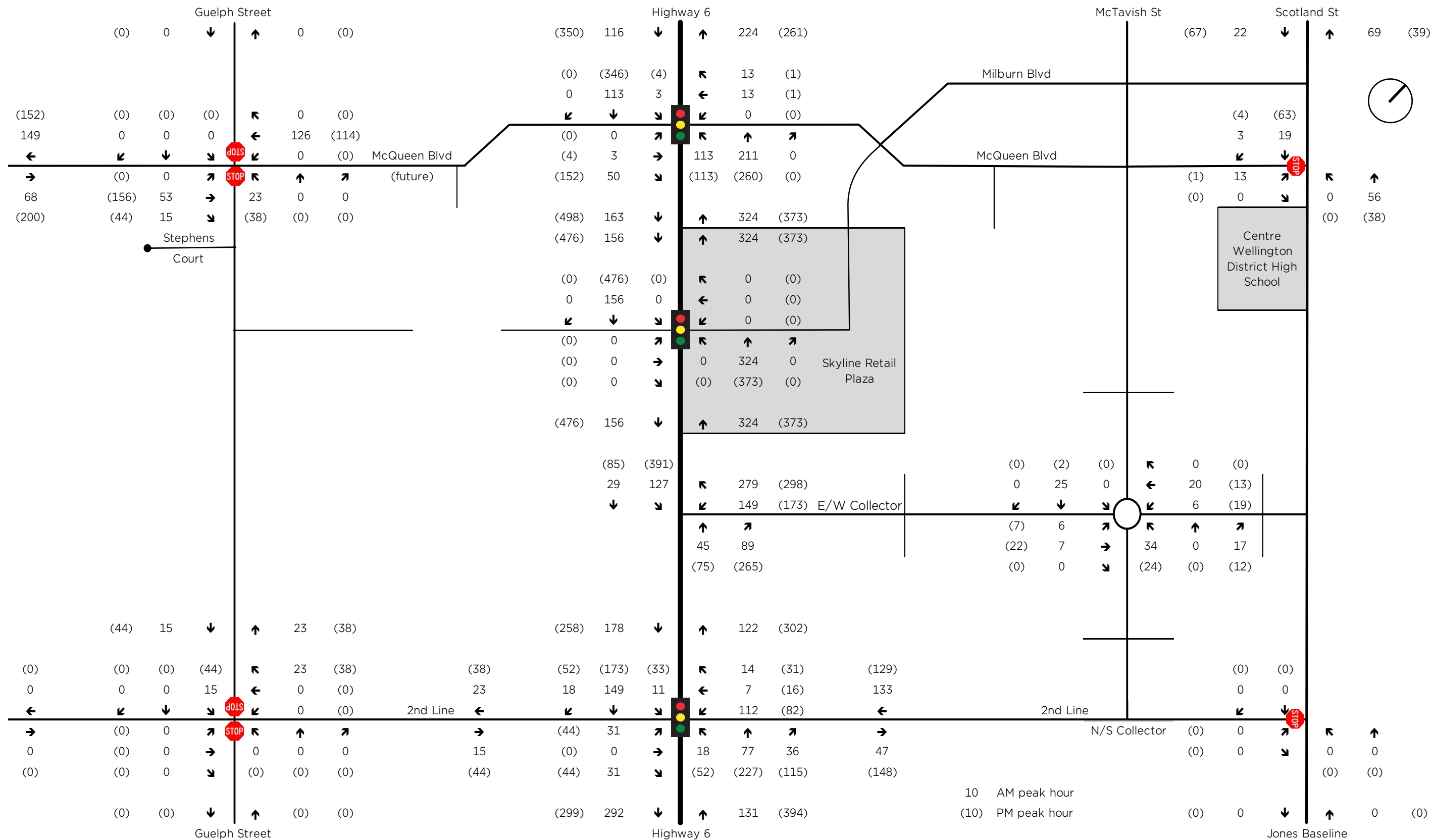




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 16: Traffic Volumes – SFSPA Phase 2

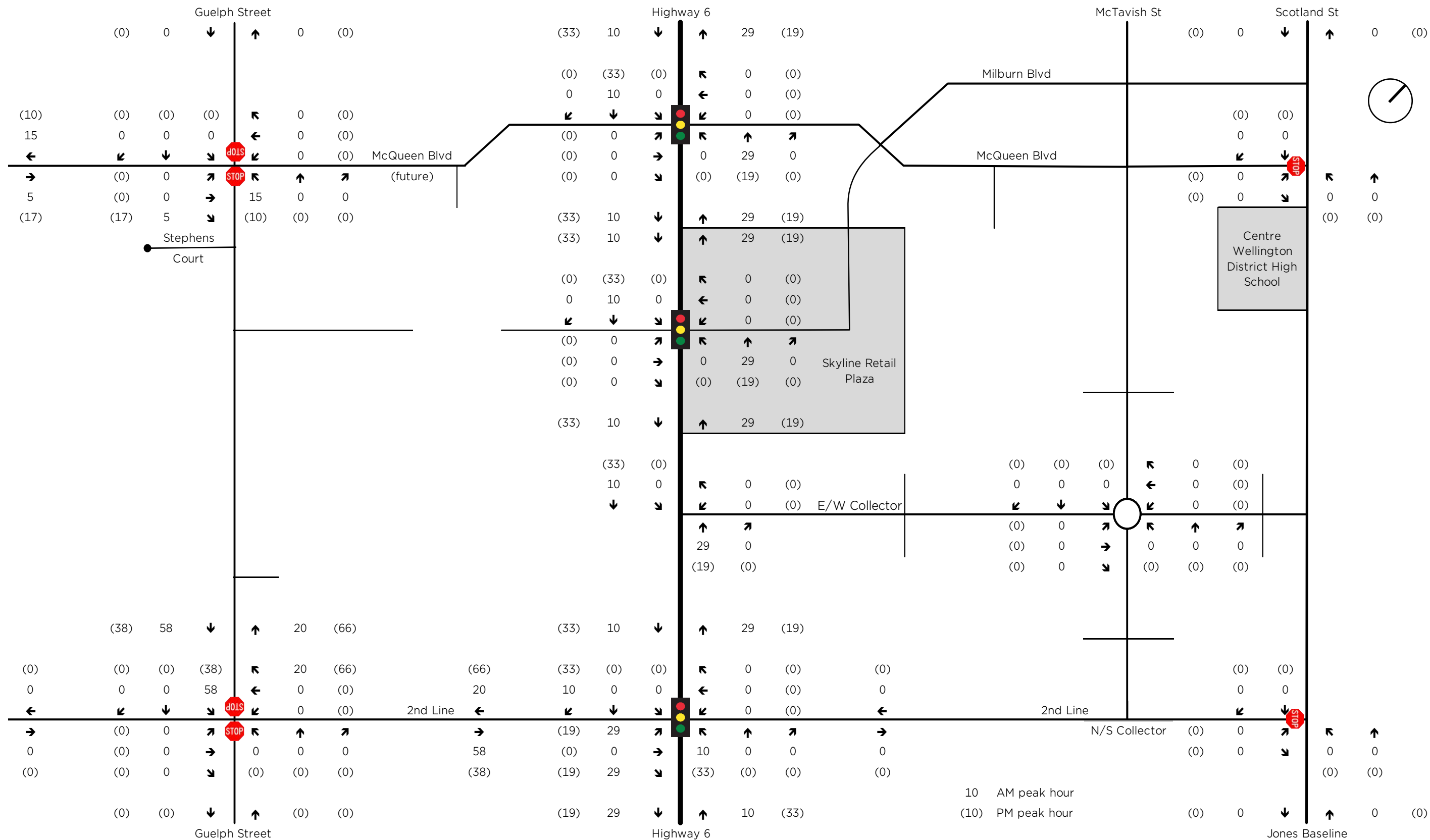




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 17: Traffic Volumes – SFSPA Phase 3

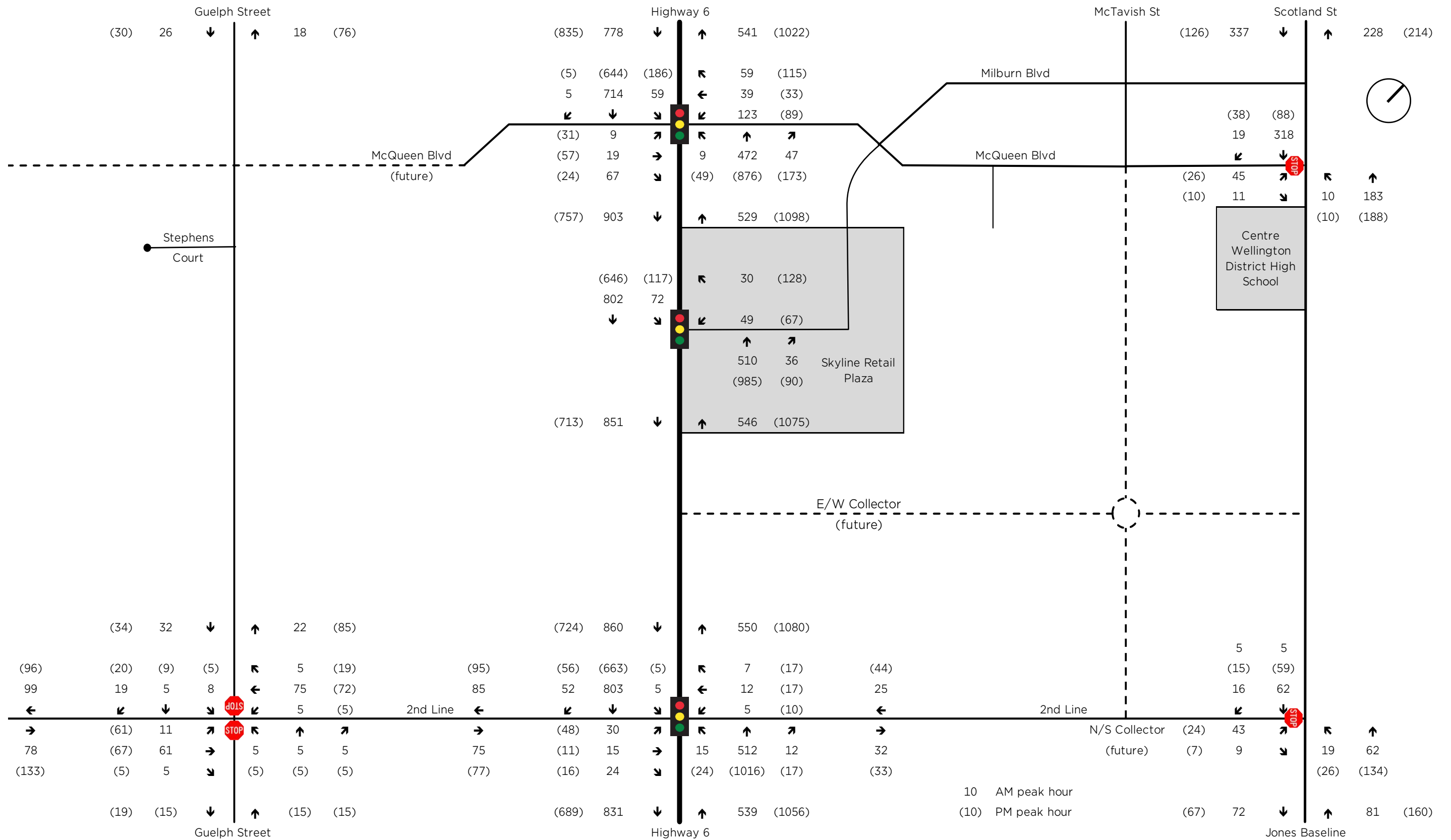




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 18: Traffic Volumes – SFSPA Phase 4

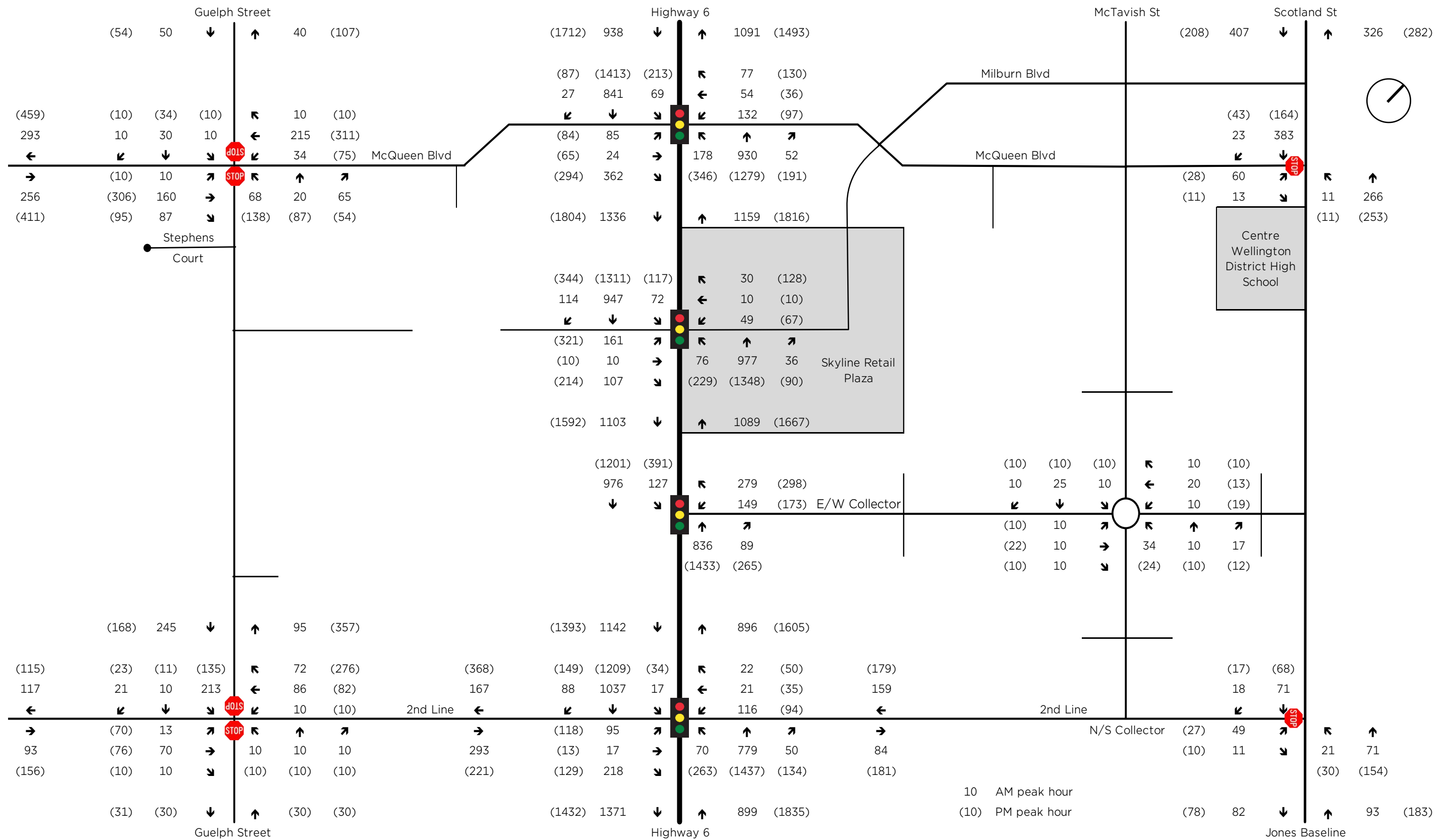




SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

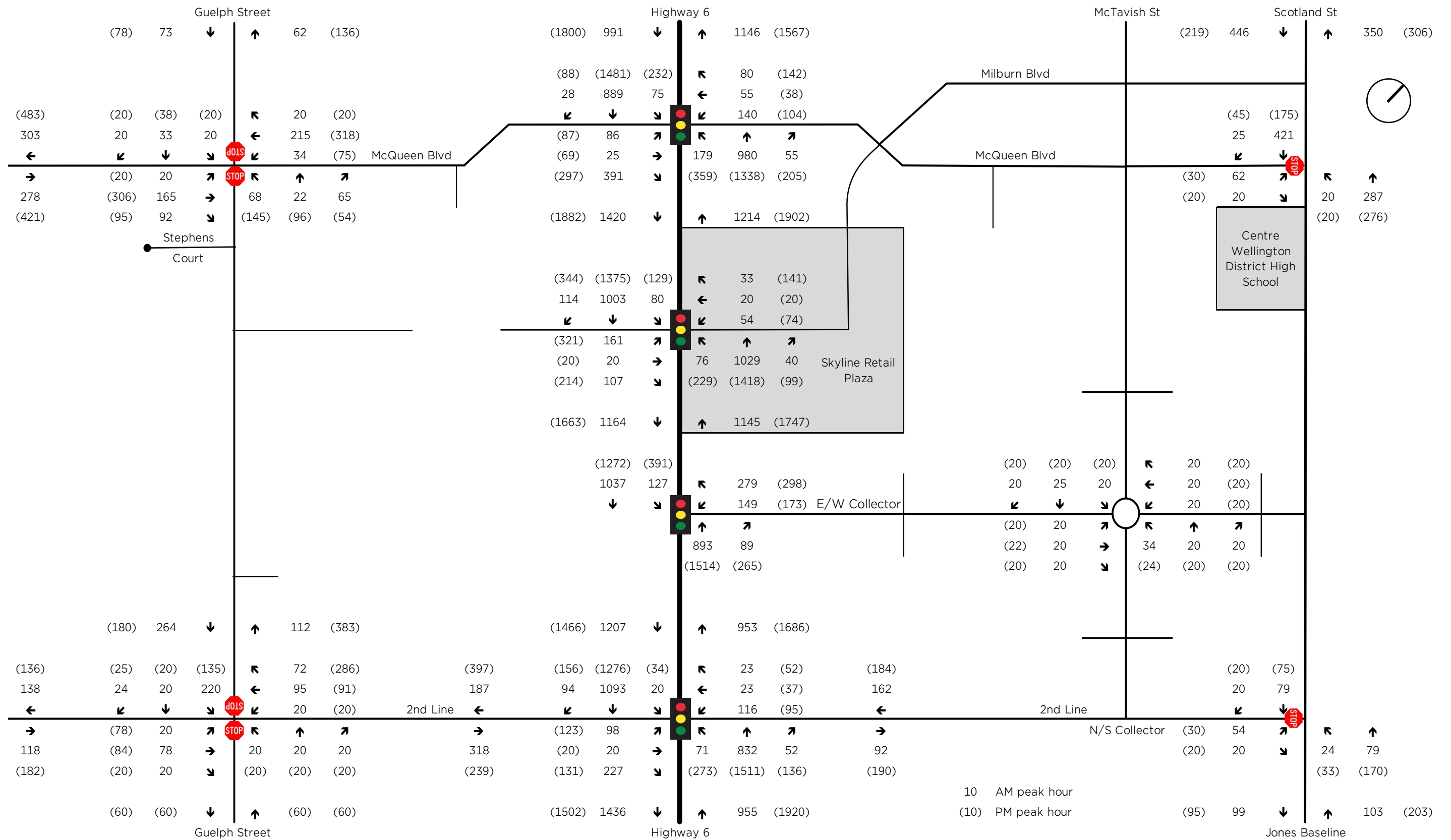
Figure 19: Traffic Volumes – 2025 Total





SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN
Figure 21: Traffic Volumes - 2039 Total





SOUTH FERGUS MESP & SECONDARY PLAN - TRANSPORTATION PLAN

Figure 22: Traffic Volumes - 2049 Total



Appendix A: Preferred Land Use Plan

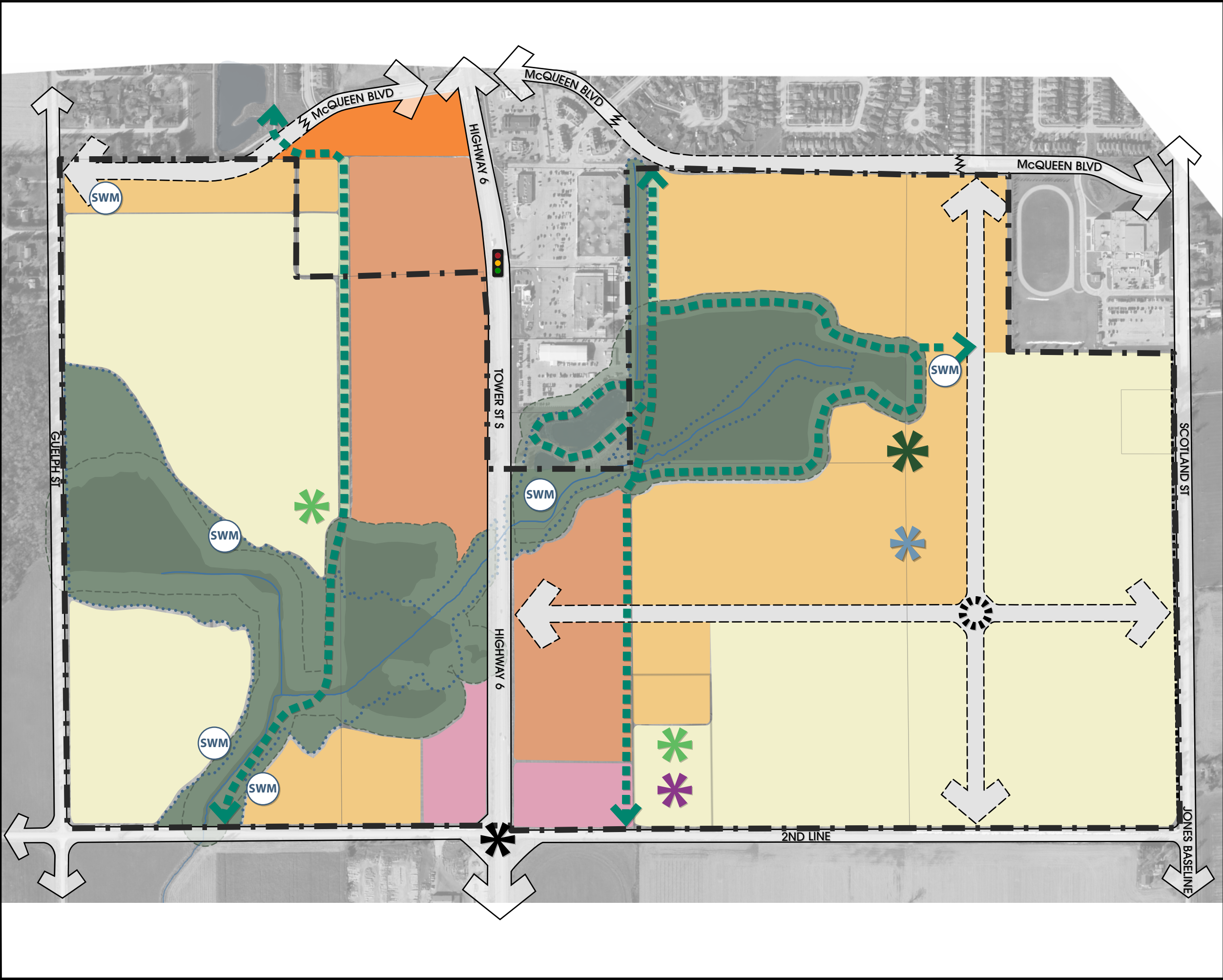


Figure #
Preferred Land Use Plan

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

Legend

- South Fergus Planning Area
- Property Lines (Approximate)
- Natural Heritage Features
- 30 m Natural Heritage Feature Buffer
- Creek
- Natural Hazard Limit

Proposed Land Use

- Low Density Residential
- Medium Density Residential
- Mixed Use Corridor
- Gateway Commercial
- Natural Heritage
- Highway Commercial

- Future School Location
- Community Park Location
- Neighbourhood Park Locations
- Preliminary SWM Locations
- Trail Corridor
- Proposed Collector Roads
- Potential Roundabout
- Future Intersection Improvements
- Property of Cultural Heritage Value or Interest

DATE: February 13, 2023

SCALE: N.T.S

FILE: 19144A

DRAWN: JB

K:\19144A - South Fergus MESP and Secondary Plan\CP

**PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE**

FRICORP
ECOLOGICAL SERVICES

TATHAM
ENGINEERING

Appendix B: Traffic Counts

Project #21-222 - Tatham Engineering Ltd

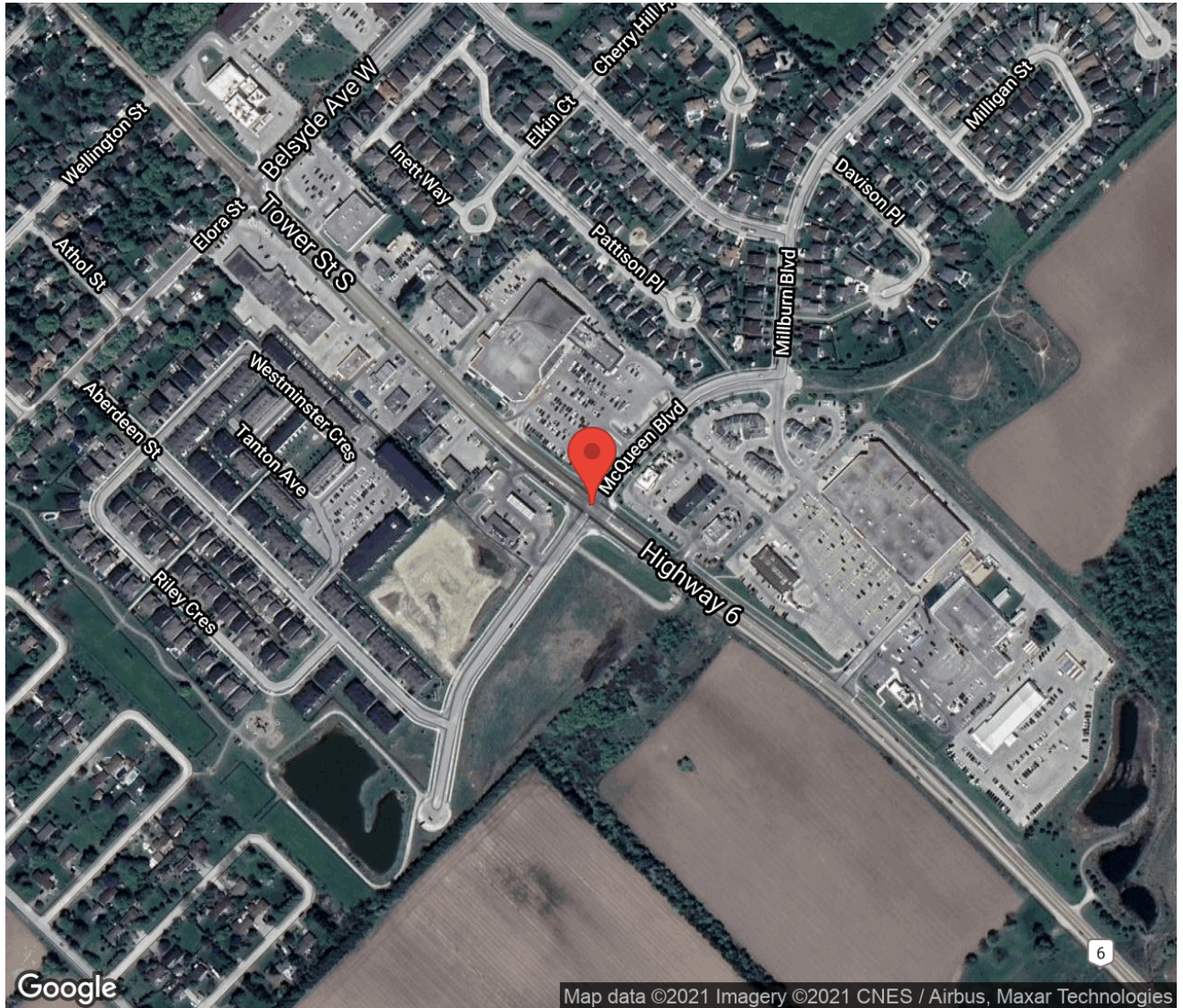
Intersection Count Report

Intersection:	Hwy 6 & McQueen Blvd
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200001
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear



Traffic Count Map

Intersection:	Hwy 6 & McQueen Blvd
Site Code:	2122200001
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

Hwy 6 - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	47	579	1	0	627	1	12	369	26	0	407	1	1034
08:00 - 09:00	73	490	3	0	566	10	15	417	44	0	476	2	1042
BREAK													
16:00 - 17:00	135	540	4	0	679	6	41	735	108	0	884	4	1563
17:00 - 18:00	151	483	7	0	641	3	47	673	103	0	823	0	1464
GRAND TOTAL	406	2092	15	0	2513	20	115	2194	281	0	2590	7	5103

Traffic Count Summary

Intersection: Hwy 6 & McQueen Blvd
 Site Code: 2122200001
 Municipality: South Fergus
 Count Date: Oct 28, 2021

McQueen Blvd - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	60	8	25	0	93	2	8	10	60	0	78	1	171
08:00 - 09:00	55	19	32	0	106	4	18	17	41	0	76	1	182
BREAK													
16:00 - 17:00	51	19	88	0	158	4	26	28	32	0	86	0	244
17:00 - 18:00	53	21	86	0	160	1	38	24	25	0	87	0	247
GRAND TOTAL	219	67	231	0	517	11	90	79	158	0	327	2	844

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	11	103	0	0	114	0	8	0	0	8	0	0	0	0	0	0
07:15	8	147	0	0	155	0	10	0	0	10	0	0	0	0	0	1
07:30	13	151	0	0	164	0	9	0	0	9	0	0	0	0	0	0
07:45	15	143	1	0	159	0	7	0	0	7	0	1	0	0	1	0
08:00	12	118	1	0	131	0	8	0	0	8	0	0	0	0	0	0
08:15	12	113	0	0	125	0	8	0	0	8	0	0	0	0	0	4
08:30	26	127	0	0	153	0	9	0	0	9	0	0	0	0	0	5
08:45	22	101	2	0	125	1	6	0	0	7	0	0	0	0	0	1
SUBTOTAL	119	1003	4	0	1126	1	65	0	0	66	0	1	0	0	1	11

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	37	126	1	0	164	0	13	0	0	13	0	0	0	0	0	0
16:15	36	152	1	0	189	0	5	0	0	5	0	0	0	0	0	3
16:30	33	128	1	0	162	0	8	0	0	8	0	0	0	0	0	0
16:45	29	105	1	0	135	0	3	0	0	3	0	0	0	0	0	3
17:00	54	141	2	0	197	0	4	0	0	4	0	0	0	0	0	0
17:15	36	128	2	0	166	0	3	0	0	3	0	0	0	0	0	1
17:30	28	108	2	0	138	0	3	0	0	3	0	0	0	0	0	0
17:45	31	89	1	0	121	2	7	0	0	9	0	0	0	0	0	2
SUBTOTAL	284	977	11	0	1272	2	46	0	0	48	0	0	0	0	0	9
GRAND TOTAL	403	1980	15	0	2398	3	111	0	0	114	0	1	0	0	1	20

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	4	60	5	0	69	0	7	0	0	7	0	0	0	0	0	0
07:15	1	75	7	0	83	0	8	0	0	8	0	0	0	0	0	0
07:30	3	83	8	0	94	0	10	0	0	10	0	0	0	0	0	0
07:45	4	115	4	0	123	0	11	2	0	13	0	0	0	0	0	1
08:00	1	87	8	0	96	0	13	0	0	13	0	0	0	0	0	0
08:15	2	103	3	0	108	0	11	0	0	11	0	0	0	0	0	2
08:30	4	76	20	0	100	1	9	0	0	10	0	0	0	0	0	0
08:45	6	105	12	0	123	1	13	1	0	15	0	0	0	0	0	0
SUBTOTAL	25	704	67	0	796	2	82	3	0	87	0	0	0	0	0	3

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	8	169	18	0	195	0	10	1	0	11	1	0	0	0	1	4
16:15	6	175	31	0	212	0	7	0	0	7	0	0	0	0	0	0
16:30	16	187	32	0	235	0	4	2	0	6	0	0	0	0	0	0
16:45	10	177	24	0	211	0	6	0	0	6	0	0	0	0	0	0
17:00	15	172	25	0	212	0	6	0	0	6	0	0	0	0	0	0
17:15	12	182	33	0	227	0	3	0	0	3	0	0	0	0	0	0
17:30	13	139	21	0	173	0	3	0	0	3	0	0	0	0	0	0
17:45	7	165	24	0	196	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	87	1366	208	0	1661	0	42	3	0	45	1	0	0	0	1	4
GRAND TOTAL	112	2070	275	0	2457	2	124	6	0	132	1	0	0	0	1	7

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

East Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	10	0	0	0	10	0	0	1	0	1	0	0	0	0	0	0
07:15	13	2	5	0	20	0	0	0	0	0	0	0	0	0	0	2
07:30	14	4	4	0	22	0	0	2	0	2	0	0	0	0	0	0
07:45	23	2	11	0	36	0	0	2	0	2	0	0	0	0	0	0
08:00	15	3	4	0	22	0	0	2	0	2	0	0	0	0	0	0
08:15	14	3	4	0	21	0	0	0	0	0	0	0	0	0	0	2
08:30	7	5	14	0	26	0	0	2	0	2	0	0	0	0	0	0
08:45	19	8	6	0	33	0	0	0	0	0	0	0	0	0	0	2
SUBTOTAL	115	27	48	0	190	0	0	9	0	9	0	0	0	0	0	6

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

East Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	8	7	20	0	35	0	0	0	0	0	0	0	0	0	0	2
16:15	15	2	15	0	32	1	0	1	0	2	0	0	0	0	0	2
16:30	12	4	18	0	34	0	0	0	0	0	0	0	0	0	0	0
16:45	15	6	34	0	55	0	0	0	0	0	0	0	0	0	0	0
17:00	12	4	27	0	43	0	0	0	0	0	0	0	0	0	0	0
17:15	12	4	23	0	39	0	0	0	0	0	0	0	0	0	0	1
17:30	13	8	19	0	40	0	0	0	0	0	0	0	0	0	0	0
17:45	16	5	17	0	38	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	103	40	173	0	316	1	0	1	0	2	0	0	0	0	0	5
GRAND TOTAL	218	67	221	0	506	1	0	10	0	11	0	0	0	0	0	11

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	1	2	8	0	11	0	0	0	0	0	0	0	0	0	0	0
07:15	1	5	13	0	19	0	0	1	0	1	0	0	0	0	0	0
07:30	4	3	22	0	29	0	0	0	0	0	0	0	0	0	0	0
07:45	2	0	16	0	18	0	0	0	0	0	0	0	0	0	0	1
08:00	1	2	12	0	15	1	0	0	0	1	0	0	0	0	0	0
08:15	5	3	8	0	16	0	0	0	0	0	0	0	0	0	0	1
08:30	7	4	14	0	25	0	0	0	0	0	0	1	0	0	1	0
08:45	4	7	7	0	18	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	25	26	100	0	151	1	0	1	0	2	0	1	0	0	1	2

Traffic Count Data

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	4	5	13	0	22	0	0	0	0	0	0	0	0	0	0	0
16:15	7	5	4	0	16	0	0	0	0	0	0	0	0	0	0	0
16:30	4	8	6	0	18	0	0	0	0	0	0	0	0	0	0	0
16:45	11	10	9	0	30	0	0	0	0	0	0	0	0	0	0	0
17:00	8	5	4	0	17	0	0	0	0	0	0	0	0	0	0	0
17:15	10	5	10	0	25	0	0	0	0	0	0	0	0	0	0	0
17:30	9	10	6	0	25	0	0	0	0	0	0	0	0	0	0	0
17:45	11	4	5	0	20	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	64	52	57	0	173	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	89	78	157	0	324	1	0	1	0	2	0	1	0	0	1	2

Peak Hour Diagram

Specified Period

From: 07:00:00

To: 09:00:00

One Hour Peak

From: 07:15:00

To: 08:15:00

Intersection: Hwy 6 & McQueen Blvd

Site Code: 2122200001

Count Date: Oct 28, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	609	392	1001
	34	49	83
	1	0	1
Totals	644	441	1085

Hwy 6

	0	1	0	0
	0	34	0	0
	2	559	48	0
Totals	2	594	48	0

East Approach

	Out	In	Total
	100	85	185
	6	2	8
	0	0	0
Totals	106	87	193

McQueen Blvd

				Totals
	0	0	0	0
	0	1	8	9
	0	0	10	10
	0	1	63	64

Peds: 1



Peds: 1

McQueen Blvd

Totals			
0	0	0	0
30	24	6	0
11	11	0	0
65	65	0	0

West Approach

	Out	In	Total
	81	22	103
	2	0	2
	0	0	0
Totals	83	22	105

	9	402	29	0
	9	360	27	0
	0	42	2	0
	0	0	0	0

Hwy 6

South Approach

	Out	In	Total
	396	687	1083
	44	35	79
	0	1	1
Totals	440	723	1163

- Cars

- Trucks

- Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (07:15 - 08:15)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach McQueen Blvd						West Approach McQueen Blvd						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:15	8	157	0	0	1	165	1	83	7	0	0	91	13	2	5	0	2	20	1	5	14	0	0	20	296
07:30	13	160	0	0	0	173	3	93	8	0	0	104	14	4	6	0	0	24	4	3	22	0	0	29	330
07:45	15	151	1	0	0	167	4	126	6	0	1	136	23	2	13	0	0	38	2	0	16	0	1	18	359
08:00	12	126	1	0	0	139	1	100	8	0	0	109	15	3	6	0	0	24	2	2	12	0	0	16	288
Grand Total	48	594	2	0	1	644	9	402	29	0	1	440	65	11	30	0	2	106	9	10	64	0	1	83	1273
Approach %	7.5	92.2	0.3	0	-	-	2	91.4	6.6	0	-	-	61.3	10.4	28.3	0	-	-	10.8	12	77.1	0	-	-	-
Totals %	3.8	46.7	0.2	0	-	50.6	0.7	31.6	2.3	0	-	34.6	5.1	0.9	2.4	0	-	8.3	0.7	0.8	5	0	-	6.5	-
PHF	0.8	0.93	0.5	0	-	0.93	0.56	0.8	0.91	0	-	0.81	0.71	0.69	0.58	0	-	0.7	0.56	0.5	0.73	0	-	0.72	0.89
Cars	48	559	2	0	-	609	9	360	27	0	-	396	65	11	24	0	-	100	8	10	63	0	-	81	1186
% Cars	100	94.1	100	0	-	94.6	100	89.6	93.1	0	-	90	100	100	80	0	-	94.3	88.9	100	98.4	0	-	97.6	93.2
Trucks	0	34	0	0	-	34	0	42	2	0	-	44	0	0	6	0	-	6	1	0	1	0	-	2	86
% Trucks	0	5.7	0	0	-	5.3	0	10.4	6.9	0	-	10	0	0	20	0	-	5.7	11.1	0	1.6	0	-	2.4	6.8
Bicycles	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles	0	0.2	0	0	-	0.2	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0.1
Peds	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	1	-	5
% Peds	-	-	-	-	20	-	-	-	-	-	20	-	-	-	-	-	40	-	-	-	-	-	20	-	-

Peak Hour Diagram

Specified Period

From: 16:00:00
To: 18:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	683	835	1518
	20	24	44
	0	0	0
Totals	703	859	1562

Hwy 6

	0	0	0	0
	0	20	0	0
	5	526	152	0
Totals	5	546	152	0






East Approach

	Out	In	Total
	164	292	456
	2	2	4
	0	0	0
Totals	166	294	460

McQueen Blvd

				Totals
	0	0	0	0
	0	0	30	30
	0	0	28	28
	0	0	23	23

Peds: 6

Peds: 0



Peds: 2

Peds: 0

McQueen Blvd

Totals			
	0	0	0
	95	94	1
	16	16	0
	55	54	1

West Approach

	Out	In	Total
	81	68	149
	0	0	0
	0	0	0
Totals	81	68	149

Totals				
	47	711	112	0
	0	23	2	0
	0	0	0	0

Hwy 6

South Approach

	Out	In	Total
	870	603	1473
	25	21	46
	0	0	0
Totals	895	624	1519

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & McQueen Blvd
Site Code: 2122200001
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach McQueen Blvd						West Approach McQueen Blvd						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:15	36	157	1	0	3	194	6	182	31	0	0	219	16	2	16	0	2	34	7	5	4	0	0	16	463
16:30	33	136	1	0	0	170	16	191	34	0	0	241	12	4	18	0	0	34	4	8	6	0	0	18	463
16:45	29	108	1	0	3	138	10	183	24	0	0	217	15	6	34	0	0	55	11	10	9	0	0	30	440
17:00	54	145	2	0	0	201	15	178	25	0	0	218	12	4	27	0	0	43	8	5	4	0	0	17	479
Grand Total	152	546	5	0	6	703	47	734	114	0	0	895	55	16	95	0	2	166	30	28	23	0	0	81	1845
Approach %	21.6	77.7	0.7	0	-	-	5.3	82	12.7	0	-	-	33.1	9.6	57.2	0	-	-	37	34.6	28.4	0	-	-	-
Totals %	8.2	29.6	0.3	0	-	38.1	2.5	39.8	6.2	0	-	48.5	3	0.9	5.1	0	-	9	1.6	1.5	1.2	0	-	4.4	-
PHF	0.7	0.87	0.63	0	-	0.87	0.73	0.96	0.84	0	-	0.93	0.86	0.67	0.7	0	-	0.75	0.68	0.7	0.64	0	-	0.68	0.96
Cars	152	526	5	0	-	683	47	711	112	0	-	870	54	16	94	0	-	164	30	28	23	0	-	81	1798
% Cars	100	96.3	100	0	-	97.2	100	96.9	98.2	0	-	97.2	98.2	100	98.9	0	-	98.8	100	100	100	0	-	100	97.5
Trucks	0	20	0	0	-	20	0	23	2	0	-	25	1	0	1	0	-	2	0	0	0	0	-	0	47
% Trucks	0	3.7	0	0	-	2.8	0	3.1	1.8	0	-	2.8	1.8	0	1.1	0	-	1.2	0	0	0	0	-	0	2.5
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	6	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	8
% Peds	-	-	-	-	75	-	-	-	-	-	0	-	-	-	-	-	25	-	-	-	-	-	0	-	-

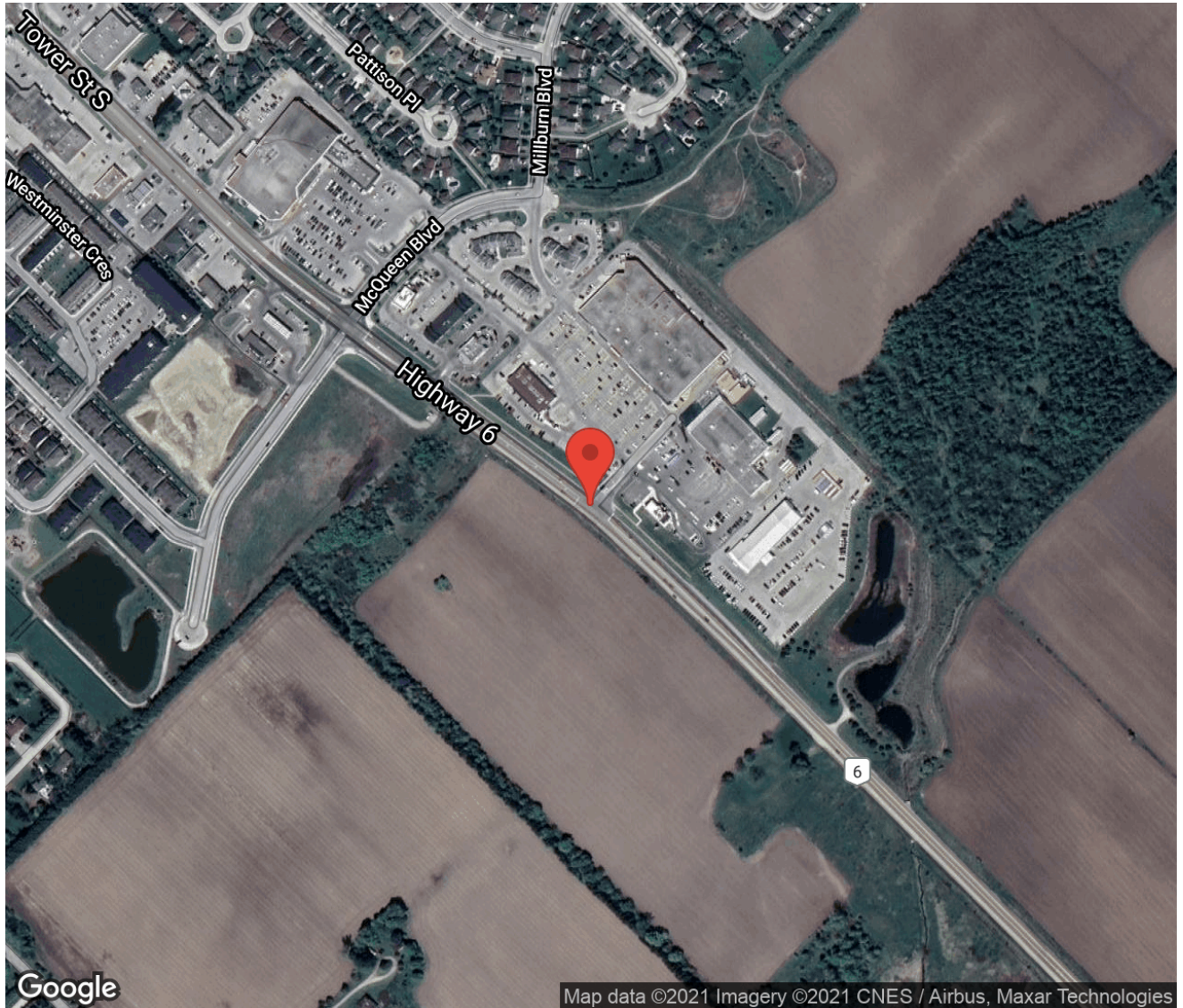
Project #21-222 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Hwy 6 & Retail Plaza
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200002
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear

Traffic Count Map

Intersection:	Hwy 6 & Retail Plaza
Site Code:	2122200002
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Hwy 6 & Retail Plaza
 Site Code: 2122200002
 Municipality: South Fergus
 Count Date: Oct 28, 2021

Hwy 6 - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	51	618	0	0	669	0	0	385	20	0	405	0	1074
08:00 - 09:00	69	546	0	0	615	0	0	429	36	0	465	0	1080
BREAK													
16:00 - 17:00	122	509	0	0	631	0	0	780	85	0	865	0	1496
17:00 - 18:00	84	462	0	0	546	0	0	687	77	0	764	0	1310
GRAND TOTAL	326	2135	0	0	2461	0	0	2281	218	0	2499	0	4960

Traffic Count Summary

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

Retail Plaza - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	42	0	18	0	60	0	0	0	0	0	0	0	60
08:00 - 09:00	41	0	33	0	74	0	0	0	0	0	0	0	74
BREAK													
16:00 - 17:00	61	0	122	0	183	0	0	0	0	0	0	0	183
17:00 - 18:00	52	0	108	0	160	0	0	0	0	0	0	0	160
GRAND TOTAL	196	0	281	0	477	0	0	0	0	0	0	0	477

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	5	129	0	0	134	0	5	0	0	5	0	0	0	0	0	0
07:15	8	148	0	0	156	0	10	0	0	10	0	0	0	0	0	0
07:30	15	169	0	0	184	1	6	0	0	7	0	0	0	0	0	0
07:45	22	144	0	0	166	0	7	0	0	7	0	0	0	0	0	0
08:00	22	136	0	0	158	2	7	0	0	9	0	0	0	0	0	0
08:15	10	145	0	0	155	0	11	0	0	11	0	0	0	0	0	0
08:30	12	126	0	0	138	1	9	0	0	10	0	0	0	0	0	0
08:45	22	105	0	0	127	0	7	0	0	7	0	0	0	0	0	0
SUBTOTAL	116	1102	0	0	1218	4	62	0	0	66	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	31	116	0	0	147	1	12	0	0	13	0	0	0	0	0	0
16:15	30	116	0	0	146	0	7	0	0	7	0	0	0	0	0	0
16:30	30	131	0	0	161	0	9	0	0	9	0	0	0	0	0	0
16:45	30	114	0	0	144	0	4	0	0	4	0	0	0	0	0	0
17:00	27	130	0	0	157	0	6	0	0	6	0	0	0	0	0	0
17:15	22	124	0	0	146	0	5	0	0	5	0	0	0	0	0	0
17:30	13	105	0	0	118	0	2	0	0	2	0	0	0	0	0	0
17:45	22	90	0	0	112	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	205	926	0	0	1131	1	45	0	0	46	0	0	0	0	0	0
GRAND TOTAL	321	2028	0	0	2349	5	107	0	0	112	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	70	2	0	72	0	7	0	0	7	0	0	0	0	0	0
07:15	0	86	3	0	89	0	7	1	0	8	0	0	0	0	0	0
07:30	0	84	4	0	88	0	11	1	0	12	0	0	0	0	0	0
07:45	0	111	8	0	119	0	9	1	0	10	0	0	0	0	0	0
08:00	0	77	8	0	85	0	7	0	0	7	0	0	0	0	0	0
08:15	0	105	14	0	119	0	18	0	0	18	0	0	0	0	0	0
08:30	0	103	6	0	109	0	7	2	0	9	0	0	0	0	0	0
08:45	0	96	6	0	102	0	16	0	0	16	0	0	0	0	0	0
SUBTOTAL	0	732	51	0	783	0	82	5	0	87	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	0	158	18	0	176	0	10	0	0	10	0	0	0	0	0	0
16:15	0	191	27	0	218	0	7	1	0	8	0	0	0	0	0	0
16:30	0	211	26	0	237	0	6	0	0	6	0	0	0	0	0	0
16:45	0	193	13	0	206	0	4	0	0	4	0	0	0	0	0	0
17:00	0	168	22	0	190	0	6	1	0	7	0	0	0	0	0	0
17:15	0	187	17	0	204	0	2	3	0	5	0	0	0	0	0	0
17:30	0	170	18	0	188	0	3	0	0	3	0	0	0	0	0	0
17:45	0	149	16	0	165	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	0	1427	157	0	1584	0	40	5	0	45	0	0	0	0	0	0
GRAND TOTAL	0	2159	208	0	2367	0	122	10	0	132	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

East Approach - Retail Plaza

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	9	0	2	0	11	0	0	0	0	0	0	0	0	0	0	0
07:15	10	0	4	0	14	0	0	0	0	0	0	0	0	0	0	0
07:30	9	0	4	0	13	3	0	0	0	3	0	0	0	0	0	0
07:45	11	0	8	0	19	0	0	0	0	0	0	0	0	0	0	0
08:00	14	0	4	0	18	0	0	1	0	1	0	0	0	0	0	0
08:15	12	0	13	0	25	0	0	0	0	0	0	0	0	0	0	0
08:30	7	0	6	0	13	0	0	0	0	0	0	0	0	0	0	0
08:45	7	0	9	0	16	1	0	0	0	1	0	0	0	0	0	0
SUBTOTAL	79	0	50	0	129	4	0	1	0	5	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Municipality: South Fergus
Count Date: Oct 28, 2021

East Approach - Retail Plaza

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	10	0	31	0	41	0	0	0	0	0	0	0	0	0	0	0
16:15	22	0	33	0	55	1	0	0	0	1	0	0	0	0	0	0
16:30	14	0	22	0	36	0	0	0	0	0	0	0	0	0	0	0
16:45	14	0	36	0	50	0	0	0	0	0	0	0	0	0	0	0
17:00	16	0	37	0	53	0	0	0	0	0	0	0	0	0	0	0
17:15	14	0	31	0	45	0	0	0	0	0	0	0	0	0	0	0
17:30	9	0	20	0	29	0	0	0	0	0	0	0	0	0	0	0
17:45	12	0	20	0	32	1	0	0	0	1	0	0	0	0	0	0
SUBTOTAL	111	0	230	0	341	2	0	0	0	2	0	0	0	0	0	0
GRAND TOTAL	190	0	280	0	470	6	0	1	0	7	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 07:30:00
To: 08:30:00

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	663	406	1069
	34	46	80
	0	0	0
Totals	697	452	1149

Hwy 6

	0	0	0
	31	3	0
	594	69	0
Totals	625	72	0





East Approach

	Out	In	Total
	75	103	178
	4	5	9
	0	0	0
Totals	79	108	187

Peds: 0



Retail Plaza

Totals			
0	0	0	0
30	29	1	0
49	46	3	0

Peds: 0

Totals	422	36	0
	377	34	0
	45	2	0
	0	0	0

Hwy 6

South Approach

	Out	In	Total
	411	640	1051
	47	34	81
	0	0	0
Totals	458	674	1132

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

	North Approach Hwy 6						South Approach Hwy 6						East Approach Retail Plaza						West Approach						Total Vehicles
Start Time	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:30	16	175		0	0	191		95	5	0	0	100	12		4	0	0	16					0		307
07:45	22	151		0	0	173		120	9	0	0	129	11		8	0	0	19					0		321
08:00	24	143		0	0	167		84	8	0	0	92	14		5	0	0	19					0		278
08:15	10	156		0	0	166		123	14	0	0	137	12		13	0	0	25					0		328
Grand Total	72	625		0	0	697		422	36	0	0	458	49		30	0	0	79					0	0	1234
Approach %	10.3	89.7		0		-		92.1	7.9	0		-	62		38	0		-					-		
Totals %	5.8	50.6		0		56.5		34.2	2.9	0		37.1	4		2.4	0		6.4					0		
PHF	0.75	0.89		0		0.91		0.86	0.64	0		0.84	0.88		0.58	0		0.79					0		0.94
Cars	69	594		0		663		377	34	0		411	46		29	0		75					0		1149
% Cars	95.8	95		0		95.1		89.3	94.4	0		89.7	93.9		96.7	0		94.9					0		93.1
Trucks	3	31		0		34		45	2	0		47	3		1	0		4					0		85
% Trucks	4.2	5		0		4.9		10.7	5.6	0		10.3	6.1		3.3	0		5.1					0		6.9
Bicycles	0	0		0		0		0	0	0		0	0		0	0		0					0		0
% Bicycles	0	0		0		0		0	0	0		0	0		0	0		0					0		0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Specified Period

From: 16:00:00
To: 18:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	608	891	1499
	26	23	49
	0	0	0
Totals	634	914	1548

Hwy 6

	0	0	0
	26	0	0
	491	117	0
Totals	517	117	0

↓ ↘ ↻

East Approach

	Out	In	Total
	194	205	399
	1	2	3
	0	0	0
Totals	195	207	402

Peds: 0



Peds: 0

	↑	↘	↻
Totals	786	90	0
	763	88	0
	23	2	0
	0	0	0

Hwy 6

Retail Plaza

Totals			
0	0	0	0
128	128	0	0
67	66	1	0

South Approach

	Out	In	Total
	851	557	1408
	25	27	52
	0	0	0
Totals	876	584	1460

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & Retail Plaza
Site Code: 2122200002
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

	North Approach Hwy 6						South Approach Hwy 6						East Approach Retail Plaza						West Approach						Total Vehicles		
Start Time	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total			
16:15	30	123		0	0	153		198	28	0	0	226	23		33	0	0	56				0		435			
16:30	30	140		0	0	170		217	26	0	0	243	14		22	0	0	36				0		449			
16:45	30	118		0	0	148		197	13	0	0	210	14		36	0	0	50				0		408			
17:00	27	136		0	0	163		174	23	0	0	197	16		37	0	0	53				0		413			
Grand Total	117	517		0	0	634		786	90	0	0	876	67		128	0	0	195				0	0	1705			
Approach %	18.5	81.5		0		-		89.7	10.3	0		-	34.4		65.6	0		-				-					
Totals %	6.9	30.3		0		37.2		46.1	5.3	0		51.4	3.9		7.5	0		11.4				0					
PHF	0.98	0.92		0		0.93		0.91	0.8	0		0.9	0.73		0.86	0		0.87				0		0.95			
Cars	117	491		0		608		763	88	0		851	66		128	0		194				0		1653			
% Cars	100	95		0		95.9		97.1	97.8	0		97.1	98.5		100	0		99.5				0		97			
Trucks	0	26		0		26		23	2	0		25	1		0	0		1				0		52			
% Trucks	0	5		0		4.1		2.9	2.2	0		2.9	1.5		0	0		0.5				0		3			
Bicycles	0	0		0		0		0	0	0		0	0		0	0		0				0		0			
% Bicycles	0	0		0		0		0	0	0		0	0		0	0		0				0		0			
Peds						0	-						0	-						0	-						0
% Peds						0	-						0	-						0	-						

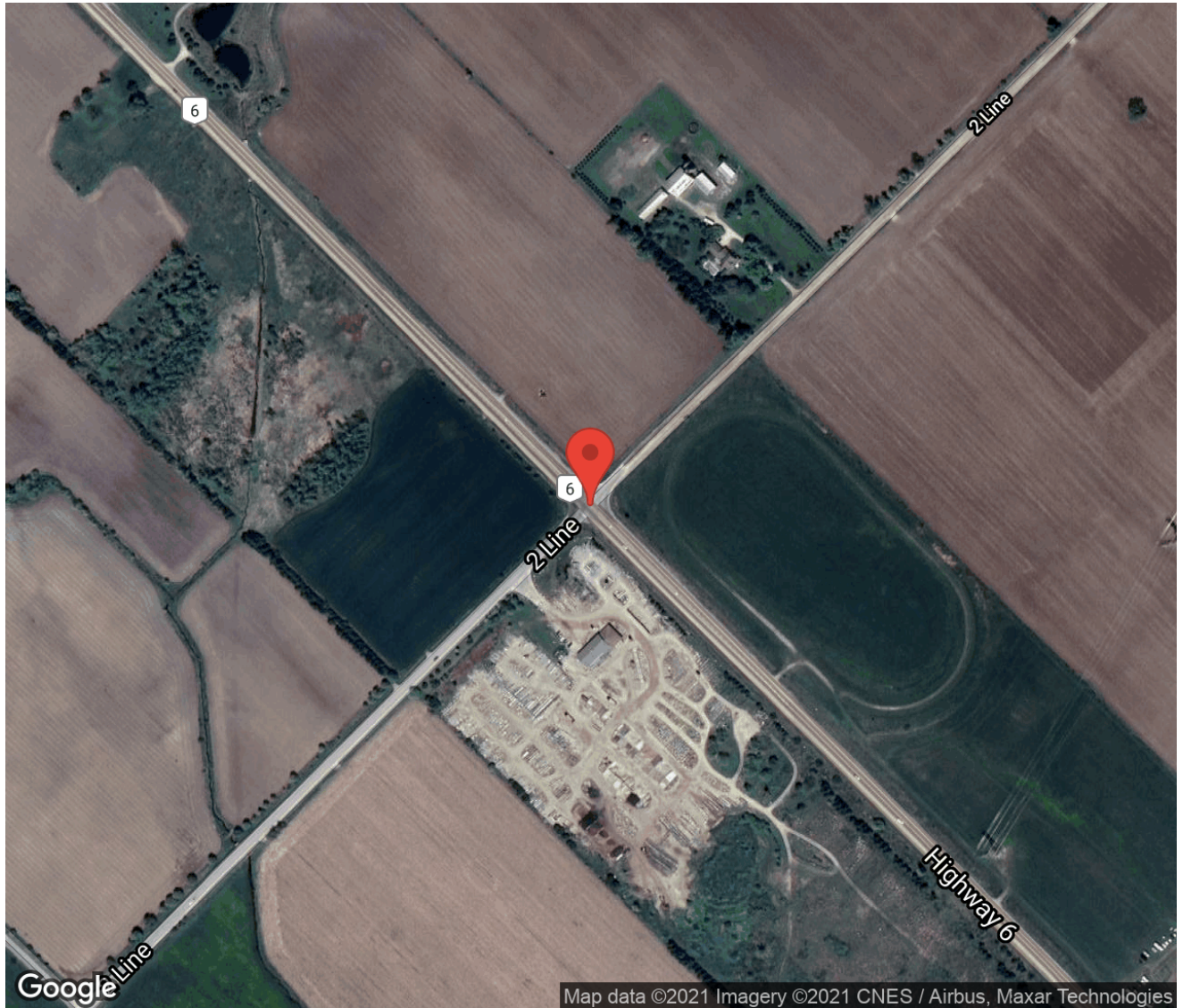
Project #21-222 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Hwy 6 & 2nd Line
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200003
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear

Traffic Count Map

Intersection:	Hwy 6 & 2nd Line
Site Code:	2122200003
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

Hwy 6 - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	3	622	44	0	669	0	11	382	8	0	401	0	1070
08:00 - 09:00	8	522	44	0	574	0	13	415	13	0	441	0	1015
BREAK													
16:00 - 17:00	4	524	53	0	581	0	23	806	12	0	841	0	1422
17:00 - 18:00	7	449	47	0	503	0	19	712	16	0	747	0	1250
GRAND TOTAL	22	2117	188	0	2327	0	66	2315	49	0	2430	0	4757

Traffic Count Summary

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

2nd Line - Traffic Summary

Hour	East Approach Totals						West Approach Totals							Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles							
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds		
07:00 - 08:00	2	9	3	0	14	0	27	11	12	0	50	0	64	
08:00 - 09:00	8	13	12	0	33	0	33	28	17	0	78	0	111	
BREAK														
16:00 - 17:00	8	11	14	0	33	0	45	14	14	0	73	0	106	
17:00 - 18:00	7	10	8	0	25	0	42	11	12	0	65	0	90	
GRAND TOTAL	25	43	37	0	105	0	147	64	55	0	266	0	371	

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	124	10	0	134	0	6	0	0	6	0	0	0	0	0	0
07:15	1	138	8	0	147	0	9	0	0	9	0	0	0	0	0	0
07:30	0	181	9	0	190	0	6	3	0	9	0	0	0	0	0	0
07:45	2	153	12	0	167	0	5	2	0	7	0	0	0	0	0	0
08:00	1	134	6	0	141	0	7	2	0	9	0	0	0	0	0	0
08:15	2	131	14	0	147	0	9	2	0	11	0	0	0	0	0	0
08:30	2	137	8	0	147	0	6	1	0	7	0	0	0	0	0	0
08:45	3	92	9	0	104	0	6	2	0	8	0	0	0	0	0	0
SUBTOTAL	11	1090	76	0	1177	0	54	12	0	66	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
Site Code: 2122200003
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	3	109	13	0	125	0	9	2	0	11	0	0	0	0	0	0
16:15	0	124	10	0	134	0	8	0	0	8	0	0	0	0	0	0
16:30	0	134	17	0	151	0	9	0	0	9	0	0	0	0	0	0
16:45	1	129	9	0	139	0	2	2	0	4	0	0	0	0	0	0
17:00	0	124	14	0	138	0	4	2	0	6	0	0	0	0	0	0
17:15	2	129	6	0	137	0	5	1	0	6	0	0	0	0	0	0
17:30	1	96	13	0	110	0	2	0	0	2	0	0	0	0	0	0
17:45	4	88	11	0	103	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	11	933	93	0	1037	0	40	7	0	47	0	0	0	0	0	0
GRAND TOTAL	22	2023	169	0	2214	0	94	19	0	113	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	2	64	1	0	67	0	4	0	0	4	0	0	0	0	0	0
07:15	3	85	2	0	90	0	7	0	0	7	0	0	0	0	0	0
07:30	2	85	1	0	88	0	10	0	0	10	0	0	0	0	0	0
07:45	4	115	4	0	123	0	12	0	0	12	0	0	0	0	0	0
08:00	4	73	3	0	80	1	11	0	0	12	0	0	0	0	0	0
08:15	3	109	3	0	115	0	9	1	0	10	0	0	0	0	0	0
08:30	1	99	2	0	102	0	9	0	0	9	0	0	0	0	0	0
08:45	4	93	4	0	101	0	12	0	0	12	0	0	0	0	0	0
SUBTOTAL	23	723	20	0	766	1	74	1	0	76	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

South Approach - Hwy 6

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	3	166	1	0	170	0	8	1	0	9	0	0	0	0	0	0
16:15	7	205	4	0	216	0	5	0	0	5	0	0	0	0	0	0
16:30	7	201	2	0	210	2	5	0	0	7	0	0	0	0	0	0
16:45	4	213	4	0	221	0	3	0	0	3	0	0	0	0	0	0
17:00	3	180	6	0	189	0	6	0	0	6	0	0	0	0	0	0
17:15	6	193	7	0	206	0	5	0	0	5	0	0	0	0	0	0
17:30	6	172	2	0	180	0	3	0	0	3	0	0	0	0	0	0
17:45	4	151	1	0	156	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	40	1481	27	0	1548	2	37	1	0	40	0	0	0	0	0	0
GRAND TOTAL	63	2204	47	0	2314	3	111	2	0	116	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

East Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	2	2	0	4	0	0	0	0	0	0	0	0	0	0	0
07:15	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0
07:30	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0
07:45	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0
08:00	1	3	1	0	5	0	0	0	0	0	0	0	0	0	0	0
08:15	1	3	5	0	9	0	1	0	0	1	0	0	0	0	0	0
08:30	2	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0
08:45	4	4	5	0	13	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	10	20	15	0	45	0	2	0	0	2	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
 Site Code: 2122200003
 Municipality: South Fergus
 Count Date: Oct 28, 2021

East Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	3	0	0	0	3	0	1	0	0	1	0	0	0	0	0	0
16:15	4	1	4	0	9	0	0	0	0	0	0	0	0	0	0	0
16:30	0	5	5	0	10	0	0	0	0	0	0	0	0	0	0	0
16:45	1	4	5	0	10	0	0	0	0	0	0	0	0	0	0	0
17:00	5	5	2	0	12	0	1	0	0	1	0	0	0	0	0	0
17:15	1	2	3	0	6	0	0	0	0	0	0	0	0	0	0	0
17:30	1	2	1	0	4	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	15	19	22	0	56	0	2	0	0	2	0	0	0	0	0	0
GRAND TOTAL	25	39	37	0	101	0	4	0	0	4	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
Site Code: 2122200003
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	7	4	2	0	13	2	0	0	0	2	0	0	0	0	0	0
07:15	4	3	0	0	7	0	0	0	0	0	0	0	0	0	0	0
07:30	3	2	4	0	9	0	0	0	0	0	0	0	0	0	0	0
07:45	9	2	6	0	17	2	0	0	0	2	0	0	0	0	0	0
08:00	7	4	7	0	18	2	0	0	0	2	0	0	0	0	0	0
08:15	6	6	4	0	16	0	0	2	0	2	0	0	0	0	0	0
08:30	7	8	2	0	17	2	1	0	0	3	0	0	0	0	0	0
08:45	6	8	2	0	16	3	1	0	0	4	0	0	0	0	0	0
SUBTOTAL	49	37	27	0	113	11	2	2	0	15	0	0	0	0	0	0

Traffic Count Data

Intersection: Hwy 6 & 2nd Line
Site Code: 2122200003
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	6	4	2	0	12	1	1	3	0	5	0	0	0	0	0	0
16:15	10	1	2	0	13	3	0	0	0	3	0	0	0	0	0	0
16:30	12	7	6	0	25	0	0	0	0	0	0	0	0	0	0	0
16:45	13	1	1	0	15	0	0	0	0	0	0	0	0	0	0	0
17:00	7	2	6	0	15	1	0	0	0	1	0	0	0	0	0	0
17:15	6	2	0	0	8	1	0	0	0	1	0	0	0	0	0	0
17:30	13	4	3	0	20	1	0	0	0	1	0	0	0	0	0	0
17:45	12	3	3	0	18	1	0	0	0	1	0	0	0	0	0	0
SUBTOTAL	79	24	23	0	126	8	1	3	0	12	0	0	0	0	0	0
GRAND TOTAL	128	61	50	0	239	19	3	5	0	27	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00

To: 09:00:00

One Hour Peak

From: 07:30:00

To: 08:30:00

Intersection: Hwy 6 & 2nd Line

Site Code: 2122200003

Count Date: Oct 28, 2021

Weather
conditions:

Clear

**** Unsignalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	645	414	1059
	36	46	82
	0	0	0
Totals	681	460	1141

Hwy 6

	0	0	0	0
	9	27	0	0
	41	599	5	0
Totals	50	626	5	0






East Approach

	Out	In	Total
	21	30	51
	1	1	2
	0	0	0
Totals	22	31	53

2nd Line

				Totals
	0	0	0	0
	0	4	25	29
	0	0	14	14
	0	2	21	23

Peds: 0

Peds: 0



Peds: 0

Peds: 0

2nd Line

Totals			
	0	0	0
	7	7	0
	12	11	1
	3	3	0

West Approach

	Out	In	Total
	60	65	125
	6	11	17
	0	0	0
Totals	66	76	142

Totals				
	13	382	11	0
	1	42	1	0
	0	0	0	0

Hwy 6

South Approach

	Out	In	Total
	406	623	1029
	44	29	73
	0	0	0
Totals	450	652	1102

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & 2nd Line
Site Code: 2122200003
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach 2nd Line						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:30	0	187	12	0	0	199	2	95	1	0	0	98	0	1	1	0	0	2	3	2	4	0	0	9	308
07:45	2	158	14	0	0	174	4	127	4	0	0	135	1	4	0	0	0	5	11	2	6	0	0	19	333
08:00	1	141	8	0	0	150	5	84	3	0	0	92	1	3	1	0	0	5	9	4	7	0	0	20	267
08:15	2	140	16	0	0	158	3	118	4	0	0	125	1	4	5	0	0	10	6	6	6	0	0	18	311
Grand Total	5	626	50	0	0	681	14	424	12	0	0	450	3	12	7	0	0	22	29	14	23	0	0	66	1219
Approach %	0.7	91.9	7.3	0	-	-	3.1	94.2	2.7	0	-	-	13.6	54.5	31.8	0	-	-	43.9	21.2	34.8	0	-	-	-
Totals %	0.4	51.4	4.1	0	-	55.9	1.1	34.8	1	0	-	36.9	0.2	1	0.6	0	-	1.8	2.4	1.1	1.9	0	-	5.4	-
PHF	0.63	0.84	0.78	0	-	0.86	0.7	0.83	0.75	0	-	0.83	0.75	0.75	0.35	0	-	0.55	0.66	0.58	0.82	0	-	0.83	0.92
Cars	5	599	41	0	-	645	13	382	11	0	-	406	3	11	7	0	-	21	25	14	21	0	-	60	1132
% Cars	100	95.7	82	0	-	94.7	92.9	90.1	91.7	0	-	90.2	100	91.7	100	0	-	95.5	86.2	100	91.3	0	-	90.9	92.9
Trucks	0	27	9	0	-	36	1	42	1	0	-	44	0	1	0	0	-	1	4	0	2	0	-	6	87
% Trucks	0	4.3	18	0	-	5.3	7.1	9.9	8.3	0	-	9.8	0	8.3	0	0	-	4.5	13.8	0	8.7	0	-	9.1	7.1
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	0
% Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-

Peak Hour Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Intersection: Hwy 6 & 2nd Line

Site Code: 2122200003

Count Date: Oct 28, 2021

Weather
conditions:

Clear

**** Unsignalized Intersection ****

Major Road: Hwy 6 runs N/S

North Approach

	Out	In	Total
	562	857	1419
	27	23	50
	0	0	0
Totals	589	880	1469

Hwy 6

	0	0	0	0
	4	23	0	0
	50	511	1	0
Totals	54	534	1	0






East Approach

	Out	In	Total
	41	28	69
	1	0	1
	0	0	0
Totals	42	28	70

2nd Line

				Totals
	0	0	0	0
	0	4	42	46
	0	0	11	11
	0	0	15	15

Peds: 0

Peds: 0



Peds: 0

Peds: 0

2nd Line

Totals			
0	0	0	0
16	16	0	0
16	15	1	0
10	10	0	0

West Approach

	Out	In	Total
	68	86	154
	4	7	11
	0	0	0
Totals	72	93	165

Totals				
23	818	16	0	0
	21	799	16	0
	2	19	0	0
	0	0	0	0

Hwy 6

South Approach

	Out	In	Total
	836	536	1372
	21	23	44
	0	0	0
Totals	857	559	1416

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Hwy 6 & 2nd Line
Site Code: 2122200003
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach 2nd Line						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:15	0	132	10	0	0	142	7	210	4	0	0	221	4	1	4	0	0	9	13	1	2	0	0	16	388
16:30	0	143	17	0	0	160	9	206	2	0	0	217	0	5	5	0	0	10	12	7	6	0	0	25	412
16:45	1	131	11	0	0	143	4	216	4	0	0	224	1	4	5	0	0	10	13	1	1	0	0	15	392
17:00	0	128	16	0	0	144	3	186	6	0	0	195	5	6	2	0	0	13	8	2	6	0	0	16	368
Grand Total	1	534	54	0	0	589	23	818	16	0	0	857	10	16	16	0	0	42	46	11	15	0	0	72	1560
Approach %	0.2	90.7	9.2	0	-	-	2.7	95.4	1.9	0	-	-	23.8	38.1	38.1	0	-	-	63.9	15.3	20.8	0	-	-	-
Totals %	0.1	34.2	3.5	0	-	37.8	1.5	52.4	1	0	-	54.9	0.6	1	1	0	-	2.7	2.9	0.7	1	0	-	4.6	-
PHF	0.25	0.93	0.79	0	-	0.92	0.64	0.95	0.67	0	-	0.96	0.5	0.67	0.8	0	-	0.81	0.88	0.39	0.63	0	-	0.72	0.95
Cars	1	511	50	0	-	562	21	799	16	0	-	836	10	15	16	0	-	41	42	11	15	0	-	68	1507
% Cars	100	95.7	92.6	0	-	95.4	91.3	97.7	100	0	-	97.5	100	93.8	100	0	-	97.6	91.3	100	100	0	-	94.4	96.6
Trucks	0	23	4	0	-	27	2	19	0	0	-	21	0	1	0	0	-	1	4	0	0	0	-	4	53
% Trucks	0	4.3	7.4	0	-	4.6	8.7	2.3	0	0	-	2.5	0	6.3	0	0	-	2.4	8.7	0	0	0	-	5.6	3.4
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	0
% Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	0

Project #21-222 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Guelph St & 2nd Line
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200004
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear

Traffic Count Map

Intersection:	Guelph St & 2nd Line
Site Code:	2122200004
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

Guelph St - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	3	9	19	0	31	0	1	15	0	0	16	0	47
08:00 - 09:00	8	2	11	0	21	0	1	4	2	0	7	0	28
BREAK													
16:00 - 17:00	1	5	16	0	22	0	0	2	0	0	2	0	24
17:00 - 18:00	6	8	12	0	26	0	1	5	0	0	6	0	32
GRAND TOTAL	18	24	58	0	100	0	3	26	2	0	31	0	131

Traffic Count Summary

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

2nd Line - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	2	62	1	0	65	0	10	43	3	0	56	0	121
08:00 - 09:00	0	65	4	0	69	0	11	72	2	0	85	0	154
BREAK													
16:00 - 17:00	1	68	13	0	82	0	59	70	1	0	130	0	212
17:00 - 18:00	0	63	15	0	78	0	40	62	0	0	102	0	180
GRAND TOTAL	3	258	33	0	294	0	120	247	6	0	373	0	667

Traffic Count Data

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

North Approach - Guelph St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
07:15	0	4	6	0	10	0	0	0	0	0	0	0	0	0	0	0
07:30	2	1	2	0	5	0	0	2	0	2	0	0	0	0	0	0
07:45	1	1	9	0	11	0	0	0	0	0	0	0	0	0	0	0
08:00	2	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0
08:15	2	0	3	0	5	1	0	0	0	1	0	0	0	0	0	0
08:30	2	2	3	0	7	0	0	0	0	0	0	0	0	0	0	0
08:45	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	10	11	28	0	49	1	0	2	0	3	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Guelph St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	0	2	4	0	6	0	0	0	0	0	0	0	0	0	0	0
16:15	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0
16:30	1	2	4	0	7	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	5	0	5	0	0	1	0	1	0	0	0	0	0	0
17:00	2	3	6	0	11	0	0	0	0	0	0	0	0	0	0	0
17:15	1	4	3	0	8	0	0	0	0	0	0	0	0	0	0	0
17:30	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0
17:45	2	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	7	13	27	0	47	0	0	1	0	1	0	0	0	0	0	0
GRAND TOTAL	17	24	55	0	96	1	0	3	0	4	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Guelph St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	8	0	0	8	0	1	0	0	1	0	0	0	0	0	0
07:15	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
07:30	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0
07:45	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
08:15	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0
08:30	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0
08:45	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	16	2	0	19	1	3	0	0	4	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

South Approach - Guelph St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0
17:15	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
17:30	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	7	0	0	8	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	2	23	2	0	27	1	3	0	0	4	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

East Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	15	0	0	15	0	1	0	0	1	0	0	0	0	0	0
07:15	1	11	0	0	12	0	0	0	0	0	0	0	0	0	0	0
07:30	1	12	0	0	13	0	2	0	0	2	0	0	0	0	0	0
07:45	0	18	1	0	19	0	3	0	0	3	0	0	0	0	0	0
08:00	0	11	1	0	12	0	3	0	0	3	0	0	0	0	0	0
08:15	0	20	0	0	20	0	3	1	0	4	0	0	0	0	0	0
08:30	0	11	0	0	11	0	1	0	0	1	0	0	0	0	0	0
08:45	0	13	2	0	15	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	2	111	4	0	117	0	16	1	0	17	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

East Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	0	14	3	0	17	0	2	0	0	2	0	0	0	0	0	0
16:15	1	15	1	0	17	0	0	0	0	0	0	0	0	0	0	0
16:30	0	19	6	0	25	0	2	0	0	2	0	0	0	0	0	0
16:45	0	14	3	0	17	0	2	0	0	2	0	0	0	0	0	0
17:00	0	16	5	0	21	0	3	0	0	3	0	0	0	0	0	0
17:15	0	12	4	0	16	0	1	0	0	1	0	0	0	0	0	0
17:30	0	18	4	0	22	0	0	0	0	0	0	0	0	0	0	0
17:45	0	13	2	0	15	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	121	28	0	150	0	10	0	0	10	0	0	0	0	0	0
GRAND TOTAL	3	232	32	0	267	0	26	1	0	27	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
 Site Code: 2122200004
 Municipality: South Fergus
 Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	10	0	0	10	0	1	0	0	1	0	0	0	0	0	0
07:15	4	8	0	0	12	0	0	0	0	0	0	0	0	0	0	0
07:30	5	9	3	0	17	0	1	0	0	1	0	0	0	0	0	0
07:45	1	13	0	0	14	0	1	0	0	1	0	0	0	0	0	0
08:00	2	15	2	0	19	0	2	0	0	2	0	0	0	0	0	0
08:15	3	17	0	0	20	0	1	0	0	1	0	0	0	0	0	0
08:30	2	13	0	0	15	0	3	0	0	3	0	0	0	0	0	0
08:45	3	16	0	0	19	1	5	0	0	6	0	0	0	0	0	0
SUBTOTAL	20	101	5	0	126	1	14	0	0	15	0	0	0	0	0	0

Traffic Count Data

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	11	14	0	0	25	2	4	0	0	6	0	0	0	0	0	0
16:15	11	11	0	0	22	0	3	1	0	4	0	0	0	0	0	0
16:30	20	26	0	0	46	1	1	0	0	2	0	0	0	0	0	0
16:45	14	11	0	0	25	0	0	0	0	0	0	0	0	0	0	0
17:00	9	12	0	0	21	0	1	0	0	1	0	0	0	0	0	0
17:15	15	12	0	0	27	0	1	0	0	1	0	0	0	0	0	0
17:30	8	15	0	0	23	0	2	0	0	2	0	0	0	0	0	0
17:45	8	18	0	0	26	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	96	119	0	0	215	3	13	1	0	17	0	0	0	0	0	0
GRAND TOTAL	116	220	5	0	341	4	27	1	0	32	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 07:30:00
To: 08:30:00

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: 2nd Line runs E/W

North Approach

	Out	In	Total
	25	17	42
	3	2	5
	0	0	0
Totals	28	19	47

Guelph St

	0	0	0	0
	2	0	1	0
	16	2	7	0
Totals	18	2	8	0






East Approach

	Out	In	Total
	64	61	125
	12	6	18
	0	0	0
Totals	76	67	143

2nd Line

				Totals
	0	0	0	0
	0	0	11	11
	0	5	54	59
	0	0	5	5

Peds: 0

Peds: 0



Peds: 0

Peds: 0

2nd Line

Totals			
	0	0	0
	3	2	1
	72	61	11
	1	1	0

West Approach

	Out	In	Total
	70	78	148
	5	14	19
	0	0	0
Totals	75	92	167

Totals				
	1	4	0	0
	1	1	0	0
	0	0	0	0

Guelph St

South Approach

	Out	In	Total
	5	8	13
	2	0	2
	0	0	0
Totals	7	8	15

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Guelph St						South Approach Guelph St						East Approach 2nd Line						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:30	2	1	4	0	0	7	1	2	0	0	0	3	1	14	0	0	0	15	5	10	3	0	0	18	43
07:45	1	1	9	0	0	11	0	1	0	0	0	1	0	21	1	0	0	22	1	14	0	0	0	15	49
08:00	2	0	2	0	0	4	0	1	0	0	0	1	0	14	1	0	0	15	2	17	2	0	0	21	41
08:15	3	0	3	0	0	6	1	1	0	0	0	2	0	23	1	0	0	24	3	18	0	0	0	21	53
Grand Total	8	2	18	0	0	28	2	5	0	0	0	7	1	72	3	0	0	76	11	59	5	0	0	75	186
Approach %	28.6	7.1	64.3	0	-	-	28.6	71.4	0	0	-	-	1.3	94.7	3.9	0	-	-	14.7	78.7	6.7	0	-	-	-
Totals %	4.3	1.1	9.7	0	-	15.1	1.1	2.7	0	0	-	3.8	0.5	38.7	1.6	0	-	40.9	5.9	31.7	2.7	0	-	40.3	-
PHF	0.67	0.5	0.5	0	-	0.64	0.5	0.63	0	0	-	0.58	0.25	0.78	0.75	0	-	0.79	0.55	0.82	0.42	0	-	0.89	0.88
Cars	7	2	16	0	-	25	1	4	0	0	-	5	1	61	2	0	-	64	11	54	5	0	-	70	164
% Cars	87.5	100	88.9	0	-	89.3	50	80	0	0	-	71.4	100	84.7	66.7	0	-	84.2	100	91.5	100	0	-	93.3	88.2
Trucks	1	0	2	0	-	3	1	1	0	0	-	2	0	11	1	0	-	12	0	5	0	0	-	5	22
% Trucks	12.5	0	11.1	0	-	10.7	50	20	0	0	-	28.6	0	15.3	33.3	0	-	15.8	0	8.5	0	0	-	6.7	11.8
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	0
% Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-

Peak Hour Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Intersection: Guelph St & 2nd Line

Site Code: 2122200004

Count Date: Oct 28, 2021

Weather conditions:

Clear

**** Unsignalized Intersection ****

Major Road: 2nd Line runs E/W

North Approach

	Out	In	Total
	31	80	111
	1	1	2
	0	0	0
Totals	32	81	113

Guelph St

	0	0	0	0
	1	0	0	0
	18	9	4	0
Totals	19	9	4	0






East Approach

	Out	In	Total
	79	65	144
	8	3	11
	0	0	0
Totals	87	68	155

2nd Line

				Totals
	0	0	0	0
	0	1	58	59
	0	3	61	64
	0	0	0	0

Peds: 0

Peds: 0



Peds: 0

Peds: 0

2nd Line

Totals			
	0	0	0
	18	18	0
	69	61	8
	0	0	0

West Approach

	Out	In	Total
	119	79	198
	4	9	13
	0	0	0
Totals	123	88	211

Totals				
	0	4	0	0
	0	0	0	0
	0	0	0	0

Guelph St

South Approach

	Out	In	Total
	4	9	13
	0	0	0
	0	0	0
Totals	4	9	13

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Guelph St & 2nd Line
Site Code: 2122200004
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Guelph St						South Approach Guelph St						East Approach 2nd Line						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	1	2	4	0	0	7	0	0	0	0	0	0	0	21	6	0	0	27	21	27	0	0	0	48	82
16:45	0	0	6	0	0	6	0	0	0	0	0	0	0	16	3	0	0	19	14	11	0	0	0	25	50
17:00	2	3	6	0	0	11	0	3	0	0	0	3	0	19	5	0	0	24	9	13	0	0	0	22	60
17:15	1	4	3	0	0	8	0	1	0	0	0	1	0	13	4	0	0	17	15	13	0	0	0	28	54
Grand Total	4	9	19	0	0	32	0	4	0	0	0	4	0	69	18	0	0	87	59	64	0	0	0	123	246
Approach %	12.5	28.1	59.4	0	-	-	0	100	0	0	-	-	0	79.3	20.7	0	-	-	48	52	0	0	-	-	-
Totals %	1.6	3.7	7.7	0	-	13	0	1.6	0	0	1.6	1.6	0	28	7.3	0	-	35.4	24	26	0	0	-	50	-
PHF	0.5	0.56	0.79	0	-	0.73	0	0.33	0	0	0.33	0.33	0	0.82	0.75	0	-	0.81	0.7	0.59	0	0	-	0.64	0.75
Cars	4	9	18	0	-	31	0	4	0	0	-	4	0	61	18	0	-	79	58	61	0	0	-	119	233
% Cars	100	100	94.7	0	-	96.9	0	100	0	0	-	100	0	88.4	100	0	-	90.8	98.3	95.3	0	0	-	96.7	94.7
Trucks	0	0	1	0	-	1	0	0	0	0	-	0	0	8	0	0	-	8	1	3	0	0	-	4	13
% Trucks	0	0	5.3	0	-	3.1	0	0	0	0	-	0	0	11.6	0	0	-	9.2	1.7	4.7	0	0	-	3.3	5.3
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	0
% Peds	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-

Project #21-222 - Tatham Engineering Ltd

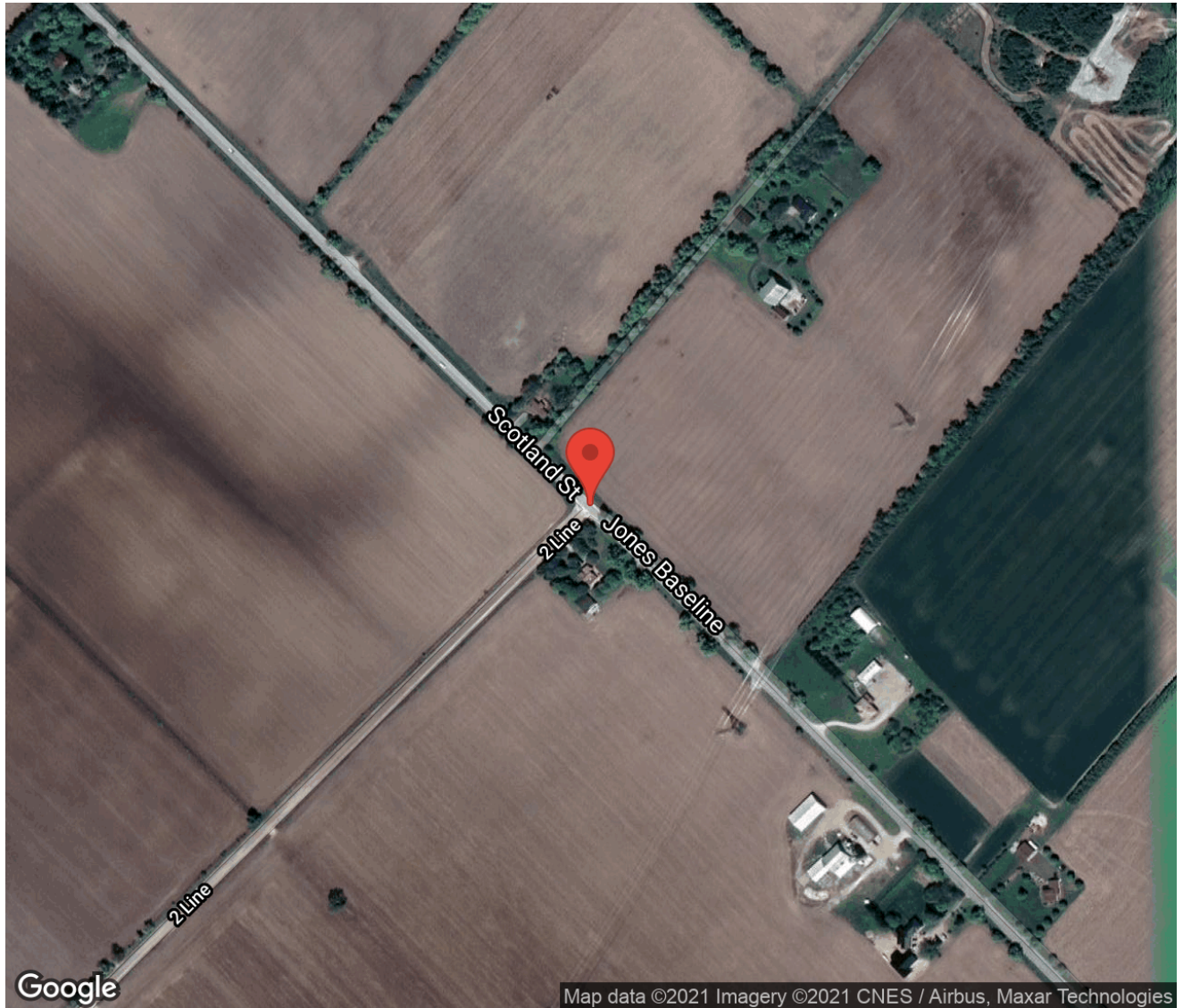
Intersection Count Report

Intersection:	Scotland St-Jones Baseline & 2nd Line
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200005
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear



Traffic Count Map

Intersection:	Scotland St-Jones Baseline & 2nd Line
Site Code:	2122200005
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

Scotland St - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	54	5	0	59	0	8	28	0	0	36	0	95
08:00 - 09:00	0	60	15	0	75	0	18	60	0	0	78	0	153
BREAK													
16:00 - 17:00	0	51	11	0	62	0	21	117	0	0	138	0	200
17:00 - 18:00	0	48	11	0	59	0	13	104	0	0	117	0	176
GRAND TOTAL	0	213	42	0	255	0	60	309	0	0	369	0	624

Traffic Count Summary

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

2nd Line - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	0	0	0	0	0	13	0	8	0	21	0	21
08:00 - 09:00	0	0	0	0	0	0	41	0	9	0	50	0	50
BREAK													
16:00 - 17:00	0	0	0	0	0	0	20	0	12	0	32	0	32
17:00 - 18:00	0	0	0	0	0	0	18	0	14	0	32	0	32
GRAND TOTAL	0	0	0	0	0	0	92	0	43	0	135	0	135

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

North Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	11	3	0	14	0	0	0	0	0	0	0	0	0	0	0
07:15	0	13	1	0	14	0	0	0	0	0	0	0	0	0	0	0
07:30	0	18	0	0	18	0	1	0	0	1	0	0	0	0	0	0
07:45	0	11	1	0	12	0	0	0	0	0	0	0	0	0	0	0
08:00	0	10	2	0	12	0	0	0	0	0	0	0	0	0	0	0
08:15	0	19	1	0	20	0	1	0	0	1	0	0	0	0	0	0
08:30	0	15	3	0	18	0	0	0	0	0	0	0	0	0	0	0
08:45	0	14	9	0	23	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	0	111	20	0	131	0	3	0	0	3	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

North Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	0	13	4	0	17	0	0	0	0	0	0	0	0	0	0	0
16:15	0	4	3	0	7	0	0	0	0	0	0	0	0	0	0	0
16:30	0	18	2	0	20	0	1	0	0	1	0	0	0	0	0	0
16:45	0	15	2	0	17	0	0	0	0	0	0	0	0	0	0	0
17:00	0	19	7	0	26	0	0	0	0	0	0	0	0	0	0	0
17:15	0	9	2	0	11	0	0	0	0	0	0	0	0	0	0	0
17:30	0	7	1	0	8	0	2	0	0	2	0	0	0	0	0	0
17:45	0	10	1	0	11	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	0	95	22	0	117	0	4	0	0	4	0	0	0	0	0	0
GRAND TOTAL	0	206	42	0	248	0	7	0	0	7	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

South Approach - Jones Baseline

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0
07:15	2	5	0	0	7	0	0	0	0	0	0	0	0	0	0	0
07:30	1	10	0	0	11	0	1	0	0	1	0	0	0	0	0	0
07:45	4	9	0	0	13	0	0	0	0	0	0	0	0	0	0	0
08:00	4	6	0	0	10	0	1	0	0	1	0	0	0	0	0	0
08:15	7	13	0	0	20	1	0	0	0	1	0	0	0	0	0	0
08:30	2	16	0	0	18	1	2	0	0	3	0	0	0	0	0	0
08:45	3	22	0	0	25	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	24	84	0	0	108	2	4	0	0	6	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

South Approach - Jones Baseline

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	0	23	0	0	23	0	1	0	0	1	0	0	0	0	0	0
16:15	5	23	0	0	28	0	2	0	0	2	0	0	0	0	0	0
16:30	7	36	0	0	43	0	0	0	0	0	0	0	0	0	0	0
16:45	9	31	0	0	40	0	1	0	0	1	0	0	0	0	0	0
17:00	3	35	0	0	38	1	1	0	0	2	0	0	0	0	0	0
17:15	4	16	0	0	20	0	0	0	0	0	0	0	0	0	0	0
17:30	3	36	0	0	39	0	0	0	0	0	0	0	0	0	0	0
17:45	2	16	0	0	18	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	33	216	0	0	249	1	5	0	0	6	0	0	0	0	0	0
GRAND TOTAL	57	300	0	0	357	3	9	0	0	12	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	3	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0
07:15	3	0	4	0	7	0	0	0	0	0	0	0	0	0	0	0
07:30	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
07:45	5	0	2	0	7	0	0	0	0	0	0	0	0	0	0	0
08:00	9	0	1	0	10	0	0	0	0	0	0	0	0	0	0	0
08:15	8	0	3	0	11	1	0	0	0	1	0	0	0	0	0	0
08:30	10	0	2	0	12	1	0	0	0	1	0	0	0	0	0	0
08:45	12	0	3	0	15	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	52	0	17	0	69	2	0	0	0	2	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St-Jones Baseline & 2nd Line
 Site Code: 2122200005
 Municipality: South Fergus
 Count Date: Oct 28, 2021

West Approach - 2nd Line

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	4	0	5	0	9	1	0	0	0	1	0	0	0	0	0	0
16:15	3	0	2	0	5	0	0	1	0	1	0	0	0	0	0	0
16:30	7	0	2	0	9	1	0	0	0	1	0	0	0	0	0	0
16:45	4	0	2	0	6	0	0	0	0	0	0	0	0	0	0	0
17:00	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
17:15	6	0	4	0	10	0	0	0	0	0	0	0	0	0	0	0
17:30	1	0	6	0	7	0	0	0	0	0	0	0	0	0	0	0
17:45	3	0	4	0	7	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	36	0	25	0	61	2	0	1	0	3	0	0	0	0	0	0
GRAND TOTAL	88	0	42	0	130	4	0	1	0	5	0	0	0	0	0	0

Peak Hour Diagram

Specified Period

From: 07:00:00

To: 09:00:00

One Hour Peak

From: 08:00:00

To: 09:00:00

Intersection: Scotland St-Jones Baseline & 2nd Line

Site Code: 2122200005

Count Date: Oct 28, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Scotland St runs N/S

North Approach

	Out	In	Total
	73	96	169
	2	5	7
	0	0	0
Totals	75	101	176

Scotland St

	0	0	0
	0	2	0
	15	58	0
Totals	15	60	0

Peds: 0

2nd Line

				Totals
	0	0	0	0
	0	2	39	41
	0	0	9	9

Peds: 0



Peds: 0

Peds: 0

West Approach

	Out	In	Total
	48	31	79
	2	2	4
	0	0	0
Totals	50	33	83

Totals	18	60	0
	16	57	0
	2	3	0
	0	0	0

Jones Baseline

South Approach

	Out	In	Total
	73	67	140
	5	2	7
	0	0	0
Totals	78	69	147

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Scotland St-Jones Baseline & 2nd Line
Site Code: 2122200005
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

Start Time	North Approach Scotland St						South Approach Jones Baseline						East Approach						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:00		10	2	0	0	12	4	7		0	0	11					0		9		1	0	0	10	33
08:15		20	1	0	0	21	8	13		0	0	21					0		9		3	0	0	12	54
08:30		15	3	0	0	18	3	18		0	0	21					0		11		2	0	0	13	52
08:45		15	9	0	0	24	3	22		0	0	25					0		12		3	0	0	15	64
Grand Total		60	15	0	0	75	18	60		0	0	78					0	0	41		9	0	0	50	203
Approach %		80	20	0	-	-	23.1	76.9		0	-	-					-	-	82		18	0	-	-	
Totals %		29.6	7.4	0	-	36.9	8.9	29.6		0	-	38.4					0	-	20.2		4.4	0	-	24.6	
PHF		0.75	0.42	0	-	0.78	0.56	0.68		0	-	0.78					0	-	0.85		0.75	0	-	0.83	0.79
Cars		58	15	0	-	73	16	57		0	-	73					0	-	39		9	0	-	48	194
% Cars		96.7	100	0	-	97.3	88.9	95		0	-	93.6					0	-	95.1		100	0	-	96	95.6
Trucks		2	0	0	-	2	2	3		0	-	5					0	-	2		0	0	-	2	9
% Trucks		3.3	0	0	-	2.7	11.1	5		0	-	6.4					0	-	4.9		0	0	-	4	4.4
Bicycles		0	0	0	-	0	0	0		0	-	0					0	-	0		0	0	-	0	0
% Bicycles		0	0	0	-	0	0	0		0	-	0					0	-	0		0	0	-	0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Specified Period

From: 16:00:00
To: 18:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Intersection: Scotland St-Jones Baseline & 2nd Line
Site Code: 2122200005
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Scotland St runs N/S

North Approach

	Out	In	Total
	70	147	217
	1	5	6
	0	0	0
Totals	71	152	223

Scotland St

	0	0	0
	0	1	0
	14	56	0
Totals	14	57	0

Peds: 0

2nd Line

				Totals
	0	0	0	0
	0	1	22	23
	0	1	6	7

Peds: 0



Peds: 0

Peds: 0

West Approach

	Out	In	Total
	28	38	66
	2	1	3
	0	0	0
Totals	30	39	69

Totals	25	129	0
	24	125	0
	1	4	0
	0	0	0

Jones Baseline

South Approach

	Out	In	Total
	149	62	211
	5	2	7
	0	0	0
Totals	154	64	218

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Scotland St-Jones Baseline & 2nd Line
Site Code: 2122200005
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Scotland St						South Approach Jones Baseline						East Approach						West Approach 2nd Line						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:15		4	3	0	0	7	5	25		0	0	30					0		3		3	0	0	6	43
16:30		19	2	0	0	21	7	36		0	0	43					0		8		2	0	0	10	74
16:45		15	2	0	0	17	9	32		0	0	41					0		4		2	0	0	6	64
17:00		19	7	0	0	26	4	36		0	0	40					0		8		0	0	0	8	74
Grand Total		57	14	0	0	71	25	129		0	0	154					0	0	23		7	0	0	30	255
Approach %		80.3	19.7	0		-	16.2	83.8		0		-					-		76.7		23.3	0		-	
Totals %		22.4	5.5	0		27.8	9.8	50.6		0		60.4					0		9		2.7	0		11.8	
PHF		0.75	0.5	0		0.68	0.69	0.9		0		0.9					0		0.72		0.58	0		0.75	0.86
Cars		56	14	0		70	24	125		0		149					0		22		6	0		28	247
% Cars		98.2	100	0		98.6	96	96.9		0		96.8					0		95.7		85.7	0		93.3	96.9
Trucks		1	0	0		1	1	4		0		5					0		1		1	0		2	8
% Trucks		1.8	0	0		1.4	4	3.1		0		3.2					0		4.3		14.3	0		6.7	3.1
Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
% Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

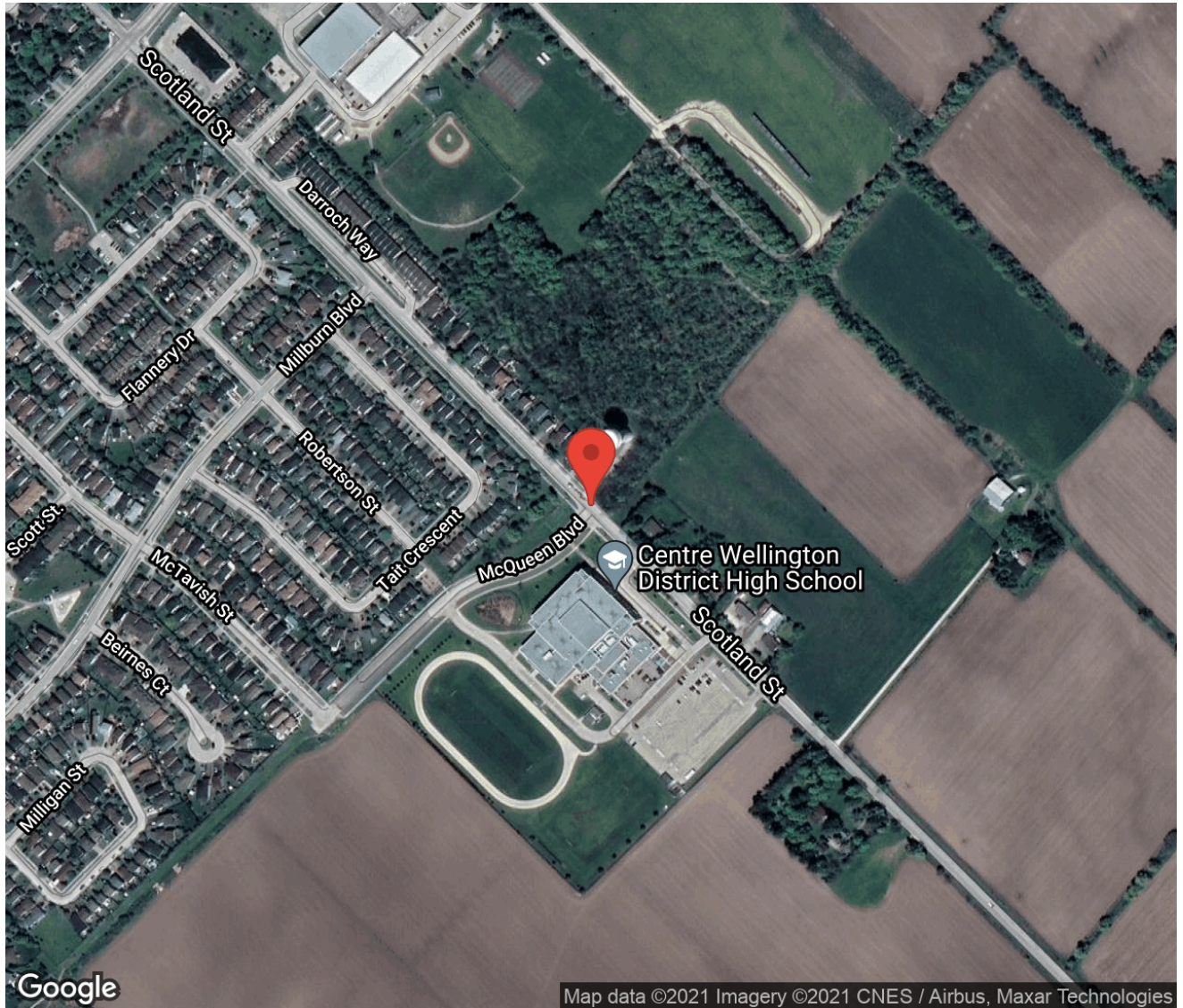
Project #21-222 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Scotland St & McQueen Blvd
Municipality:	South Fergus
Count Date:	Oct 28, 2021
Site Code:	2122200006
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:00
Weather:	Clear

Traffic Count Map

Intersection:	Scotland St & McQueen Blvd
Site Code:	2122200006
Municipality:	South Fergus
Count Date:	Oct 28, 2021



Traffic Count Summary

Intersection: Scotland St & McQueen Blvd
 Site Code: 2122200006
 Municipality: South Fergus
 Count Date: Oct 28, 2021

Scotland St - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	87	0	0	87	0	0	41	0	0	41	0	128
08:00 - 09:00	0	306	0	0	306	3	0	176	0	0	176	0	482
BREAK													
16:00 - 17:00	0	71	0	0	71	4	0	162	0	0	162	0	233
17:00 - 18:00	0	80	0	0	80	0	0	153	0	0	153	0	233
GRAND TOTAL	0	544	0	0	544	7	0	532	0	0	532	0	1076

Traffic Count Summary

Intersection: Scotland St & McQueen Blvd
 Site Code: 2122200006
 Municipality: South Fergus
 Count Date: Oct 28, 2021

McQueen Blvd - Traffic Summary

Hour	East Approach Totals						West Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 - 09:00	0	0	0	0	0	0	16	0	1	0	17	55	17
BREAK													
16:00 - 17:00	0	0	0	0	0	0	0	0	0	0	0	2	0
17:00 - 18:00	0	0	0	0	0	0	0	0	0	0	0	3	0
GRAND TOTAL	0	0	0	0	0	0	16	0	1	0	17	60	17

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	13	0	0	13	0	0	0	0	0	0	0	0	0	0	0
07:15	0	18	0	0	18	0	0	0	0	0	0	0	0	0	0	0
07:30	0	26	0	0	26	0	1	0	0	1	0	0	0	0	0	0
07:45	0	28	0	0	28	0	1	0	0	1	0	0	0	0	0	0
08:00	0	27	0	0	27	0	0	0	0	0	0	0	0	0	0	0
08:15	0	46	0	0	46	0	1	0	0	1	0	0	0	0	0	1
08:30	0	73	0	0	73	0	7	0	0	7	0	1	0	0	1	0
08:45	0	135	0	0	135	0	14	0	0	14	0	2	0	0	2	2
SUBTOTAL	0	366	0	0	366	0	24	0	0	24	0	3	0	0	3	3

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

North Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	0	18	0	0	18	0	0	0	0	0	0	0	0	0	0	0
16:15	0	9	0	0	9	0	0	0	0	0	0	0	0	0	0	2
16:30	0	25	0	0	25	0	1	0	0	1	0	0	0	0	0	1
16:45	0	18	0	0	18	0	0	0	0	0	0	0	0	0	0	1
17:00	0	32	0	0	32	0	0	0	0	0	0	0	0	0	0	0
17:15	0	15	0	0	15	0	0	0	0	0	0	0	0	0	0	0
17:30	0	14	0	0	14	0	0	0	0	0	0	0	0	0	0	0
17:45	0	19	0	0	19	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	150	0	0	150	0	1	0	0	1	0	0	0	0	0	4
GRAND TOTAL	0	516	0	0	516	0	25	0	0	25	0	3	0	0	3	7

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
07:00	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0
07:15	0	11	0	0	11	0	0	0	0	0	0	0	0	0	0	0
07:30	0	15	0	0	15	0	1	0	0	1	0	0	0	0	0	0
07:45	0	9	0	0	9	0	0	0	0	0	0	0	0	0	0	0
08:00	0	10	0	0	10	0	0	0	0	0	0	0	0	0	0	0
08:15	0	18	0	0	18	0	1	0	0	1	0	0	0	0	0	0
08:30	0	51	0	0	51	0	1	0	0	1	0	0	0	0	0	0
08:45	0	93	0	0	93	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	0	212	0	0	212	0	5	0	0	5	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

South Approach - Scotland St

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↻	Total	←	↑	→	↻	Total	←	↑	→	↻	Total	
16:00	0	33	0	0	33	0	2	0	0	2	0	0	0	0	0	0
16:15	0	35	0	0	35	0	1	0	0	1	0	0	0	0	0	0
16:30	0	42	0	0	42	0	0	0	0	0	0	0	0	0	0	0
16:45	0	48	0	0	48	0	1	0	0	1	0	0	0	0	0	0
17:00	0	54	0	0	54	0	0	0	0	0	0	0	0	0	0	0
17:15	0	26	0	0	26	0	0	0	0	0	0	0	0	0	0	0
17:30	0	43	0	0	43	0	0	0	0	0	0	0	0	0	0	0
17:45	0	30	0	0	30	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	311	0	0	311	0	4	0	0	4	0	0	0	0	0	0
GRAND TOTAL	0	523	0	0	523	0	9	0	0	9	0	0	0	0	0	0

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
08:30	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	23
08:45	0	0	0	0	0	10	0	1	0	11	0	0	0	0	0	28
SUBTOTAL	0	0	0	0	0	16	0	1	0	17	0	0	0	0	0	55

Traffic Count Data

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Municipality: South Fergus
Count Date: Oct 28, 2021

West Approach - McQueen Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	←	↑	→	↺	Total	←	↑	→	↺	Total	←	↑	→	↺	Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
GRAND TOTAL	0	0	0	0	0	16	0	1	0	17	0	0	0	0	0	60

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 08:00:00
To: 09:00:00

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Count Date: Oct 28, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Scotland St runs N/S

North Approach

	Out	In	Total
	281	172	453
	22	20	42
	3	0	3
Totals	306	192	498

Scotland St

	0	3	0
	0	22	0
	0	281	0
Totals	0	306	0

Peds: 3



Peds: 0

McQueen Blvd

			Totals
0	0	0	0
0	16	0	16
0	1	0	1

Peds: 55

Peds: 0

West Approach

	Out	In	Total
	0	0	0
	17	0	17
	0	0	0
Totals	17	0	17

Totals	0	176	0
	0	172	0
	0	4	0
	0	0	0

Scotland St

South Approach

	Out	In	Total
	172	281	453
	4	23	27
	0	3	3
Totals	176	307	483

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Count Date: Oct 28, 2021
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

	North Approach Scotland St						South Approach Scotland St						East Approach						West Approach McQueen Blvd						Total Vehicl es
Start Time	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
08:00		27	0	0	0	27	0	10		0	0	10					0		0	0	0	0	0	37	
08:15		47	0	0	1	47	0	19		0	0	19					0			0	0	4	0	66	
08:30		81	0	0	0	81	0	52		0	0	52					6			0	23	6	139		
08:45		151	0	0	2	151	0	95		0	0	95					10			1	0	28	11	257	
Grand Total		306	0	0	3	306	0	176		0	0	176					0	0	16		1	0	55	17	499
Approach %		100	0	0	-	-	0	100		0	-	-					-	-	94.1		5.9	0	-	-	
Totals %		61.3	0	0	-	61.3	0	35.3		0	-	35.3					0	-	3.2		0.2	0	-	3.4	
PHF		0.51	0	0	-	0.51	0	0.46		0	-	0.46					0	-	0.4		0.25	0	-	0.39	0.49
Cars		281	0	0	-	281	0	172		0	-	172					0	-	0		0	0	0	0	453
% Cars		91.8	0	0	-	91.8	0	97.7		0	-	97.7					0	-	0		0	0	0	0	90.8
Trucks		22	0	0	-	22	0	4		0	-	4					0	-	16		1	0	17	43	
% Trucks		7.2	0	0	-	7.2	0	2.3		0	-	2.3					0	-	100		100	0	100	8.6	
Bicycles		3	0	0	-	3	0	0		0	-	0					0	-	0		0	0	0	3	
% Bicycles		1	0	0	-	1	0	0		0	-	0					0	-	0		0	0	0	0.6	
Peds					3	-					0	-											55	-	58
% Peds					5.2	-					0	-											94.8	-	

Peak Hour Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Intersection: Scotland St & McQueen Blvd

Site Code: 2122200006

Count Date: Oct 28, 2021

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Scotland St runs N/S

North Approach

	Out	In	Total
	84	179	263
	1	2	3
	0	0	0
Totals	85	181	266

Scotland St

	0	0	0
	0	1	0
	0	84	0
Totals	0	85	0



Peds: 4

McQueen Blvd

			Totals
0	0	0	0
0	0	0	0
0	0	0	0



Peds: 3



Peds: 0

Peds: 0

West Approach

	Out	In	Total
	0	0	0
	0	0	0
	0	0	0
Totals	0	0	0

Totals	0	181	0
	0	179	0
	0	2	0
	0	0	0



Scotland St

South Approach

	Out	In	Total
	179	84	263
	2	1	3
	0	0	0
Totals	181	85	266

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Scotland St & McQueen Blvd
Site Code: 2122200006
Count Date: Oct 28, 2021
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Scotland St						South Approach Scotland St						East Approach						West Approach McQueen Blvd						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:15		9	0	0	2	9	0	36		0	0	36					0		0		0	0	2	0	45
16:30		26	0	0	1	26	0	42		0	0	42					0		0		0	0	0	0	68
16:45		18	0	0	1	18	0	49		0	0	49					0		0		0	0	0	0	67
17:00		32	0	0	0	32	0	54		0	0	54					0		0		0	0	1	0	86
Grand Total		85	0	0	4	85	0	181		0	0	181					0	0	0		0	0	3	0	266
Approach %		100	0	0	-	-	0	100		0	-	-					0	-	0		0	0	-	-	-
Totals %		32	0	0		32	0	68		0		68					0		0		0	0		0	
PHF		0.66	0	0		0.66	0	0.84		0		0.84					0		0		0	0		0	0.77
Cars		84	0	0		84	0	179		0		179					0		0		0	0		0	263
% Cars		98.8	0	0		98.8	0	98.9		0		98.9					0		0		0	0		0	98.9
Trucks		1	0	0		1	0	2		0		2					0		0		0	0		0	3
% Trucks		1.2	0	0		1.2	0	1.1		0		1.1					0		0		0	0		0	1.1
Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
% Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
Peds					4	-					0	-					0	-				3	-		7
% Peds					57.1	-					0	-					0	-				42.9	-		

Appendix C: LOS Definitions

CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The level of service at an unsignalized intersection is determined on the basis of control delay for each critical lane. This method of analysis is taken from the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 1997.

The average control delay for any particular critical movement (control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay) is a function of the service rate or capacity of the approach and degree of saturation. The level of service criteria for unsignalized intersections is outlined below and is related to ranges in vehicle delay.

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 \leq d \leq 15$
C	Average traffic delays	$15 \leq d \leq 25$
D	Long traffic delays	$25 \leq d \leq 35$
E	Very long traffic delays	$35 \leq d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$d > 50$

CAPACITY ANALYSIS AT SIGNALIZED INTERSECTIONS

Highway Capacity Manual Methodology

The capacity of signalized intersections has been determined in terms of delay taken from Chapter 9 of the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 2000.

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay. The following table describes in detail the characteristics of each level:

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Describes operations with very low control delay, up to 10 seconds/vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$d \leq 10$
B	Describes operations with control delay greater than 10 seconds and up to 20 seconds/vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 \leq d \leq 20$
C	Describes operations with control delay greater than 20 seconds and up to 35 seconds/vehicle. These higher delays may result from fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 \leq d \leq 35$
D	Describes operations with control delay greater than 35 seconds and up to 55 seconds/vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 \leq d \leq 55$
E	Describes operations with control delay greater than 55 seconds and up to 80 seconds/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.	$55 \leq d \leq 80$
F	LOS F describes operations with control delay in excess of 80 seconds/vehicle. This <i>oversaturation</i> , considered to be unacceptable to most drivers, occurs when arrival flow rates exceed the design 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 factors to such high delay levels.	$d > 80$

Appendix D: Existing Operations

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2022 Existing Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	1	0	178	309	0
Future Volume (Veh/h)	16	1	0	178	309	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	16	1	0	178	309	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	487	309	309			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	487	309	309			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	540	731	1252			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	17	178	309			
Volume Left	16	0	0			
Volume Right	1	0	0			
cSH	548	1252	1700			
Volume to Capacity	0.03	0.00	0.18			
Queue Length 95th (m)	0.7	0.0	0.0			
Control Delay (s)	11.8	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.8	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		26.3%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2022 Existing Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	10	65	66	11	30	9	406	29	48	600	2
Future Volume (vph)	9	10	65	66	11	30	9	406	29	48	600	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1658		1770	3504		1770	3537	
Flt Permitted	0.83	1.00	1.00	0.83	1.00		0.42	1.00		0.42	1.00	
Satd. Flow (perm)	1552	1863	1583	1552	1658		790	3504		790	3537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	10	65	66	11	30	9	406	29	48	600	2
RTOR Reduction (vph)	0	0	58	0	27	0	0	7	0	0	0	0
Lane Group Flow (vph)	9	10	7	66	14	0	9	428	0	48	602	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	4.8	4.8	4.8	4.8	4.8		22.6	22.6		32.8	32.8	
Effective Green, g (s)	4.8	4.8	4.8	4.8	4.8		22.6	22.6		32.8	32.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.47	0.47		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	187	159	156	167		375	1663		672	2437	
v/s Ratio Prot		0.01			0.01			0.12		0.01	c0.17	
v/s Ratio Perm	0.01		0.00	c0.04			0.01			0.04		
v/c Ratio	0.06	0.05	0.04	0.42	0.08		0.02	0.26		0.07	0.25	
Uniform Delay, d1	19.4	19.3	19.3	20.1	19.4		6.6	7.5		2.5	2.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	1.9	0.2		0.1	0.4		0.2	0.2	
Delay (s)	19.5	19.5	19.4	22.0	19.6		6.8	7.9		2.7	3.0	
Level of Service	B	B	B	C	B		A	A		A	A	
Approach Delay (s)		19.4			21.1			7.8			3.0	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.2			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			47.6			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			43.6%			ICU Level of Service				A		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2022 Existing Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	9	18	61	61	15
Future Volume (Veh/h)	41	9	18	61	61	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	41	9	18	61	61	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	166	68	76			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	166	68	76			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	99			
cM capacity (veh/h)	815	995	1523			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	79	76			
Volume Left	41	18	0			
Volume Right	9	0	15			
cSH	843	1523	1700			
Volume to Capacity	0.06	0.01	0.04			
Queue Length 95th (m)	1.4	0.3	0.0			
Control Delay (s)	9.5	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.5	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization		20.9%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2022 Existing Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	30	426	36	72	631
Future Volume (vph)	49	30	426	36	72	631
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1714		3498		1770	1863
Flt Permitted	0.97		1.00		0.43	1.00
Satd. Flow (perm)	1714		3498		809	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	30	426	36	72	631
RTOR Reduction (vph)	27	0	6	0	0	0
Lane Group Flow (vph)	52	0	456	0	72	631
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	4.9		33.3		40.4	40.4
Effective Green, g (s)	4.9		33.3		40.4	40.4
Actuated g/C Ratio	0.09		0.62		0.76	0.76
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	157		2185		669	1412
v/s Ratio Prot			0.13		0.01	c0.34
v/s Ratio Perm	c0.03				0.08	
v/c Ratio	0.33		0.21		0.11	0.45
Uniform Delay, d1	22.7		4.3		1.8	2.4
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.2		0.2		0.1	1.0
Delay (s)	23.9		4.5		1.9	3.4
Level of Service	C		A		A	A
Approach Delay (s)	23.9		4.5			3.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.48			
Actuated Cycle Length (s)			53.3		Sum of lost time (s)	12.0
Intersection Capacity Utilization			44.4%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2022 Existing Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	14	23	3	12	7	14	428	12	5	632	51
Future Volume (Veh/h)	29	14	23	3	12	7	14	428	12	5	632	51
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	29	14	23	3	12	7	14	428	12	5	632	51
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1136	1136	658	1134	1155	434	683	440				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1136	1136	658	1134	1155	434	683	440				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	83	93	95	98	94	99	98	100				
cM capacity (veh/h)	166	198	465	159	193	622	910	1120				
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	66	22	14	440	5	683						
Volume Left	29	3	14	0	5	0						
Volume Right	23	7	0	12	0	51						
cSH	224	238	910	1700	1120	1700						
Volume to Capacity	0.29	0.09	0.02	0.26	0.00	0.40						
Queue Length 95th (m)	9.2	2.3	0.4	0.0	0.1	0.0						
Control Delay (s)	27.7	21.6	9.0	0.0	8.2	0.0						
Lane LOS	D	C	A	A								
Approach Delay (s)	27.7	21.6	0.3	0.1								
Approach LOS	D	C										
Intersection Summary												
Average Delay	2.0											
Intersection Capacity Utilization	52.2%			ICU Level of Service				A				
Analysis Period (min)	30											

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2022 Existing Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	60	5	1	73	3	2	5	0	8	2	18
Future Volume (Veh/h)	11	60	5	1	73	3	2	5	0	8	2	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	60	5	1	73	3	2	5	0	8	2	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	76			65			180	162	62	164	164	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			65			180	162	62	164	164	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	100	98
cM capacity (veh/h)	1523			1537			761	724	1002	792	723	987
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	77	7	28								
Volume Left	11	1	2	8								
Volume Right	5	3	0	18								
cSH	1523	1537	734	900								
Volume to Capacity	0.01	0.00	0.01	0.03								
Queue Length 95th (m)	0.2	0.0	0.2	0.7								
Control Delay (s)	1.1	0.1	9.9	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.1	0.1	9.9	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			20.5%	ICU Level of Service					A			
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2022 Existing Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	183	86	0
Future Volume (Veh/h)	0	0	0	183	86	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	183	86	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	269	86	86			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	269	86	86			
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)	720	973	1510			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	183	86			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1510	1700			
Volume to Capacity	0.00	0.00	0.05			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			13.0%	ICU Level of Service		A
Analysis Period (min)			30			

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2022 Existing Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	28	23	66	11	30	47	741	115	154	551	5
Future Volume (vph)	30	28	23	66	11	30	47	741	115	154	551	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1658		1770	3468		1770	3534	
Flt Permitted	0.82	1.00	1.00	0.82	1.00		0.44	1.00		0.24	1.00	
Satd. Flow (perm)	1521	1863	1583	1521	1658		827	3468		445	3534	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	28	23	66	11	30	47	741	115	154	551	5
RTOR Reduction (vph)	0	0	21	0	27	0	0	17	0	0	1	0
Lane Group Flow (vph)	30	28	2	66	14	0	47	839	0	154	555	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Effective Green, g (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.47	0.47		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	191	162	156	170		391	1643		478	2430	
v/s Ratio Prot		0.02			0.01			c0.24		c0.04	0.16	
v/s Ratio Perm	0.02		0.00	c0.04			0.06			0.18		
v/c Ratio	0.19	0.15	0.01	0.42	0.08		0.12	0.51		0.32	0.23	
Uniform Delay, d1	19.6	19.5	19.2	20.1	19.4		7.0	8.7		3.3	2.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4	0.0	1.9	0.2		0.6	1.1		1.8	0.2	
Delay (s)	20.2	19.9	19.3	21.9	19.6		7.6	9.9		5.1	3.0	
Level of Service	C	B	B	C	B		A	A		A	A	
Approach Delay (s)		19.8			21.0			9.7			3.4	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.4	HCM 2000 Level of Service					A			
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			47.7	Sum of lost time (s)					14.0			
Intersection Capacity Utilization			54.7%	ICU Level of Service					A			
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2022 Existing Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	7	25	130	58	14
Future Volume (Veh/h)	23	7	25	130	58	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	23	7	25	130	58	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	245	65	72			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	245	65	72			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	98			
cM capacity (veh/h)	731	999	1528			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	30	155	72			
Volume Left	23	25	0			
Volume Right	7	0	14			
cSH	780	1528	1700			
Volume to Capacity	0.04	0.02	0.04			
Queue Length 95th (m)	0.9	0.4	0.0			
Control Delay (s)	9.8	1.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	1.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization		24.9%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2022 Existing Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	128	794	90	117	522
Future Volume (vph)	67	128	794	90	117	522
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.91		0.98		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1669		3485		1770	1863
Flt Permitted	0.98		1.00		0.22	1.00
Satd. Flow (perm)	1669		3485		417	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	128	794	90	117	522
RTOR Reduction (vph)	108	0	11	0	0	0
Lane Group Flow (vph)	87	0	873	0	117	522
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	8.0		25.4		35.0	35.0
Effective Green, g (s)	8.0		25.4		35.0	35.0
Actuated g/C Ratio	0.16		0.50		0.69	0.69
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	261		1735		434	1278
v/s Ratio Prot			c0.25		0.03	c0.28
v/s Ratio Perm	c0.05				0.16	
v/c Ratio	0.33		0.50		0.27	0.41
Uniform Delay, d1	19.1		8.6		3.7	3.5
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		1.0		0.3	1.0
Delay (s)	19.9		9.6		4.0	4.5
Level of Service	B		A		A	A
Approach Delay (s)	19.9		9.6			4.4
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			8.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			51.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			52.9%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2022 Existing Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	11	15	10	16	16	23	824	16	1	539	54
Future Volume (Veh/h)	46	11	15	10	16	16	23	824	16	1	539	54
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	46	11	15	10	16	16	23	824	16	1	539	54
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1462	1454	566	1440	1473	832	593	840				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1462	1454	566	1440	1473	832	593	840				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	49	91	97	90	87	96	98	100				
cM capacity (veh/h)	90	127	524	98	124	369	983	795				
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	72	42	23	840	1	593						
Volume Left	46	10	23	0	1	0						
Volume Right	15	16	0	16	0	54						
cSH	115	153	983	1700	795	1700						
Volume to Capacity	0.62	0.27	0.02	0.49	0.00	0.35						
Queue Length 95th (m)	28.3	8.3	0.5	0.0	0.0	0.0						
Control Delay (s)	82.1	37.3	8.8	0.0	9.5	0.0						
Lane LOS	F	E	A		A							
Approach Delay (s)	82.1	37.3	0.2		0.0							
Approach LOS	F	E										
Intersection Summary												
Average Delay	4.9											
Intersection Capacity Utilization	60.3%			ICU Level of Service				B				
Analysis Period (min)	30											

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2022 Existing Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	64	0	0	69	18	0	4	0	4	9	19
Future Volume (Veh/h)	59	64	0	0	69	18	0	4	0	4	9	19
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	59	64	0	0	69	18	0	4	0	4	9	19
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	87			64			284	269	64	262	260	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	87			64			284	269	64	262	260	78
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 %	96			100			100	99	100	99	99	98
cM capacity (veh/h)	1509			1538			629	612	1000	667	619	983
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	123	87	4	32								
Volume Left	59	0	0	4								
Volume Right	0	18	0	19								
cSH	1509	1538	612	803								
Volume to Capacity	0.04	0.00	0.01	0.04								
Queue Length 95th (m)	0.9	0.0	0.1	0.9								
Control Delay (s)	3.7	0.0	10.9	9.7								
Lane LOS	A		B	A								
Approach Delay (s)	3.7	0.0	10.9	9.7								
Approach LOS			B	A								
Intersection Summary												
Average Delay				3.3								
Intersection Capacity Utilization				25.3%	ICU Level of Service				A			
Analysis Period (min)				30								

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB
Directions Served	LR
Maximum Queue (m)	11.4
Average Queue (m)	3.9
95th Queue (m)	11.3
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	8.2	11.3	16.4	21.7	14.7	9.4	27.3	32.5	15.4	29.6	38.3
Average Queue (m)	2.3	1.5	8.7	11.1	5.6	1.4	12.7	14.5	5.2	7.1	18.1
95th Queue (m)	8.1	7.2	14.6	19.9	13.1	6.4	24.0	27.1	13.8	18.8	33.2
Link Distance (m)							273.6	273.6		363.4	363.4
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	50.0		50.0	30.0		30.0			30.0		
Storage Blk Time (%)				0			0			0	
Queuing Penalty (veh)				0			0			0	

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	13.0	8.0
Average Queue (m)	6.3	0.6
95th Queue (m)	12.1	3.8
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	18.3	27.4	30.4	17.2	45.0
Average Queue (m)	11.2	9.7	9.6	7.5	14.7
95th Queue (m)	19.3	20.4	23.0	15.5	33.6
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (m)	25.7	12.9	8.4	7.0
Average Queue (m)	9.6	4.2	2.2	0.5
95th Queue (m)	18.8	11.3	8.0	3.7
Link Distance (m)	663.4	719.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			100.0	100.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 16: Guelph St & 2nd Line

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	6.0	9.0	12.0
Average Queue (m)	0.4	1.5	5.2
95th Queue (m)	3.1	6.9	12.8
Link Distance (m)	164.0	266.0	1012.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 2: Scotland St & McQueen Blvd

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	16.8	16.9	11.5	23.0	20.0	18.5	45.6	58.3	28.7	19.2	39.8
Average Queue (m)	6.7	5.3	4.2	11.1	6.3	7.5	24.4	31.0	13.9	7.0	17.3
95th Queue (m)	14.7	13.6	11.4	21.0	15.1	16.6	42.1	49.8	23.9	17.7	31.9
Link Distance (m)							273.6	273.6		363.4	363.4
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	50.0		50.0	30.0		30.0			30.0		
Storage Blk Time (%)				0	0	0	3		0	0	
Queuing Penalty (veh)				0	0	0	1		0	0	

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	7.5
Average Queue (m)	4.9	0.6
95th Queue (m)	10.7	3.9
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	22.2	41.9	50.4	24.7	46.3
Average Queue (m)	16.5	19.6	24.2	11.6	18.8
95th Queue (m)	21.6	34.1	42.6	20.9	36.4
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (m)	38.0	24.9	10.4	1.7	1.4
Average Queue (m)	14.0	8.4	2.4	0.1	0.1
95th Queue (m)	29.9	18.3	8.7	1.2	1.4
Link Distance (m)	663.4	719.9			335.4
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			100.0	100.0	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 16: Guelph St & 2nd Line

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	10.1	9.1	13.4
Average Queue (m)	1.2	1.0	5.8
95th Queue (m)	6.3	5.7	13.3
Link Distance (m)	164.0	266.0	1012.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 2

Appendix E: Future Background Operations

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2025 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	11	10	183	319	10
Future Volume (Veh/h)	17	11	10	183	319	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	11	10	183	319	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						
vC, conflicting volume	527	324	329			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	527	324	329			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	99			
cM capacity (veh/h)	507	717	1231			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	28	193	329			
Volume Left	17	10	0			
Volume Right	11	0	10			
cSH	573	1231	1700			
Volume to Capacity	0.05	0.01	0.19			
Queue Length 95th (m)	1.2	0.2	0.0			
Control Delay (s)	11.6	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		27.8%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2025 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	10	67	68	11	31	9	473	30	50	715	2
Future Volume (vph)	9	10	67	68	11	31	9	473	30	50	715	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1657		1770	3508		1770	3538	
Flt Permitted	0.82	1.00	1.00	0.82	1.00		0.38	1.00		0.40	1.00	
Satd. Flow (perm)	1521	1863	1583	1521	1657		706	3508		740	3538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	10	67	68	11	31	9	473	30	50	715	2
RTOR Reduction (vph)	0	0	60	0	28	0	0	6	0	0	0	0
Lane Group Flow (vph)	9	10	7	68	14	0	9	497	0	50	717	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Effective Green, g (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.47	0.47		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	191	162	156	170		334	1662		642	2432	
v/s Ratio Prot		0.01			0.01			0.14		0.01	c0.20	
v/s Ratio Perm	0.01		0.00	c0.04			0.01			0.04		
v/c Ratio	0.06	0.05	0.04	0.44	0.08		0.03	0.30		0.08	0.29	
Uniform Delay, d1	19.3	19.3	19.3	20.1	19.4		6.7	7.7		2.6	2.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	2.0	0.2		0.1	0.5		0.2	0.3	
Delay (s)	19.5	19.4	19.4	22.1	19.6		6.8	8.2		2.8	3.2	
Level of Service	B	B	B	C	B		A	A		A	A	
Approach Delay (s)		19.4			21.1			8.1			3.2	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.2			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.35									
Actuated Cycle Length (s)			47.7			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			46.9%			ICU Level of Service				A		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2025 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	9	19	62	62	16
Future Volume (Veh/h)	43	9	19	62	62	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	43	9	19	62	62	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)						
pX, platoon unblocked						
vC, conflicting volume	170	70	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	170	70	78			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	99			
cM capacity (veh/h)	810	993	1520			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	52	81	78			
Volume Left	43	19	0			
Volume Right	9	0	16			
cSH	837	1520	1700			
Volume to Capacity	0.06	0.01	0.05			
Queue Length 95th (m)	1.5	0.3	0.0			
Control Delay (s)	9.6	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.6	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization		21.0%		ICU Level of Service		A
Analysis Period (min)			30			

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2025 Background Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	30	494	36	72	748
Future Volume (vph)	49	30	494	36	72	748
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1714		3503		1770	1863
Flt Permitted	0.97		1.00		0.41	1.00
Satd. Flow (perm)	1714		3503		757	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	30	494	36	72	748
RTOR Reduction (vph)	27	0	6	0	0	0
Lane Group Flow (vph)	52	0	524	0	72	748
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	4.9		33.3		40.4	40.4
Effective Green, g (s)	4.9		33.3		40.4	40.4
Actuated g/C Ratio	0.09		0.62		0.76	0.76
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	157		2188		632	1412
v/s Ratio Prot			0.15		0.01	c0.40
v/s Ratio Perm	c0.03				0.08	
v/c Ratio	0.33		0.24		0.11	0.53
Uniform Delay, d1	22.7		4.4		1.8	2.6
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.2		0.3		0.1	1.4
Delay (s)	23.9		4.7		1.9	4.0
Level of Service	C		A		A	A
Approach Delay (s)	23.9		4.7			3.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			53.3		Sum of lost time (s)	12.0
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2025 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	15	24	3	12	7	15	496	12	5	749	52
Future Volume (vph)	30	15	24	3	12	7	15	496	12	5	749	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1738			1771		1770	1856		1770	1845	
Flt Permitted		0.85			0.94		0.29	1.00		0.46	1.00	
Satd. Flow (perm)		1508			1673		547	1856		866	1845	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	15	24	3	12	7	15	496	12	5	749	52
RTOR Reduction (vph)	0	22	0	0	6	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	47	0	0	16	0	15	507	0	5	798	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.0			6.0		44.1	44.1		44.1	44.1	
Effective Green, g (s)		6.0			6.0		44.1	44.1		44.1	44.1	
Actuated g/C Ratio		0.10			0.10		0.71	0.71		0.71	0.71	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		145			161		388	1318		614	1310	
v/s Ratio Prot								0.27			c0.43	
v/s Ratio Perm		c0.03			0.01		0.03			0.01		
v/c Ratio		0.33			0.10		0.04	0.38		0.01	0.61	
Uniform Delay, d1		26.2			25.6		2.7	3.6		2.6	4.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3			0.3		0.2	0.9		0.0	2.1	
Delay (s)		27.5			25.8		2.9	4.4		2.6	6.7	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		27.5			25.8			4.4			6.7	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.2			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		62.1			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		62.1%			ICU Level of Service			B				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2025 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	61	5	1	75	3	2	5	0	8	2	19
Future Volume (Veh/h)	11	61	5	1	75	3	2	5	0	8	2	19
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	61	5	1	75	3	2	5	0	8	2	19
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	78			66			184	166	64	166	166	76
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			66			184	166	64	166	166	76
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	100	98
cM capacity (veh/h)	1520			1536			756	721	1001	789	720	985
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	77	79	7	29								
Volume Left	11	1	2	8								
Volume Right	5	3	0	19								
cSH	1520	1536	731	900								
Volume to Capacity	0.01	0.00	0.01	0.03								
Queue Length 95th (m)	0.2	0.0	0.2	0.8								
Control Delay (s)	1.1	0.1	10.0	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.1	0.1	10.0	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay				2.2								
Intersection Capacity Utilization				20.6%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2025 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	10	10	188	88	10
Future Volume (Veh/h)	10	10	10	188	88	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	10	188	88	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						
vC, conflicting volume	301	93	98			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	301	93	98			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	686	964	1495			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	20	198	98			
Volume Left	10	10	0			
Volume Right	10	0	10			
cSH	802	1495	1700			
Volume to Capacity	0.02	0.01	0.06			
Queue Length 95th (m)	0.6	0.2	0.0			
Control Delay (s)	9.6	0.4	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.6	0.4	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		27.1%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2025 Background Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	29	24	68	11	31	49	877	119	158	645	5
Future Volume (vph)	31	29	24	68	11	31	49	877	119	158	645	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1657		1770	3476		1770	3535	
Flt Permitted	0.82	1.00	1.00	0.82	1.00		0.40	1.00		0.19	1.00	
Satd. Flow (perm)	1521	1863	1583	1521	1657		754	3476		348	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	31	29	24	68	11	31	49	877	119	158	645	5
RTOR Reduction (vph)	0	0	22	0	28	0	0	15	0	0	1	0
Lane Group Flow (vph)	31	29	2	68	14	0	49	981	0	158	649	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Effective Green, g (s)	4.9	4.9	4.9	4.9	4.9		22.6	22.6		32.8	32.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.47	0.47		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	191	162	156	170		357	1646		424	2430	
v/s Ratio Prot		0.02			0.01			c0.28		c0.05	0.18	
v/s Ratio Perm	0.02		0.00	c0.04			0.06			0.21		
v/c Ratio	0.20	0.15	0.02	0.44	0.08		0.14	0.60		0.37	0.27	
Uniform Delay, d1	19.6	19.5	19.2	20.1	19.4		7.1	9.2		3.8	2.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4	0.0	2.0	0.2		0.8	1.6		2.5	0.3	
Delay (s)	20.2	19.9	19.3	22.1	19.6		7.9	10.8		6.4	3.1	
Level of Service	C	B	B	C	B		A	B		A	A	
Approach Delay (s)		19.8			21.1			10.7			3.8	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM 2000 Control Delay	8.9			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	47.7			Sum of lost time (s)			14.0					
Intersection Capacity Utilization	58.9%			ICU Level of Service			B					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2025 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	7	26	134	59	15
Future Volume (Veh/h)	24	7	26	134	59	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	24	7	26	134	59	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	252	66	74			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252	66	74			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	98			
cM capacity (veh/h)	724	997	1526			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	31	160	74			
Volume Left	24	26	0			
Volume Right	7	0	15			
cSH	771	1526	1700			
Volume to Capacity	0.04	0.02	0.04			
Queue Length 95th (m)	1.0	0.4	0.0			
Control Delay (s)	9.9	1.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	1.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		25.2%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2025 Background Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	128	931	90	117	615
Future Volume (vph)	67	128	931	90	117	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1669		3492		1770	1863
Flt Permitted	0.98		1.00		0.18	1.00
Satd. Flow (perm)	1669		3492		329	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	128	931	90	117	615
RTOR Reduction (vph)	108	0	9	0	0	0
Lane Group Flow (vph)	87	0	1012	0	117	615
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	8.0		25.4		35.0	35.0
Effective Green, g (s)	8.0		25.4		35.0	35.0
Actuated g/C Ratio	0.16		0.50		0.69	0.69
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	261		1739		384	1278
v/s Ratio Prot			c0.29		0.03	c0.33
v/s Ratio Perm	c0.05				0.18	
v/c Ratio	0.33		0.58		0.30	0.48
Uniform Delay, d1	19.1		9.0		4.2	3.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		1.4		0.5	1.3
Delay (s)	19.9		10.5		4.6	5.1
Level of Service	B		B		A	A
Approach Delay (s)	19.9		10.5			5.0
Approach LOS	B		B			A
Intersection Summary						
HCM 2000 Control Delay			9.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			51.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			56.7%		ICU Level of Service	B
Analysis Period (min)			30			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2025 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	11	16	10	17	17	24	962	17	1	632	56
Future Volume (vph)	48	11	16	10	17	17	24	962	17	1	632	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1746		1770	1858		1770	1840	
Flt Permitted		0.78			0.90		0.36	1.00		0.20	1.00	
Satd. Flow (perm)		1411			1589		663	1858		367	1840	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	11	16	10	17	17	24	962	17	1	632	56
RTOR Reduction (vph)	0	14	0	0	15	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	61	0	0	29	0	24	978	0	1	684	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		5.7			5.7		42.2	42.2		42.2	42.2	
Effective Green, g (s)		5.7			5.7		42.2	42.2		42.2	42.2	
Actuated g/C Ratio		0.10			0.10		0.70	0.70		0.70	0.70	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		134			151		467	1308		258	1296	
v/s Ratio Prot								c0.53			0.37	
v/s Ratio Perm		c0.04			0.02		0.04			0.00		
v/c Ratio		0.45			0.19		0.05	0.75		0.00	0.53	
Uniform Delay, d1		25.6			25.0		2.7	5.5		2.6	4.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.4			0.6		0.2	4.0		0.0	1.5	
Delay (s)		28.0			25.6		2.9	9.5		2.6	5.7	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		28.0			25.6			9.4			5.7	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		9.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		59.9			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		71.7%			ICU Level of Service			C				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2025 Background Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	67	0	0	72	19	0	4	0	4	9	20
Future Volume (Veh/h)	61	67	0	0	72	19	0	4	0	4	9	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	61	67	0	0	72	19	0	4	0	4	9	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	91			67			295	280	67	272	270	82
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	91			67			295	280	67	272	270	82
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 %	96			100			100	99	100	99	99	98
cM capacity (veh/h)	1504			1535			617	603	997	656	610	978
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	128	91	4	33								
Volume Left	61	0	0	4								
Volume Right	0	19	0	20								
cSH	1504	1535	603	799								
Volume to Capacity	0.04	0.00	0.01	0.04								
Queue Length 95th (m)	1.0	0.0	0.2	1.0								
Control Delay (s)	3.7	0.0	11.0	9.7								
Lane LOS	A		B	A								
Approach Delay (s)	3.7	0.0	11.0	9.7								
Approach LOS			B	A								
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			25.6%		ICU Level of Service				A			
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2031 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	12	11	195	339	11
Future Volume (Veh/h)	18	12	11	195	339	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	12	11	195	339	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	562	344	350			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562	344	350			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	98	99			
cM capacity (veh/h)	484	698	1209			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	30	206	350			
Volume Left	18	11	0			
Volume Right	12	0	11			
cSH	552	1209	1700			
Volume to Capacity	0.05	0.01	0.21			
Queue Length 95th (m)	1.3	0.2	0.0			
Control Delay (s)	11.9	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.9	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization		29.2%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2031 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	11	202	72	12	33	10	549	32	53	716	2
Future Volume (vph)	10	11	202	72	12	33	10	549	32	53	716	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1658		1770	3510		1770	3538	
Flt Permitted	0.73	1.00	1.00	0.75	1.00		0.38	1.00		0.35	1.00	
Satd. Flow (perm)	1356	1863	1583	1398	1658		705	3510		647	3538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	11	202	72	12	33	10	549	32	53	716	2
RTOR Reduction (vph)	0	0	158	0	28	0	0	6	0	0	0	0
Lane Group Flow (vph)	10	11	44	72	17	0	10	575	0	53	718	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	8.0	8.0	8.0	8.0	8.0		21.0	21.0		32.0	32.0	
Effective Green, g (s)	8.0	8.0	8.0	8.0	8.0		21.0	21.0		32.0	32.0	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.42	0.42		0.64	0.64	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	298	253	223	265		296	1474		571	2264	
v/s Ratio Prot		0.01			0.01			c0.16		0.01	c0.20	
v/s Ratio Perm	0.01		0.03	c0.05			0.01			0.05		
v/c Ratio	0.05	0.04	0.17	0.32	0.07		0.03	0.39		0.09	0.32	
Uniform Delay, d1	17.8	17.7	18.1	18.6	17.8		8.5	10.1		3.6	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1	0.3	0.8	0.1		0.2	0.8		0.3	0.4	
Delay (s)	17.9	17.8	18.5	19.4	17.9		8.7	10.8		3.9	4.4	
Level of Service	B	B	B	B	B		A	B		A	A	
Approach Delay (s)		18.4			18.9			10.8			4.4	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay	9.5			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.37											
Actuated Cycle Length (s)	50.0			Sum of lost time (s)			14.0					
Intersection Capacity Utilization	49.0%			ICU Level of Service			A					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2031 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	10	20	66	66	17
Future Volume (Veh/h)	45	10	20	66	66	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	45	10	20	66	66	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	180	74	83			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180	74	83			
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	99	99			
cM capacity (veh/h)	798	987	1514			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	55	86	83			
Volume Left	45	20	0			
Volume Right	10	0	17			
cSH	827	1514	1700			
Volume to Capacity	0.07	0.01	0.05			
Queue Length 95th (m)	1.6	0.3	0.0			
Control Delay (s)	9.7	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.1				
Intersection Capacity Utilization		21.2%		ICU Level of Service	A	
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2031 Background Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	30	571	36	72	743
Future Volume (vph)	49	30	571	36	72	743
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1714		3508		1770	1863
Flt Permitted	0.97		1.00		0.38	1.00
Satd. Flow (perm)	1714		3508		699	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	30	571	36	72	743
RTOR Reduction (vph)	27	0	5	0	0	0
Lane Group Flow (vph)	52	0	602	0	72	743
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	4.9		31.8		39.5	39.5
Effective Green, g (s)	4.9		31.8		39.5	39.5
Actuated g/C Ratio	0.09		0.58		0.73	0.73
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	154		2050		580	1352
v/s Ratio Prot			0.17		0.01	c0.40
v/s Ratio Perm	c0.03				0.08	
v/c Ratio	0.34		0.29		0.12	0.55
Uniform Delay, d1	23.2		5.7		2.3	3.4
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3		0.4		0.1	1.6
Delay (s)	24.5		6.0		2.4	5.0
Level of Service	C		A		A	A
Approach Delay (s)	24.5		6.0			4.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			54.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			52.0%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2031 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	19	0	0	28	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	19	0	0	28	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	0	0	0	0	19	0	0	28	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	0			0			14	0	0	10	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			14	0	0	10	0	0
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	98	100	100	97	100
cM capacity (veh/h)	1623			1623			978	896	1085	993	896	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	0	19	28								
Volume Left	0	0	0	0								
Volume Right	0	0	0	0								
cSH	1700	1700	896	896								
Volume to Capacity	0.00	0.00	0.02	0.03								
Queue Length 95th (m)	0.0	0.0	0.5	0.7								
Control Delay (s)	0.0	0.0	9.1	9.1								
Lane LOS			A	A								
Approach Delay (s)	0.0	0.0	9.1	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay				9.1								
Intersection Capacity Utilization				6.7%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2031 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	15	25	3	13	8	15	573	13	6	744	55
Future Volume (vph)	32	15	25	3	13	8	15	573	13	6	744	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1737			1768		1770	1857		1770	1844	
Flt Permitted		0.90			0.94		0.30	1.00		0.42	1.00	
Satd. Flow (perm)		1603			1677		555	1857		789	1844	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	15	25	3	13	8	15	573	13	6	744	55
RTOR Reduction (vph)	0	23	0	0	7	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	49	0	0	17	0	15	584	0	6	794	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Effective Green, g (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Actuated g/C Ratio		0.07			0.07		0.70	0.70		0.70	0.70	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		116			122		388	1298		551	1289	
v/s Ratio Prot								0.31			c0.43	
v/s Ratio Perm		c0.03			0.01		0.03			0.01		
v/c Ratio		0.42			0.14		0.04	0.45		0.01	0.62	
Uniform Delay, d1		19.5			19.1		2.0	2.9		2.0	3.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.5			0.5		0.2	1.1		0.0	2.2	
Delay (s)		21.9			19.6		2.2	4.0		2.0	5.7	
Level of Service		C			B		A	A		A	A	
Approach Delay (s)		21.9			19.6			4.0			5.7	
Approach LOS		C			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.0			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		43.9			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		61.5%			ICU Level of Service			B				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2031 Background Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	65	6	1	80	3	2	6	0	9	2	20
Future Volume (Veh/h)	12	65	6	1	80	3	2	6	0	9	2	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	65	6	1	80	3	2	6	0	9	2	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	83			71			196	177	68	178	178	82
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	83			71			196	177	68	178	178	82
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	100	98
cM capacity (veh/h)	1514			1529			740	710	995	773	709	978
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	83	84	8	31								
Volume Left	12	1	2	9								
Volume Right	6	3	0	20								
cSH	1514	1529	718	888								
Volume to Capacity	0.01	0.00	0.01	0.03								
Queue Length 95th (m)	0.2	0.0	0.3	0.8								
Control Delay (s)	1.1	0.1	10.1	9.2								
Lane LOS	A	A	B	A								
Approach Delay (s)	1.1	0.1	10.1	9.2								
Approach LOS			B	A								
Intersection Summary												
Average Delay												
Intersection Capacity Utilization												
Analysis Period (min)												

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2031 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	11	11	200	94	11
Future Volume (Veh/h)	11	11	11	200	94	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	11	11	200	94	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	322	100	105			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	322	100	105			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	667	956	1486			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	22	211	105			
Volume Left	11	11	0			
Volume Right	11	0	11			
cSH	786	1486	1700			
Volume to Capacity	0.03	0.01	0.06			
Queue Length 95th (m)	0.7	0.2	0.0			
Control Delay (s)	9.7	0.4	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	0.4	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		27.8%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2031 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	31	25	72	12	33	52	877	126	168	759	6
Future Volume (vph)	33	31	25	72	12	33	52	877	126	168	759	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1658		1770	3473		1770	3535	
Flt Permitted	0.80	1.00	1.00	0.80	1.00		0.36	1.00		0.18	1.00	
Satd. Flow (perm)	1490	1863	1583	1490	1658		674	3473		344	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	33	31	25	72	12	33	52	877	126	168	759	6
RTOR Reduction (vph)	0	0	22	0	30	0	0	16	0	0	1	0
Lane Group Flow (vph)	33	31	3	72	15	0	52	987	0	168	764	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	5.0	5.0	5.0	5.0	5.0		22.7	22.7		32.9	32.9	
Effective Green, g (s)	5.0	5.0	5.0	5.0	5.0		22.7	22.7		32.9	32.9	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.47	0.47		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	155	194	165	155	173		319	1645		420	2428	
v/s Ratio Prot		0.02			0.01			c0.28		c0.05	0.22	
v/s Ratio Perm	0.02		0.00	c0.05			0.08			0.22		
v/c Ratio	0.21	0.16	0.02	0.46	0.09		0.16	0.60		0.40	0.31	
Uniform Delay, d1	19.6	19.5	19.2	20.2	19.4		7.2	9.3		4.0	3.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.4	0.0	2.2	0.2		1.1	1.6		2.8	0.3	
Delay (s)	20.3	19.9	19.3	22.4	19.6		8.3	10.9		6.8	3.3	
Level of Service	C	B	B	C	B		A	B		A	A	
Approach Delay (s)		19.9			21.3			10.8			4.0	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM 2000 Control Delay	8.8			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.55											
Actuated Cycle Length (s)	47.9			Sum of lost time (s)			14.0					
Intersection Capacity Utilization	59.9%			ICU Level of Service			B					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2031 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	28	143	63	15
Future Volume (Veh/h)	25	8	28	143	63	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	8	28	143	63	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	270	70	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	70	78			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	98			
cM capacity (veh/h)	707	992	1520			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	33	171	78			
Volume Left	25	28	0			
Volume Right	8	0	15			
cSH	760	1520	1700			
Volume to Capacity	0.04	0.02	0.05			
Queue Length 95th (m)	1.0	0.4	0.0			
Control Delay (s)	10.0	1.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	10.0	1.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		25.7%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2031 Background Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	128	923	90	117	727
Future Volume (vph)	67	128	923	90	117	727
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1669		3492		1770	1863
Flt Permitted	0.98		1.00		0.19	1.00
Satd. Flow (perm)	1669		3492		347	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	128	923	90	117	727
RTOR Reduction (vph)	109	0	10	0	0	0
Lane Group Flow (vph)	86	0	1003	0	117	727
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	8.1		26.4		35.4	35.4
Effective Green, g (s)	8.1		26.4		35.4	35.4
Actuated g/C Ratio	0.15		0.49		0.66	0.66
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	252		1723		362	1232
v/s Ratio Prot			0.29		0.03	c0.39
v/s Ratio Perm	c0.05				0.18	
v/c Ratio	0.34		0.58		0.32	0.59
Uniform Delay, d1	20.3		9.6		4.6	5.0
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		1.5		0.5	2.1
Delay (s)	21.1		11.1		5.1	7.1
Level of Service	C		B		A	A
Approach Delay (s)	21.1		11.1			6.8
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			10.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			53.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			58.2%		ICU Level of Service	B
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 14: Guelph St & McQueen Blvd Extension

2031 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	81	0	0	32	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	81	0	0	32	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	0	0	0	0	81	0	0	32	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	0			0			16	0	0	40	0	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			16	0	0	40	0	0
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	91	100	100	96	100
cM capacity (veh/h)	1623			1623			972	896	1085	897	896	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	0	81	32								
Volume Left	0	0	0	0								
Volume Right	0	0	0	0								
cSH	1700	1700	896	896								
Volume to Capacity	0.00	0.00	0.09	0.04								
Queue Length 95th (m)	0.0	0.0	2.3	0.8								
Control Delay (s)	0.0	0.0	9.4	9.2								
Lane LOS			A	A								
Approach Delay (s)	0.0	0.0	9.4	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay				9.3								
Intersection Capacity Utilization				7.6%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2031 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	12	17	11	18	18	25	949	18	1	745	60
Future Volume (vph)	51	12	17	11	18	18	25	949	18	1	745	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1746		1770	1858		1770	1842	
Flt Permitted		1.00			0.90		0.29	1.00		0.21	1.00	
Satd. Flow (perm)		1809			1582		549	1858		384	1842	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	12	17	11	18	18	25	949	18	1	745	60
RTOR Reduction (vph)	0	16	0	0	17	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	64	0	0	30	0	25	965	0	1	799	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Effective Green, g (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Actuated g/C Ratio		0.07			0.07		0.70	0.70		0.70	0.70	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		131			115		383	1299		268	1288	
v/s Ratio Prot							c0.52				0.43	
v/s Ratio Perm		c0.04			0.02		0.05			0.00		
v/c Ratio		0.49			0.26		0.07	0.74		0.00	0.62	
Uniform Delay, d1		19.6			19.2		2.1	4.1		2.0	3.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.9			1.2		0.3	3.9		0.0	2.3	
Delay (s)		22.5			20.5		2.4	8.1		2.0	5.8	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		22.5			20.5			7.9			5.8	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.9			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		43.9			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		69.8%			ICU Level of Service			C				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2031 Background Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	71	0	0	76	20	0	4	0	4	10	21
Future Volume (Veh/h)	65	71	0	0	76	20	0	4	0	4	10	21
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	65	71	0	0	76	20	0	4	0	4	10	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	96			71			313	297	71	289	287	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96			71			313	297	71	289	287	86
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 %	96			100			100	99	100	99	98	98
cM capacity (veh/h)	1498			1529			597	588	991	638	596	973
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	136	96	4	35								
Volume Left	65	0	0	4								
Volume Right	0	20	0	21								
cSH	1498	1529	588	784								
Volume to Capacity	0.04	0.00	0.01	0.04								
Queue Length 95th (m)	1.0	0.0	0.2	1.1								
Control Delay (s)	3.8	0.0	11.2	9.8								
Lane LOS	A		B	A								
Approach Delay (s)	3.8	0.0	11.2	9.8								
Approach LOS			B	A								
Intersection Summary												
Average Delay												
Intersection Capacity Utilization												
Analysis Period (min)												
3.3												
26.2%												
ICU Level of Service												
A												
30												

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2039 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	13	11	211	366	11
Future Volume (Veh/h)	19	13	11	211	366	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	19	13	11	211	366	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	604	372	377			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	604	372	377			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	98	99			
cM capacity (veh/h)	457	674	1181			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	32	222	377			
Volume Left	19	11	0			
Volume Right	13	0	11			
cSH	526	1181	1700			
Volume to Capacity	0.06	0.01	0.22			
Queue Length 95th (m)	1.5	0.2	0.0			
Control Delay (s)	12.3	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.3	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization		30.1%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2039 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	12	276	78	13	36	11	585	35	57	645	2
Future Volume (vph)	11	12	276	78	13	36	11	585	35	57	645	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1657		1770	3509		1770	3538	
Flt Permitted	0.73	1.00	1.00	0.75	1.00		0.41	1.00		0.32	1.00	
Satd. Flow (perm)	1351	1863	1583	1397	1657		756	3509		604	3538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	12	276	78	13	36	11	585	35	57	645	2
RTOR Reduction (vph)	0	0	186	0	30	0	0	6	0	0	0	0
Lane Group Flow (vph)	11	12	90	78	19	0	11	614	0	57	647	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	8.7	8.7	8.7	8.7	8.7		21.1	21.1		32.1	32.1	
Effective Green, g (s)	8.7	8.7	8.7	8.7	8.7		21.1	21.1		32.1	32.1	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17		0.42	0.42		0.63	0.63	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	319	271	239	283		314	1457		542	2235	
v/s Ratio Prot		0.01			0.01			c0.17		0.01	c0.18	
v/s Ratio Perm	0.01		c0.06	0.06			0.01			0.05		
v/c Ratio	0.05	0.04	0.33	0.33	0.07		0.04	0.42		0.11	0.29	
Uniform Delay, d1	17.6	17.6	18.5	18.5	17.6		8.8	10.5		3.9	4.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.0	0.7	0.8	0.1		0.2	0.9		0.4	0.3	
Delay (s)	17.7	17.6	19.2	19.3	17.8		9.0	11.4		4.3	4.5	
Level of Service	B	B	B	B	B		A	B		A	A	
Approach Delay (s)		19.1			18.7			11.4			4.5	
Approach LOS		B			B			B			A	
Intersection Summary												
HCM 2000 Control Delay			10.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			50.8			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			51.8%			ICU Level of Service				A		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2039 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	11	22	72	72	18
Future Volume (Veh/h)	49	11	22	72	72	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	49	11	22	72	72	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	197	81	90			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	197	81	90			
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	99	99			
cM capacity (veh/h)	780	979	1505			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	60	94	90			
Volume Left	49	22	0			
Volume Right	11	0	18			
cSH	810	1505	1700			
Volume to Capacity	0.07	0.01	0.05			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	9.8	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization		21.7%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2039 Background Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	30	609	36	72	728
Future Volume (vph)	49	30	609	36	72	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1714		3510		1770	1863
Flt Permitted	0.97		1.00		0.36	1.00
Satd. Flow (perm)	1714		3510		668	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	30	609	36	72	728
RTOR Reduction (vph)	27	0	5	0	0	0
Lane Group Flow (vph)	52	0	640	0	72	728
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	4.9		31.8		39.5	39.5
Effective Green, g (s)	4.9		31.8		39.5	39.5
Actuated g/C Ratio	0.09		0.58		0.73	0.73
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	154		2051		559	1352
v/s Ratio Prot			0.18		0.01	c0.39
v/s Ratio Perm	c0.03				0.08	
v/c Ratio	0.34		0.31		0.13	0.54
Uniform Delay, d1	23.2		5.7		2.3	3.4
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3		0.4		0.1	1.5
Delay (s)	24.5		6.1		2.4	4.9
Level of Service	C		A		A	A
Approach Delay (s)	24.5		6.1			4.7
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			54.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			51.2%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 14: Guelph St & McQueen Blvd Extension

2039 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	57	57	0	0	0	0	20	0	0	30	0
Future Volume (Veh/h)	0	57	57	0	0	0	0	20	0	0	30	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	57	57	0	0	0	0	20	0	0	30	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	0			114			100	86	86	96	114	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			114			100	86	86	96	114	0
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	98	100	100	96	100
cM capacity (veh/h)	1623			1475			855	805	973	870	776	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	114	0	20	30								
Volume Left	0	0	0	0								
Volume Right	57	0	0	0								
cSH	1623	1700	805	776								
Volume to Capacity	0.00	0.00	0.02	0.04								
Queue Length 95th (m)	0.0	0.0	0.6	0.9								
Control Delay (s)	0.0	0.0	9.6	9.8								
Lane LOS			A	A								
Approach Delay (s)	0.0	0.0	9.6	9.8								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			16.5%	ICU Level of Service						A		
Analysis Period (min)			30									

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2039 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	17	84	4	14	8	17	612	14	6	729	60
Future Volume (vph)	35	17	84	4	14	8	17	612	14	6	729	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1686			1772		1770	1856		1770	1841	
Flt Permitted		0.90			0.96		0.29	1.00		0.39	1.00	
Satd. Flow (perm)		1543			1713		538	1856		725	1841	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	17	84	4	14	8	17	612	14	6	729	60
RTOR Reduction (vph)	0	76	0	0	7	0	0	2	0	0	7	0
Lane Group Flow (vph)	0	60	0	0	19	0	17	624	0	6	782	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		4.1			4.1		28.1	28.1		28.1	28.1	
Effective Green, g (s)		4.1			4.1		28.1	28.1		28.1	28.1	
Actuated g/C Ratio		0.10			0.10		0.67	0.67		0.67	0.67	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		149			166		358	1235		482	1225	
v/s Ratio Prot								0.34			c0.42	
v/s Ratio Perm		c0.04			0.01		0.03			0.01		
v/c Ratio		0.40			0.11		0.05	0.51		0.01	0.64	
Uniform Delay, d1		17.9			17.4		2.4	3.6		2.4	4.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.8			0.3		0.3	1.5		0.0	2.6	
Delay (s)		19.7			17.7		2.7	5.0		2.4	6.7	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		19.7			17.7			5.0			6.6	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.3										
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		42.2										
Intersection Capacity Utilization		63.5%										
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2039 Background Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	71	6	1	86	4	2	6	0	66	2	22
Future Volume (Veh/h)	13	71	6	1	86	4	2	6	0	66	2	22
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	71	6	1	86	4	2	6	0	66	2	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	90			77			213	192	74	193	193	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	90			77			213	192	74	193	193	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	91	100	98
cM capacity (veh/h)	1505			1522			720	697	988	756	696	970
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	90	91	8	90								
Volume Left	13	1	2	66								
Volume Right	6	4	0	22								
cSH	1505	1522	702	798								
Volume to Capacity	0.01	0.00	0.01	0.11								
Queue Length 95th (m)	0.2	0.0	0.3	2.9								
Control Delay (s)	1.1	0.1	10.2	10.1								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.1	0.1	10.2	10.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay				3.9								
Intersection Capacity Utilization				29.9%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2039 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	11	11	217	102	11
Future Volume (Veh/h)	11	11	11	217	102	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	11	11	217	102	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	346	108	113			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	346	108	113			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	645	946	1476			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	22	228	113			
Volume Left	11	11	0			
Volume Right	11	0	11			
cSH	767	1476	1700			
Volume to Capacity	0.03	0.01	0.07			
Queue Length 95th (m)	0.7	0.2	0.0			
Control Delay (s)	9.8	0.4	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	0.4	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		28.7%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2039 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	34	28	78	13	36	127	789	136	182	808	6
Future Volume (vph)	36	34	28	78	13	36	127	789	136	182	808	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1657		1770	3461		1770	3535	
Flt Permitted	0.73	1.00	1.00	0.73	1.00		0.34	1.00		0.20	1.00	
Satd. Flow (perm)	1351	1863	1583	1369	1657		642	3461		380	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	34	28	78	13	36	127	789	136	182	808	6
RTOR Reduction (vph)	0	0	24	0	31	0	0	20	0	0	1	0
Lane Group Flow (vph)	36	34	4	78	18	0	127	905	0	182	813	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	6.8	6.8	6.8	6.8	6.8		22.5	22.5		32.6	32.6	
Effective Green, g (s)	6.8	6.8	6.8	6.8	6.8		22.5	22.5		32.6	32.6	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.46	0.46		0.66	0.66	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	256	217	188	228		292	1576		422	2332	
v/s Ratio Prot		0.02			0.01			c0.26		c0.05	0.23	
v/s Ratio Perm	0.03		0.00	c0.06			0.20			0.23		
v/c Ratio	0.19	0.13	0.02	0.41	0.08		0.43	0.57		0.43	0.35	
Uniform Delay, d1	18.9	18.7	18.4	19.5	18.6		9.1	9.9		4.4	3.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.2	0.0	1.5	0.1		4.7	1.5		3.2	0.4	
Delay (s)	19.4	18.9	18.4	21.0	18.7		13.8	11.5		7.6	4.1	
Level of Service	B	B	B	C	B		B	B		A	A	
Approach Delay (s)		19.0			20.1			11.7			4.8	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			9.5			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			49.4			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			58.9%			ICU Level of Service				B		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2039 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	8	30	154	68	17
Future Volume (Veh/h)	28	8	30	154	68	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	28	8	30	154	68	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	290	76	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	76	85			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	98			
cM capacity (veh/h)	686	985	1512			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	36	184	85			
Volume Left	28	30	0			
Volume Right	8	0	17			
cSH	736	1512	1700			
Volume to Capacity	0.05	0.02	0.05			
Queue Length 95th (m)	1.2	0.5	0.0			
Control Delay (s)	10.1	1.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.1	1.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		26.4%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2039 Background Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	128	904	90	117	773
Future Volume (vph)	67	128	904	90	117	773
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1669		3491		1770	1863
Flt Permitted	0.98		1.00		0.19	1.00
Satd. Flow (perm)	1669		3491		359	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	128	904	90	117	773
RTOR Reduction (vph)	109	0	10	0	0	0
Lane Group Flow (vph)	86	0	984	0	117	773
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	8.1		26.4		35.4	35.4
Effective Green, g (s)	8.1		26.4		35.4	35.4
Actuated g/C Ratio	0.15		0.49		0.66	0.66
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	252		1722		369	1232
v/s Ratio Prot			0.28		0.03	c0.41
v/s Ratio Perm	c0.05				0.18	
v/c Ratio	0.34		0.57		0.32	0.63
Uniform Delay, d1	20.3		9.6		4.5	5.2
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		1.4		0.5	2.4
Delay (s)	21.1		10.9		5.0	7.7
Level of Service	C		B		A	A
Approach Delay (s)	21.1		10.9			7.3
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			10.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			53.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			60.6%		ICU Level of Service	B
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 14: Guelph St & McQueen Blvd Extension

2039 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	70	0	70	87	0	0	34	0
Future Volume (Veh/h)	0	0	0	0	70	0	70	87	0	0	34	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	0	70	0	70	87	0	0	34	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	70			0			87	70	0	114	70	70
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	70			0			87	70	0	114	70	70
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			92	89	100	100	96	100
cM capacity (veh/h)	1531			1623			870	821	1085	794	821	993
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	70	157	34								
Volume Left	0	0	70	0								
Volume Right	0	0	0	0								
cSH	1700	1623	842	821								
Volume to Capacity	0.00	0.00	0.19	0.04								
Queue Length 95th (m)	0.0	0.0	5.2	1.0								
Control Delay (s)	0.0	0.0	10.3	9.6								
Lane LOS			B	A								
Approach Delay (s)	0.0	0.0	10.3	9.6								
Approach LOS			B	A								
Intersection Summary												
Average Delay				7.4								
Intersection Capacity Utilization				25.5%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2039 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	13	18	12	19	19	98	930	19	1	794	65
Future Volume (vph)	55	13	18	12	19	19	98	930	19	1	794	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1754			1746		1770	1857		1770	1842	
Flt Permitted		1.00			0.89		0.26	1.00		0.22	1.00	
Satd. Flow (perm)		1810			1575		493	1857		402	1842	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	13	18	12	19	19	98	930	19	1	794	65
RTOR Reduction (vph)	0	17	0	0	18	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	69	0	0	32	0	98	947	0	1	853	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Effective Green, g (s)		3.2			3.2		30.7	30.7		30.7	30.7	
Actuated g/C Ratio		0.07			0.07		0.70	0.70		0.70	0.70	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		131			114		344	1298		281	1288	
v/s Ratio Prot							c0.51				0.46	
v/s Ratio Perm		c0.04			0.02		0.20			0.00		
v/c Ratio		0.53			0.28		0.28	0.73		0.00	0.66	
Uniform Delay, d1		19.6			19.3		2.5	4.1		2.0	3.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.9			1.4		2.1	3.7		0.0	2.7	
Delay (s)		23.5			20.6		4.6	7.7		2.0	6.4	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		23.5			20.6			7.4			6.4	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.0			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		43.9			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		77.8%			ICU Level of Service			D				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2039 Background Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	77	0	0	83	92	0	5	0	5	11	23
Future Volume (Veh/h)	71	77	0	0	83	92	0	5	0	5	11	23
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	71	77	0	0	83	92	0	5	0	5	11	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	175			77			376	394	77	350	348	129
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175			77			376	394	77	350	348	129
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 %	95			100			100	99	100	99	98	98
cM capacity (veh/h)	1401			1522			536	515	984	577	547	921
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	148	175	5	39								
Volume Left	71	0	0	5								
Volume Right	0	92	0	23								
cSH	1401	1522	515	725								
Volume to Capacity	0.05	0.00	0.01	0.05								
Queue Length 95th (m)	1.2	0.0	0.2	1.3								
Control Delay (s)	3.9	0.0	12.1	10.2								
Lane LOS	A		B	B								
Approach Delay (s)	3.9	0.0	12.1	10.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay				2.8								
Intersection Capacity Utilization				34.6%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2049 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	14	13	233	405	13
Future Volume (Veh/h)	21	14	13	233	405	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	21	14	13	233	405	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	670	412	418			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	670	412	418			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	99			
cM capacity (veh/h)	417	640	1141			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	35	246	418			
Volume Left	21	13	0			
Volume Right	14	0	13			
cSH	485	1141	1700			
Volume to Capacity	0.07	0.01	0.25			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	13.0	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.0	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization		32.9%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2049 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	304	86	15	40	12	636	38	63	692	3
Future Volume (vph)	12	13	304	86	15	40	12	636	38	63	692	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1660		1770	3509		1770	3537	
Flt Permitted	0.72	1.00	1.00	0.75	1.00		0.39	1.00		0.31	1.00	
Satd. Flow (perm)	1343	1863	1583	1395	1660		722	3509		581	3537	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	12	13	304	86	15	40	12	636	38	63	692	3
RTOR Reduction (vph)	0	0	254	0	34	0	0	6	0	0	0	0
Lane Group Flow (vph)	12	13	50	86	21	0	12	668	0	63	695	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	8.5	8.5	8.5	8.5	8.5		25.4	24.3		34.3	29.2	
Effective Green, g (s)	8.5	8.5	8.5	8.5	8.5		25.4	24.3		34.3	29.2	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.48	0.46		0.65	0.55	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	299	254	224	267		369	1614		512	1956	
v/s Ratio Prot		0.01			0.01		0.00	c0.19		c0.01	c0.20	
v/s Ratio Perm	0.01		0.03	c0.06			0.01			0.07		
v/c Ratio	0.06	0.04	0.20	0.38	0.08		0.03	0.41		0.12	0.36	
Uniform Delay, d1	18.8	18.7	19.2	19.8	18.8		7.2	9.5		3.7	6.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1	0.4	1.1	0.1		0.0	0.8		0.5	0.5	
Delay (s)	18.9	18.8	19.6	20.9	19.0		7.2	10.3		4.2	7.1	
Level of Service	B	B	B	C	B		A	B		A	A	
Approach Delay (s)		19.5			20.1			10.2			6.8	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			52.8			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			55.3%			ICU Level of Service				B		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2049 Background Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	12	24	79	79	20
Future Volume (Veh/h)	54	12	24	79	79	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	12	24	79	79	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	216	89	99			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216	89	99			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	98			
cM capacity (veh/h)	760	969	1494			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	66	103	99			
Volume Left	54	24	0			
Volume Right	12	0	20			
cSH	791	1494	1700			
Volume to Capacity	0.08	0.02	0.06			
Queue Length 95th (m)	2.1	0.4	0.0			
Control Delay (s)	10.0	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	10.0	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.2				
Intersection Capacity Utilization		22.5%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2049 Background Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	54	33	662	40	80	785
Future Volume (vph)	54	33	662	40	80	785
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1714		3509		1770	1863
Flt Permitted	0.97		1.00		0.33	1.00
Satd. Flow (perm)	1714		3509		619	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	54	33	662	40	80	785
RTOR Reduction (vph)	30	0	5	0	0	0
Lane Group Flow (vph)	57	0	697	0	80	785
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	5.0		31.8		39.5	39.5
Effective Green, g (s)	5.0		31.8		39.5	39.5
Actuated g/C Ratio	0.09		0.58		0.72	0.72
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	157		2047		526	1350
v/s Ratio Prot			0.20		0.01	c0.42
v/s Ratio Perm	c0.03				0.10	
v/c Ratio	0.36		0.34		0.15	0.58
Uniform Delay, d1	23.3		5.9		2.4	3.6
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.4		0.5		0.1	1.8
Delay (s)	24.7		6.4		2.5	5.4
Level of Service	C		A		A	A
Approach Delay (s)	24.7		6.4			5.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.61			
Actuated Cycle Length (s)			54.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			54.7%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2049 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	63	63	0	0	0	0	23	0	0	33	0
Future Volume (Veh/h)	0	63	63	0	0	0	0	23	0	0	33	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	63	63	0	0	0	0	23	0	0	33	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	0			126			111	94	94	106	126	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			126			111	94	94	106	126	0
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	97	100	100	96	100
cM capacity (veh/h)	1623			1460			838	796	962	854	764	1085
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	126	0	23	33								
Volume Left	0	0	0	0								
Volume Right	63	0	0	0								
cSH	1623	1700	796	764								
Volume to Capacity	0.00	0.00	0.03	0.04								
Queue Length 95th (m)	0.0	0.0	0.7	1.0								
Control Delay (s)	0.0	0.0	9.7	9.9								
Lane LOS			A	A								
Approach Delay (s)	0.0	0.0	9.7	9.9								
Approach LOS			A	A								
Intersection Summary												
Average Delay	3.0											
Intersection Capacity Utilization	17.2%			ICU Level of Service					A			
Analysis Period (min)	30											

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2049 Background Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	19	93	4	16	9	19	665	16	7	786	66
Future Volume (vph)	38	19	93	4	16	9	19	665	16	7	786	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1685			1772		1770	1856		1770	1841	
Flt Permitted		0.90			0.96		0.25	1.00		0.35	1.00	
Satd. Flow (perm)		1543			1717		467	1856		659	1841	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	19	93	4	16	9	19	665	16	7	786	66
RTOR Reduction (vph)	0	84	0	0	8	0	0	2	0	0	7	0
Lane Group Flow (vph)	0	66	0	0	21	0	19	679	0	7	845	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		4.1			4.1		27.8	27.8		27.8	27.8	
Effective Green, g (s)		4.1			4.1		27.8	27.8		27.8	27.8	
Actuated g/C Ratio		0.10			0.10		0.66	0.66		0.66	0.66	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		150			168		309	1231		437	1221	
v/s Ratio Prot								0.37			c0.46	
v/s Ratio Perm		c0.04			0.01		0.04			0.01		
v/c Ratio		0.44			0.12		0.06	0.55		0.02	0.69	
Uniform Delay, d1		17.8			17.3		2.5	3.7		2.4	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.1			0.3		0.4	1.8		0.1	3.3	
Delay (s)		19.9			17.6		2.9	5.5		2.5	7.7	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		19.9			17.6			5.5			7.6	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.0			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		41.9			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		68.8%			ICU Level of Service			C				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2049 Background Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	78	7	1	95	4	3	7	0	73	3	24
Future Volume (Veh/h)	15	78	7	1	95	4	3	7	0	73	3	24
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	78	7	1	95	4	3	7	0	73	3	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	99			85			236	212	82	214	214	97
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99			85			236	212	82	214	214	97
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	90	100	97
cM capacity (veh/h)	1494			1512			692	678	978	731	676	959
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	100	10	100								
Volume Left	15	1	3	73								
Volume Right	7	4	0	24								
cSH	1494	1512	682	773								
Volume to Capacity	0.01	0.00	0.01	0.13								
Queue Length 95th (m)	0.2	0.0	0.3	3.4								
Control Delay (s)	1.2	0.1	10.4	10.3								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.2	0.1	10.4	10.3								
Approach LOS			B	B								
Intersection Summary												
Average Delay				4.1								
Intersection Capacity Utilization				30.9%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2049 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	13	13	239	112	13
Future Volume (Veh/h)	13	13	13	239	112	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	13	13	239	112	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	384	118	125			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	384	118	125			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	614	933	1462			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	26	252	125			
Volume Left	13	13	0			
Volume Right	13	0	13			
cSH	740	1462	1700			
Volume to Capacity	0.04	0.01	0.07			
Queue Length 95th (m)	0.8	0.2	0.0			
Control Delay (s)	10.0	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.0	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		33.2%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2049 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	37	30	86	15	40	140	848	151	201	876	7
Future Volume (vph)	40	37	30	86	15	40	140	848	151	201	876	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1660		1770	3459		1770	3535	
Flt Permitted	0.72	1.00	1.00	0.73	1.00		0.30	1.00		0.18	1.00	
Satd. Flow (perm)	1343	1863	1583	1365	1660		565	3459		338	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	37	30	86	15	40	140	848	151	201	876	7
RTOR Reduction (vph)	0	0	26	0	34	0	0	21	0	0	1	0
Lane Group Flow (vph)	40	37	4	86	21	0	140	978	0	201	882	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	7.0	7.0	7.0	7.0	7.0		26.9	22.4		32.1	25.0	
Effective Green, g (s)	7.0	7.0	7.0	7.0	7.0		26.9	22.4		32.1	25.0	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.53	0.44		0.64	0.50	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	186	258	219	189	230		408	1534		416	1750	
v/s Ratio Prot		0.02			0.01		0.03	c0.28		c0.07	0.25	
v/s Ratio Perm	0.03		0.00	c0.06			0.15			0.24		
v/c Ratio	0.22	0.14	0.02	0.46	0.09		0.34	0.64		0.48	0.50	
Uniform Delay, d1	19.3	19.1	18.8	20.0	19.0		6.0	10.9		5.1	8.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.3	0.0	1.7	0.2		0.5	2.1		4.0	1.0	
Delay (s)	19.9	19.4	18.8	21.7	19.1		6.5	13.0		9.1	9.6	
Level of Service	B	B	B	C	B		A	B		A	A	
Approach Delay (s)		19.4			20.7			12.2			9.5	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			11.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			50.5			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			62.5%			ICU Level of Service				B		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2049 Background Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	9	33	171	75	19
Future Volume (Veh/h)	30	9	33	171	75	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	9	33	171	75	19
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	322	84	94			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	322	84	94			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	98			
cM capacity (veh/h)	657	975	1500			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	39	204	94			
Volume Left	30	33	0			
Volume Right	9	0	19			
cSH	711	1500	1700			
Volume to Capacity	0.05	0.02	0.06			
Queue Length 95th (m)	1.3	0.5	0.0			
Control Delay (s)	10.4	1.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.4	1.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		27.5%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2049 Background Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	74	141	975	99	129	838
Future Volume (vph)	74	141	975	99	129	838
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0		4.0	5.0
Lane Util. Factor	1.00		0.95		1.00	1.00
Frt	0.91		0.99		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1669		3490		1770	1863
Flt Permitted	0.98		1.00		0.17	1.00
Satd. Flow (perm)	1669		3490		308	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	74	141	975	99	129	838
RTOR Reduction (vph)	119	0	10	0	0	0
Lane Group Flow (vph)	96	0	1064	0	129	838
Turn Type	Perm		NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8				6	
Actuated Green, G (s)	8.4		26.5		35.5	35.5
Effective Green, g (s)	8.4		26.5		35.5	35.5
Actuated g/C Ratio	0.16		0.49		0.66	0.66
Clearance Time (s)	5.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	260		1715		338	1227
v/s Ratio Prot			0.30		0.04	c0.45
v/s Ratio Perm	c0.06				0.22	
v/c Ratio	0.37		0.62		0.38	0.68
Uniform Delay, d1	20.4		10.0		5.1	5.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.9		1.7		0.7	3.1
Delay (s)	21.3		11.7		5.8	8.8
Level of Service	C		B		A	A
Approach Delay (s)	21.3		11.7			8.4
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			11.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			53.9		Sum of lost time (s)	14.0
Intersection Capacity Utilization			65.2%		ICU Level of Service	C
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2049 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	78	0	78	96	0	0	38	0
Future Volume (Veh/h)	0	0	0	0	78	0	78	96	0	0	38	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	0	78	0	78	96	0	0	38	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	78			0			97	78	0	126	78	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			0			97	78	0	126	78	78
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			91	88	100	100	95	100
cM capacity (veh/h)	1520			1623			854	812	1085	771	812	983
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	78	174	38								
Volume Left	0	0	78	0								
Volume Right	0	0	0	0								
cSH	1700	1623	830	812								
Volume to Capacity	0.00	0.00	0.21	0.05								
Queue Length 95th (m)	0.0	0.0	6.0	1.1								
Control Delay (s)	0.0	0.0	10.5	9.6								
Lane LOS				B A								
Approach Delay (s)	0.0	0.0	10.5	9.6								
Approach LOS				B A								
Intersection Summary												
Average Delay				7.6								
Intersection Capacity Utilization				26.8%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2049 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	15	20	13	21	21	108	1004	21	1	860	71
Future Volume (vph)	61	15	20	13	21	21	108	1004	21	1	860	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1755			1746		1770	1857		1770	1841	
Flt Permitted		1.00			0.90		0.23	1.00		0.17	1.00	
Satd. Flow (perm)		1810			1598		421	1857		326	1841	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	61	15	20	13	21	21	108	1004	21	1	860	71
RTOR Reduction (vph)	0	19	0	0	20	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	77	0	0	35	0	108	1023	0	1	925	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		3.1			3.1		30.4	30.4		30.4	30.4	
Effective Green, g (s)		3.1			3.1		30.4	30.4		30.4	30.4	
Actuated g/C Ratio		0.07			0.07		0.70	0.70		0.70	0.70	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		128			113		294	1297		227	1286	
v/s Ratio Prot							c0.55				0.50	
v/s Ratio Perm		c0.04			0.02		0.26			0.00		
v/c Ratio		0.60			0.31		0.37	0.79		0.00	0.72	
Uniform Delay, d1		19.6			19.2		2.7	4.4		2.0	4.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.0			1.6		3.5	5.1		0.0	3.5	
Delay (s)		27.6			20.8		6.2	9.5		2.0	7.5	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		27.6			20.8			9.1			7.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		9.5			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		43.5			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		82.8%			ICU Level of Service			E				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 16: Guelph St & 2nd Line

2049 Background Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	85	0	0	91	101	0	5	0	5	12	25
Future Volume (Veh/h)	78	85	0	0	91	101	0	5	0	5	12	25
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	78	85	0	0	91	101	0	5	0	5	12	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	192			85			414	433	85	385	382	142
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			85			414	433	85	385	382	142
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 %	94			100			100	99	100	99	98	97
cM capacity (veh/h)	1381			1512			502	487	974	544	520	906
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	163	192	5	42								
Volume Left	78	0	0	5								
Volume Right	0	101	0	25								
cSH	1381	1512	487	702								
Volume to Capacity	0.06	0.00	0.01	0.06								
Queue Length 95th (m)	1.4	0.0	0.2	1.5								
Control Delay (s)	4.0	0.0	12.5	10.5								
Lane LOS	A		B	B								
Approach Delay (s)	4.0	0.0	12.5	10.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay				2.9								
Intersection Capacity Utilization				36.5%	ICU Level of Service				A			
Analysis Period (min)				30								

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	12.8	13.1
Average Queue (m)	5.8	1.2
95th Queue (m)	13.1	6.7
Link Distance (m)	306.7	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR	
Maximum Queue (m)	8.2	11.2	43.0	29.3	18.3	9.3	46.3	53.0	18.0	30.9	43.5	
Average Queue (m)	1.8	2.4	20.5	12.9	6.2	2.4	21.8	25.2	6.8	13.1	22.5	
95th Queue (m)	7.2	8.9	34.6	24.4	14.8	8.6	38.5	46.2	15.5	26.9	36.6	
Link Distance (m)							273.6	273.6			363.4	363.4
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	50.0		50.0		30.0		30.0		30.0			
Storage Blk Time (%)			0		0		2		0			
Queuing Penalty (veh)			0		0		0		0			

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.8	6.8
Average Queue (m)	7.2	0.4
95th Queue (m)	12.7	3.5
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	21.1	30.0	33.8	17.3	54.0
Average Queue (m)	11.4	12.9	14.8	8.0	21.0
95th Queue (m)	20.1	26.0	29.1	16.3	45.2
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	12.1	15.9
Average Queue (m)	4.4	6.4
95th Queue (m)	12.1	14.5
Link Distance (m)	1012.4	325.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	32.4	12.8	10.3	38.1	9.1	57.0
Average Queue (m)	16.2	4.9	3.1	17.9	1.1	29.0
95th Queue (m)	27.6	11.8	9.6	33.0	5.8	50.9
Link Distance (m)	663.4	719.9		374.4		335.4
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			100.0		100.0	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	3.0	1.4	9.2	19.0
Average Queue (m)	0.2	0.0	1.2	10.7
95th Queue (m)	1.9	1.0	6.2	17.5
Link Distance (m)	164.0	663.4	266.0	1012.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.2	3.7
Average Queue (m)	4.0	0.1
95th Queue (m)	11.2	1.9
Link Distance (m)	306.7	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR		
Maximum Queue (m)	18.8	16.1	15.0	28.4	24.8	51.4	64.1	66.3	31.8	39.5	48.8		
Average Queue (m)	5.8	5.2	5.4	12.6	7.6	20.2	29.4	36.0	15.6	13.4	25.4		
95th Queue (m)	14.8	13.6	13.2	24.0	17.8	39.5	53.1	57.5	26.9	31.2	44.4		
Link Distance (m)							273.6	273.6				363.4	363.4
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)	50.0		50.0		30.0		30.0		30.0				
Storage Blk Time (%)					0	0	5	4	0		0		
Queuing Penalty (veh)					0	0	18	6	1		0		

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.9	11.0
Average Queue (m)	5.6	0.9
95th Queue (m)	12.8	5.4
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	24.6	54.8	60.6	35.0	110.1
Average Queue (m)	16.5	26.8	31.7	13.5	41.9
95th Queue (m)	22.3	46.9	54.0	25.3	84.4
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	23.6	13.0
Average Queue (m)	13.8	6.0
95th Queue (m)	21.0	13.5
Link Distance (m)	1012.4	325.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	27.8	18.2	54.0	95.2	3.5	83.2
Average Queue (m)	11.2	7.4	17.7	34.7	0.1	37.1
95th Queue (m)	21.4	15.6	41.9	72.3	1.9	72.1
Link Distance (m)	663.4	719.9		374.4		335.4
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			100.0		100.0	
Storage Blk Time (%)				1		0
Queuing Penalty (veh)				1		0

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	16.5	1.3	9.0	13.6
Average Queue (m)	3.4	0.0	1.2	6.1
95th Queue (m)	11.1	0.9	6.1	14.0
Link Distance (m)	164.0	663.4	266.0	1012.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 26

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	17.0	12.7
Average Queue (m)	6.5	1.7
95th Queue (m)	14.5	8.3
Link Distance (m)	306.7	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR	
Maximum Queue (m)	10.6	12.3	58.9	33.0	22.7	8.1	44.8	46.7	20.7	51.1	53.3	
Average Queue (m)	2.3	2.0	25.4	13.6	6.8	2.1	24.3	28.1	7.3	17.1	26.3	
95th Queue (m)	8.6	8.1	46.0	25.5	15.9	7.8	40.7	44.0	16.5	35.4	45.8	
Link Distance (m)						273.6	273.6	363.4				363.4
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	50.0	50.0		30.0	30.0			30.0				
Storage Blk Time (%)	1			0	0	3			0	0		
Queuing Penalty (veh)	0			0	0	0			0	0		

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.0	7.6
Average Queue (m)	7.6	0.6
95th Queue (m)	12.6	3.9
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	19.6	33.8	35.8	21.0	57.6
Average Queue (m)	12.0	14.5	16.7	9.5	23.5
95th Queue (m)	20.6	27.0	31.2	17.7	48.5
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.6	10.7	15.9
Average Queue (m)	0.1	4.9	6.8
95th Queue (m)	1.3	12.5	14.5
Link Distance (m)	118.4	1012.4	325.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	45.6	14.3	12.9	37.8	9.1	76.0
Average Queue (m)	17.9	4.4	4.2	19.1	1.4	34.3
95th Queue (m)	32.9	11.8	11.4	31.9	6.7	63.3
Link Distance (m)	663.4	719.9		374.4		335.4
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			100.0		100.0	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 16: Guelph St & 2nd Line

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	9.1	9.2	22.5
Average Queue (m)	0.6	2.4	11.2
95th Queue (m)	4.3	8.8	17.6
Link Distance (m)	164.0	266.0	1012.4
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 1

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	5.6
Average Queue (m)	4.6	0.4
95th Queue (m)	11.7	3.3
Link Distance (m)	306.7	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR		
Maximum Queue (m)	21.3	22.8	16.6	26.7	19.8	51.1	75.9	85.6	42.8	69.2	79.6		
Average Queue (m)	6.8	6.8	5.6	13.7	6.5	18.3	37.7	46.1	19.2	26.9	39.8		
95th Queue (m)	17.3	16.7	13.9	23.5	15.0	35.8	63.4	71.5	33.6	54.1	65.6		
Link Distance (m)							273.6	273.6				363.4	363.4
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)	50.0		50.0		30.0		30.0		30.0				
Storage Blk Time (%)					0	0	1	11	1		2		
Queuing Penalty (veh)					0	0	6	15	6		4		

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.4	7.9
Average Queue (m)	6.1	0.7
95th Queue (m)	12.6	4.4
Link Distance (m)	304.8	382.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Tower St S & Commerical Access

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	TR	L	T
Maximum Queue (m)	22.4	55.9	61.1	38.3	134.3
Average Queue (m)	16.7	29.9	35.6	16.7	46.7
95th Queue (m)	21.7	49.7	56.8	30.0	103.1
Link Distance (m)		243.2	243.2	273.6	273.6
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	27.2	13.4
Average Queue (m)	13.8	6.6
95th Queue (m)	21.7	14.2
Link Distance (m)	1012.4	325.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	28.7	17.9	78.2	138.8	1.8	129.3
Average Queue (m)	12.1	7.0	23.5	47.8	0.1	45.7
95th Queue (m)	23.4	15.0	61.1	110.1	1.3	90.3
Link Distance (m)	663.4	719.9		374.4		335.4
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			100.0		100.0	
Storage Blk Time (%)				2		1
Queuing Penalty (veh)				3		0

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	13.0	2.5	9.2	13.2
Average Queue (m)	3.8	0.1	1.4	6.7
95th Queue (m)	11.4	1.3	6.8	14.3
Link Distance (m)	164.0	663.4	266.0	1012.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 33

Appendix F: Future Total Operations

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2025 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	47	11	10	183	319	19
Future Volume (Veh/h)	47	11	10	183	319	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	47	11	10	183	319	19
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	532	328	338			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	532	328	338			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	98	99			
cM capacity (veh/h)	504	713	1221			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	58	193	338			
Volume Left	47	10	0			
Volume Right	11	0	19			
cSH	534	1221	1700			
Volume to Capacity	0.11	0.01	0.20			
Queue Length 95th (m)	2.8	0.2	0.0			
Control Delay (s)	12.6	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.6	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization		27.9%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2025 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	19	67	127	41	61	9	473	48	59	715	5
Future Volume (vph)	9	19	67	127	41	61	9	473	48	59	715	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1696		1770	3490		1770	3536	
Flt Permitted	0.69	1.00	1.00	0.75	1.00		0.38	1.00		0.41	1.00	
Satd. Flow (perm)	1287	1863	1583	1388	1696		704	3490		771	3536	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	19	67	127	41	61	9	473	48	59	715	5
RTOR Reduction (vph)	0	0	56	0	51	0	0	6	0	0	0	0
Lane Group Flow (vph)	9	19	11	127	51	0	9	515	0	59	720	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.4	11.4	11.4	11.4	11.4		40.1	40.1		48.4	48.4	
Effective Green, g (s)	11.4	11.4	11.4	11.4	11.4		40.1	40.1		48.4	48.4	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.57	0.57		0.69	0.69	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	210	304	258	226	276		404	2005		596	2451	
v/s Ratio Prot		0.01			0.03			0.15		0.01	c0.20	
v/s Ratio Perm	0.01		0.01	c0.09			0.01			0.06		
v/c Ratio	0.04	0.06	0.04	0.56	0.18		0.02	0.26		0.10	0.29	
Uniform Delay, d1	24.6	24.7	24.6	26.9	25.2		6.4	7.4		3.5	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1	0.1	3.2	0.3		0.1	0.3		0.1	0.3	
Delay (s)	24.7	24.8	24.7	30.1	25.5		6.5	7.7		3.6	4.4	
Level of Service	C	C	C	C	C		A	A		A	A	
Approach Delay (s)		24.7			28.1			7.7			4.4	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.0			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			69.8			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			52.0%			ICU Level of Service				A		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2025 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	9	19	62	62	16
Future Volume (Veh/h)	43	9	19	62	62	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	43	9	19	62	62	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)						
pX, platoon unblocked						
vC, conflicting volume	170	70	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	170	70	78			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	99			
cM capacity (veh/h)	810	993	1520			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	52	81	78			
Volume Left	43	19	0			
Volume Right	9	0	16			
cSH	837	1520	1700			
Volume to Capacity	0.06	0.01	0.05			
Queue Length 95th (m)	1.5	0.3	0.0			
Control Delay (s)	9.6	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.6	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization		21.0%		ICU Level of Service		A
Analysis Period (min)			30			

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2025 Total Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	30	512	36	72	807
Future Volume (vph)	49	30	512	36	72	807
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		4.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3504		1770	1863
Flt Permitted	0.95	1.00	1.00		0.42	1.00
Satd. Flow (perm)	1770	1583	3504		775	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	30	512	36	72	807
RTOR Reduction (vph)	0	28	6	0	0	0
Lane Group Flow (vph)	49	2	542	0	72	807
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8			6	
Actuated Green, G (s)	6.3	6.3	53.2		62.8	62.8
Effective Green, g (s)	6.3	6.3	53.2		62.8	62.8
Actuated g/C Ratio	0.08	0.08	0.66		0.77	0.77
Clearance Time (s)	6.0	6.0	6.0		4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	137	122	2298		668	1442
v/s Ratio Prot			0.15		0.01	c0.43
v/s Ratio Perm	c0.03	0.00			0.08	
v/c Ratio	0.36	0.02	0.24		0.11	0.56
Uniform Delay, d1	35.5	34.5	5.7		2.3	3.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.6	0.1	0.2		0.1	1.6
Delay (s)	37.1	34.6	5.9		2.3	5.2
Level of Service	D	C	A		A	A
Approach Delay (s)	36.1		5.9			5.0
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			7.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			81.1		Sum of lost time (s)	16.0
Intersection Capacity Utilization			55.8%		ICU Level of Service	B
Analysis Period (min)			30			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2025 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	15	24	5	12	7	15	514	12	5	808	52
Future Volume (vph)	30	15	24	5	12	7	15	514	12	5	808	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1738			1771		1770	1856		1770	1846	
Flt Permitted		0.85			0.94		0.29	1.00		0.45	1.00	
Satd. Flow (perm)		1506			1677		532	1856		845	1846	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	15	24	5	12	7	15	514	12	5	808	52
RTOR Reduction (vph)	0	22	0	0	6	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	47	0	0	18	0	15	525	0	5	858	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.9			6.9		62.0	62.0		62.0	62.0	
Effective Green, g (s)		6.9			6.9		62.0	62.0		62.0	62.0	
Actuated g/C Ratio		0.09			0.09		0.79	0.79		0.79	0.79	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		131			146		418	1458		664	1450	
v/s Ratio Prot								0.28			c0.46	
v/s Ratio Perm		c0.03			0.01		0.03			0.01		
v/c Ratio		0.36			0.12		0.04	0.36		0.01	0.59	
Uniform Delay, d1		33.9			33.2		1.9	2.5		1.8	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.7			0.4		0.2	0.7		0.0	1.8	
Delay (s)		35.6			33.6		2.0	3.2		1.8	5.2	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		35.6			33.6			3.2			5.2	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.3			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		78.9			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		61.5%			ICU Level of Service			B				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2025 Total Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	61	5	5	75	5	5	5	5	8	5	19
Future Volume (Veh/h)	11	61	5	5	75	5	5	5	5	8	5	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	61	5	5	75	5	5	5	5	8	5	19
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh				2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	80			66			194	176	64	180	176	78
vC1, stage 1 conf vol							86	86		88	88	
vC2, stage 2 conf vol							109	90		93	88	
vCu, unblocked vol	80			66			194	176	64	180	176	78
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	99	99	98
cM capacity (veh/h)	1518			1536			814	760	1001	837	762	983
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	77	85	15	32								
Volume Left	11	5	5	8								
Volume Right	5	5	5	19								
cSH	1518	1536	847	903								
Volume to Capacity	0.01	0.00	0.02	0.04								
Queue Length 95th (m)	0.2	0.1	0.4	0.8								
Control Delay (s)	1.1	0.5	9.3	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.1	0.5	9.3	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			17.2%	ICU Level of Service				A				
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2025 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	10	10	188	88	40
Future Volume (Veh/h)	28	10	10	188	88	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	28	10	10	188	88	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	316	108	128			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	316	108	128			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	99			
cM capacity (veh/h)	672	946	1458			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	38	198	128			
Volume Left	28	10	0			
Volume Right	10	0	40			
cSH	728	1458	1700			
Volume to Capacity	0.05	0.01	0.08			
Queue Length 95th (m)	1.3	0.2	0.0			
Control Delay (s)	10.2	0.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.2	0.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		28.1%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2025 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	59	24	127	41	61	49	877	178	188	645	5
Future Volume (vph)	31	59	24	127	41	61	49	877	178	188	645	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1696		1770	3450		1770	3535	
Flt Permitted	0.69	1.00	1.00	0.72	1.00		0.40	1.00		0.18	1.00	
Satd. Flow (perm)	1287	1863	1583	1338	1696		754	3450		337	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	31	59	24	127	41	61	49	877	178	188	645	5
RTOR Reduction (vph)	0	0	20	0	51	0	0	18	0	0	1	0
Lane Group Flow (vph)	31	59	4	127	51	0	49	1037	0	188	649	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	12.2	12.2	12.2	12.2	12.2		39.6	39.6		52.2	52.2	
Effective Green, g (s)	12.2	12.2	12.2	12.2	12.2		39.6	39.6		52.2	52.2	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.53	0.53		0.70	0.70	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	211	305	259	219	278		401	1836		402	2480	
v/s Ratio Prot		0.03			0.03			c0.30		c0.05	0.18	
v/s Ratio Perm	0.02		0.00	c0.09			0.06			0.27		
v/c Ratio	0.15	0.19	0.02	0.58	0.18		0.12	0.56		0.47	0.26	
Uniform Delay, d1	26.6	26.9	26.1	28.7	26.8		8.7	11.6		6.0	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0	3.7	0.3		0.6	1.3		0.9	0.3	
Delay (s)	27.0	27.2	26.1	32.5	27.1		9.3	12.9		6.8	4.3	
Level of Service	C	C	C	C	C		A	B		A	A	
Approach Delay (s)		26.9			30.1			12.7			4.9	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			12.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			74.4			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			65.7%			ICU Level of Service				C		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2025 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	7	26	134	59	15
Future Volume (Veh/h)	24	7	26	134	59	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	24	7	26	134	59	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	252	66	74			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252	66	74			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	98			
cM capacity (veh/h)	724	997	1526			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	31	160	74			
Volume Left	24	26	0			
Volume Right	7	0	15			
cSH	771	1526	1700			
Volume to Capacity	0.04	0.02	0.04			
Queue Length 95th (m)	1.0	0.4	0.0			
Control Delay (s)	9.9	1.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	1.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		25.2%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & Commerical Access

2025 Total Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	128	990	90	117	650
Future Volume (vph)	67	128	990	90	117	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		4.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3495		1770	1863
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1770	1583	3495		378	1863
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	128	990	90	117	650
RTOR Reduction (vph)	0	115	7	0	0	0
Lane Group Flow (vph)	67	13	1073	0	117	650
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8			6	
Actuated Green, G (s)	7.9	7.9	45.8		55.5	55.5
Effective Green, g (s)	7.9	7.9	45.8		55.5	55.5
Actuated g/C Ratio	0.10	0.10	0.61		0.74	0.74
Clearance Time (s)	6.0	6.0	6.0		4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	185	165	2122		383	1371
v/s Ratio Prot			c0.31		0.02	c0.35
v/s Ratio Perm	c0.04	0.01			0.20	
v/c Ratio	0.36	0.08	0.51		0.31	0.47
Uniform Delay, d1	31.4	30.5	8.4		4.0	4.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.2	0.2	0.9		0.5	1.2
Delay (s)	32.6	30.7	9.3		4.4	5.2
Level of Service	C	C	A		A	A
Approach Delay (s)	31.3		9.3			5.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			9.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			75.4		Sum of lost time (s)	16.0
Intersection Capacity Utilization			58.4%		ICU Level of Service	B
Analysis Period (min)			30			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2025 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	11	16	10	17	17	24	1021	17	5	667	56
Future Volume (vph)	48	11	16	10	17	17	24	1021	17	5	667	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1746		1770	1858		1770	1841	
Flt Permitted		0.78			0.93		0.35	1.00		0.20	1.00	
Satd. Flow (perm)		1411			1644		646	1858		372	1841	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	11	16	10	17	17	24	1021	17	5	667	56
RTOR Reduction (vph)	0	14	0	0	15	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	61	0	0	29	0	24	1038	0	5	721	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.5			7.5		60.1	60.1		60.1	60.1	
Effective Green, g (s)		7.5			7.5		60.1	60.1		60.1	60.1	
Actuated g/C Ratio		0.10			0.10		0.77	0.77		0.77	0.77	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		136			158		500	1438		288	1425	
v/s Ratio Prot								c0.56			0.39	
v/s Ratio Perm		c0.04			0.02		0.04			0.01		
v/c Ratio		0.45			0.18		0.05	0.72		0.02	0.51	
Uniform Delay, d1		33.1			32.2		2.0	4.5		2.0	3.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.3			0.6		0.2	3.2		0.1	1.3	
Delay (s)		35.4			32.8		2.2	7.7		2.1	4.5	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		35.4			32.8			7.6			4.5	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.69										
Actuated Cycle Length (s)		77.6			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		73.1%			ICU Level of Service			D				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2025 Total Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	67	5	5	72	19	5	5	5	5	9	20
Future Volume (Veh/h)	61	67	5	5	72	19	5	5	5	5	9	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	61	67	5	5	72	19	5	5	5	5	9	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLT							
Median storage veh					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	91			72			308	292	70	290	286	82
vC1, stage 1 conf vol							192	192		92	92	
vC2, stage 2 conf vol							116	101		199	194	
vCu, unblocked vol	91			72			308	292	70	290	286	82
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			99	99	99	99	99	98
cM capacity (veh/h)	1504			1528			709	665	993	724	673	978
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	133	96	15	34								
Volume Left	61	5	5	5								
Volume Right	5	19	5	20								
cSH	1504	1528	765	835								
Volume to Capacity	0.04	0.00	0.02	0.04								
Queue Length 95th (m)	1.0	0.1	0.5	1.0								
Control Delay (s)	3.6	0.4	9.8	9.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	3.6	0.4	9.8	9.5								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.6									
Intersection Capacity Utilization			23.9%		ICU Level of Service				A			
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2031 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	48	12	11	195	339	20
Future Volume (Veh/h)	48	12	11	195	339	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	48	12	11	195	339	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	566	349	359			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	566	349	359			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	99			
cM capacity (veh/h)	481	694	1200			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	60	206	359			
Volume Left	48	11	0			
Volume Right	12	0	20			
cSH	513	1200	1700			
Volume to Capacity	0.12	0.01	0.21			
Queue Length 95th (m)	3.0	0.2	0.0			
Control Delay (s)	13.0	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.0	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization		29.3%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2031 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	20	240	131	42	63	64	656	50	62	792	28
Future Volume (vph)	88	20	240	131	42	63	64	656	50	62	792	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1695		1770	3502		1770	3521	
Flt Permitted	0.69	1.00	1.00	0.74	1.00		0.34	1.00		0.32	1.00	
Satd. Flow (perm)	1284	1863	1583	1386	1695		638	3502		604	3521	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	88	20	240	131	42	63	64	656	50	62	792	28
RTOR Reduction (vph)	0	0	170	0	52	0	0	6	0	0	3	0
Lane Group Flow (vph)	88	20	70	131	53	0	64	700	0	62	817	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.7	11.7	11.7	11.7	11.7		39.3	39.3		47.1	47.1	
Effective Green, g (s)	11.7	11.7	11.7	11.7	11.7		39.3	39.3		47.1	47.1	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17		0.57	0.57		0.68	0.68	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	218	316	269	235	288		364	2000		477	2410	
v/s Ratio Prot		0.01			0.03			0.20		0.01	c0.23	
v/s Ratio Perm	0.07		0.04	c0.09			0.10			0.08		
v/c Ratio	0.40	0.06	0.26	0.56	0.18		0.18	0.35		0.13	0.34	
Uniform Delay, d1	25.4	24.0	24.8	26.2	24.5		7.0	7.9		3.9	4.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.1	0.5	2.9	0.3		1.1	0.5		0.1	0.4	
Delay (s)	26.7	24.0	25.3	29.1	24.8		8.1	8.4		4.0	4.8	
Level of Service	C	C	C	C	C		A	A		A	A	
Approach Delay (s)		25.6			27.1			8.4			4.8	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			11.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			68.8			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			57.4%			ICU Level of Service				B		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2031 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	10	20	66	66	17
Future Volume (Veh/h)	45	10	20	66	66	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	45	10	20	66	66	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	180	74	83			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180	74	83			
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	99	99			
cM capacity (veh/h)	798	987	1514			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	55	86	83			
Volume Left	45	20	0			
Volume Right	10	0	17			
cSH	827	1514	1700			
Volume to Capacity	0.07	0.01	0.05			
Queue Length 95th (m)	1.6	0.3	0.0			
Control Delay (s)	9.7	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.1				
Intersection Capacity Utilization		21.2%	ICU Level of Service	A		
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2031 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	10	107	49	10	30	76	589	36	72	802	114
Future Volume (vph)	161	10	107	49	10	30	76	589	36	72	802	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.89		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1607		1770	1653		1770	3509		1770	3473	
Flt Permitted	0.73	1.00		0.68	1.00		0.26	1.00		0.40	1.00	
Satd. Flow (perm)	1362	1607		1270	1653		484	3509		742	3473	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	161	10	107	49	10	30	76	589	36	72	802	114
RTOR Reduction (vph)	0	88	0	0	25	0	0	4	0	0	10	0
Lane Group Flow (vph)	161	29	0	49	15	0	76	621	0	72	906	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.7	14.7		14.7	14.7		51.8	46.0		51.2	45.7	
Effective Green, g (s)	14.7	14.7		14.7	14.7		51.8	46.0		51.2	45.7	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.63	0.56		0.62	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	243	287		227	295		395	1963		530	1930	
v/s Ratio Prot		0.02			0.01		c0.01	0.18		0.01	c0.26	
v/s Ratio Perm	c0.12			0.04			0.11			0.08		
v/c Ratio	0.66	0.10		0.22	0.05		0.19	0.32		0.14	0.47	
Uniform Delay, d1	31.4	28.2		28.8	28.0		6.3	9.7		6.1	11.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.2		0.5	0.1		0.2	0.4		0.1	0.8	
Delay (s)	38.2	28.4		29.3	28.0		6.5	10.1		6.2	11.8	
Level of Service	D	C		C	C		A	B		A	B	
Approach Delay (s)		34.1			28.7			9.7			11.4	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		14.6					HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio		0.49										
Actuated Cycle Length (s)		82.2					Sum of lost time (s)			16.0		
Intersection Capacity Utilization		60.6%					ICU Level of Service			B		
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 14: Guelph St & McQueen Blvd Extension

2031 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	50	11	36	92	10	32	19	68	10	28	10
Future Volume (Veh/h)	10	50	11	36	92	10	32	19	68	10	28	10
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	50	11	36	92	10	32	19	68	10	28	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	102			61			264	250	56	316	250	97
vC1, stage 1 conf vol							76	76		169	169	
vC2, stage 2 conf vol							188	174		148	81	
vCu, unblocked vol	102			61			264	250	56	316	250	97
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			96	97	93	99	96	99
cM capacity (veh/h)	1490			1542			721	698	1011	684	700	959
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	10	61	36	102	119	48						
Volume Left	10	0	36	0	32	10						
Volume Right	0	11	0	10	68	10						
cSH	1490	1700	1542	1700	857	738						
Volume to Capacity	0.01	0.04	0.02	0.06	0.14	0.07						
Queue Length 95th (m)	0.2	0.0	0.5	0.0	3.7	1.6						
Control Delay (s)	7.4	0.0	7.4	0.0	9.9	10.2						
Lane LOS	A		A		A	B						
Approach Delay (s)	1.0		1.9		9.9	10.2						
Approach LOS					A	B						
Intersection Summary												
Average Delay				5.3								
Intersection Capacity Utilization				25.6%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2031 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	15	103	10	13	10	41	667	13	10	910	55
Future Volume (vph)	32	15	103	10	13	10	41	667	13	10	910	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.91			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1672			1760		1770	3529		1770	3509	
Flt Permitted		0.92			0.84		0.28	1.00		0.39	1.00	
Satd. Flow (perm)		1550			1501		530	3529		732	3509	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	15	103	10	13	10	41	667	13	10	910	55
RTOR Reduction (vph)	0	91	0	0	9	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	59	0	0	24	0	41	679	0	10	962	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9			8.9		59.6	59.6		59.6	59.6	
Effective Green, g (s)		8.9			8.9		59.6	59.6		59.6	59.6	
Actuated g/C Ratio		0.11			0.11		0.76	0.76		0.76	0.76	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		175			170		402	2679		555	2664	
v/s Ratio Prot								0.19			c0.27	
v/s Ratio Perm		c0.04			0.02		0.08			0.01		
v/c Ratio		0.34			0.14		0.10	0.25		0.02	0.36	
Uniform Delay, d1		32.1			31.4		2.5	2.8		2.3	3.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1			0.4		0.5	0.2		0.1	0.4	
Delay (s)		33.2			31.7		3.0	3.0		2.4	3.5	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		33.2			31.7			3.0			3.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.2			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.36										
Actuated Cycle Length (s)		78.5			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		53.0%			ICU Level of Service			A				
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2031 Total Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	65	10	10	80	29	10	10	10	87	10	20
Future Volume (Veh/h)	12	65	10	10	80	29	10	10	10	87	10	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	65	10	10	80	29	10	10	10	87	10	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh				2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	109			75			234	223	70	224	214	94
vC1, stage 1 conf vol							94	94		114	114	
vC2, stage 2 conf vol							140	129		109	99	
vCu, unblocked vol	109			75			234	223	70	224	214	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	99	89	99	98
cM capacity (veh/h)	1481			1524			776	729	993	797	737	962
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	87	119	30	117								
Volume Left	12	10	10	87								
Volume Right	10	29	10	20								
cSH	1481	1524	818	816								
Volume to Capacity	0.01	0.01	0.04	0.14								
Queue Length 95th (m)	0.2	0.2	0.9	3.8								
Control Delay (s)	1.1	0.7	9.6	10.2								
Lane LOS	A	A	A	B								
Approach Delay (s)	1.1	0.7	9.6	10.2								
Approach LOS			A	B								
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			27.7%	ICU Level of Service						A		
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2031 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	11	11	200	94	41
Future Volume (Veh/h)	29	11	11	200	94	41
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	29	11	11	200	94	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	336	114	135			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	336	114	135			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	99			
cM capacity (veh/h)	654	938	1449			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	40	211	135			
Volume Left	29	11	0			
Volume Right	11	0	41			
cSH	713	1449	1700			
Volume to Capacity	0.06	0.01	0.08			
Queue Length 95th (m)	1.4	0.2	0.0			
Control Delay (s)	10.3	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.3	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		29.5%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2031 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	61	140	96	36	123	159	1091	185	198	988	92
Future Volume (vph)	84	61	140	96	36	123	159	1091	185	198	988	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1647		1770	3462		1770	3494	
Flt Permitted	0.59	1.00	1.00	0.72	1.00		0.26	1.00		0.14	1.00	
Satd. Flow (perm)	1108	1863	1583	1336	1647		493	3462		261	3494	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	61	140	96	36	123	159	1091	185	198	988	92
RTOR Reduction (vph)	0	0	121	0	106	0	0	14	0	0	6	0
Lane Group Flow (vph)	84	61	19	96	53	0	159	1262	0	198	1074	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	11.6	11.6	11.6	11.6	11.6		49.4	49.4		61.1	61.1	
Effective Green, g (s)	11.6	11.6	11.6	11.6	11.6		49.4	49.4		61.1	61.1	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.58	0.58		0.72	0.72	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	255	216	182	225		287	2019		325	2520	
v/s Ratio Prot		0.03			0.03			0.36		0.06	0.31	
v/s Ratio Perm	0.08		0.01	0.07			0.32			0.38		
v/c Ratio	0.56	0.24	0.09	0.53	0.23		0.55	0.63		0.61	0.43	
Uniform Delay, d1	34.1	32.6	31.9	34.0	32.6		10.9	11.6		7.9	4.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.5	0.2	2.8	0.5		7.6	1.5		3.3	0.5	
Delay (s)	38.6	33.1	32.1	36.8	33.1		18.5	13.1		11.1	5.3	
Level of Service	D	C	C	D	C		B	B		B	A	
Approach Delay (s)		34.2			34.5			13.7			6.2	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			84.7			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			80.7%			ICU Level of Service				D		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2031 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	10	28	143	63	15
Future Volume (Veh/h)	25	10	28	143	63	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	10	28	143	63	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	270	70	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	70	78			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	98			
cM capacity (veh/h)	707	992	1520			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	35	171	78			
Volume Left	25	28	0			
Volume Right	10	0	15			
cSH	770	1520	1700			
Volume to Capacity	0.05	0.02	0.05			
Queue Length 95th (m)	1.1	0.4	0.0			
Control Delay (s)	9.9	1.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	1.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		25.7%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2031 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	10	214	67	10	128	229	982	90	117	762	344
Future Volume (vph)	321	10	214	67	10	128	229	982	90	117	762	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.86		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1596		1770	1604		1770	3495		1770	3374	
Flt Permitted	0.67	1.00		0.55	1.00		0.11	1.00		0.19	1.00	
Satd. Flow (perm)	1246	1596		1022	1604		204	3495		358	3374	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	321	10	214	67	10	128	229	982	90	117	762	344
RTOR Reduction (vph)	0	152	0	0	91	0	0	7	0	0	55	0
Lane Group Flow (vph)	321	72	0	67	47	0	229	1065	0	117	1051	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.1	25.1		25.1	25.1		50.2	40.8		40.9	35.5	
Effective Green, g (s)	25.1	25.1		25.1	25.1		50.2	40.8		40.9	35.5	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.58	0.47		0.47	0.41	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	358	458		293	461		309	1633		255	1372	
v/s Ratio Prot		0.04			0.03		c0.09	0.30		0.03	0.31	
v/s Ratio Perm	c0.26			0.07			c0.34			0.19		
v/c Ratio	0.90	0.16		0.23	0.10		0.74	0.65		0.46	0.77	
Uniform Delay, d1	29.9	23.2		23.7	22.8		16.8	17.8		13.9	22.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.7	0.2		0.4	0.1		9.5	2.1		1.3	4.2	
Delay (s)	57.6	23.4		24.1	22.9		26.3	19.9		15.3	26.5	
Level of Service	E	C		C	C		C	B		B	C	
Approach Delay (s)		43.5			23.3			21.0			25.4	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay	26.6			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	87.3			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	89.3%			ICU Level of Service			E					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

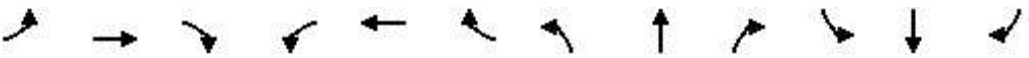
2031 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	153	36	80	130	10	21	81	57	10	32	10
Future Volume (Veh/h)	10	153	36	80	130	10	21	81	57	10	32	10
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	153	36	80	130	10	21	81	57	10	32	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh)	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	140			189			507	491	171	566	504	135
vC1, stage 1 conf vol							191	191		295	295	
vC2, stage 2 conf vol							316	300		270	209	
vCu, unblocked vol	140			189			507	491	171	566	504	135
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			96	86	93	98	94	99
cM capacity (veh/h)	1443			1385			568	573	873	485	558	914
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	10	189	80	140	159	52						
Volume Left	10	0	80	0	21	10						
Volume Right	0	36	0	10	57	10						
cSH	1443	1700	1385	1700	653	585						
Volume to Capacity	0.01	0.11	0.06	0.08	0.24	0.09						
Queue Length 95th (m)	0.2	0.0	1.4	0.0	7.3	2.2						
Control Delay (s)	7.5	0.0	7.8	0.0	12.3	11.8						
Lane LOS	A		A		B	B						
Approach Delay (s)	0.4		2.8		12.3	11.8						
Approach LOS					B	B						
Intersection Summary												
Average Delay				5.2								
Intersection Capacity Utilization				35.5%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2031 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	51	12	68	11	18	18	111	1237	18	10	994	60
Future Volume (vph)	51	12	68	11	18	18	111	1237	18	10	994	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.93			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1699			1746		1770	3532		1770	3509	
Flt Permitted		0.85			0.91		0.25	1.00		0.20	1.00	
Satd. Flow (perm)		1476			1600		474	3532		368	3509	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	12	68	11	18	18	111	1237	18	10	994	60
RTOR Reduction (vph)	0	48	0	0	16	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	83	0	0	31	0	111	1254	0	10	1050	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.4			10.4		63.5	63.5		63.5	63.5	
Effective Green, g (s)		10.4			10.4		63.5	63.5		63.5	63.5	
Actuated g/C Ratio		0.12			0.12		0.74	0.74		0.74	0.74	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		178			193		350	2610		272	2593	
v/s Ratio Prot								0.36			0.30	
v/s Ratio Perm		0.06			0.02		0.23			0.03		
v/c Ratio		0.46			0.16		0.32	0.48		0.04	0.41	
Uniform Delay, d1		35.2			33.8		3.8	4.5		3.0	4.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9			0.4		2.4	0.6		0.3	0.5	
Delay (s)		37.1			34.2		6.2	5.2		3.3	4.6	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		37.1			34.2			5.3			4.6	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		7.1										
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		85.9										
Intersection Capacity Utilization		68.4%										
Analysis Period (min)		30										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2031 Total Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	71	10	10	76	106	10	10	10	55	10	21
Future Volume (Veh/h)	65	71	10	10	76	106	10	10	10	55	10	21
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	65	71	10	10	76	106	10	10	10	55	10	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh				2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	182			81			381	408	76	370	360	129
vC1, stage 1 conf vol							206	206		149	149	
vC2, stage 2 conf vol							175	202		221	211	
vCu, unblocked vol	182			81			381	408	76	370	360	129
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			98	98	99	92	98	98
cM capacity (veh/h)	1393			1517			656	606	985	673	639	921
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	146	192	30	86								
Volume Left	65	10	10	55								
Volume Right	10	106	10	21								
cSH	1393	1517	716	715								
Volume to Capacity	0.05	0.01	0.04	0.12								
Queue Length 95th (m)	1.1	0.2	1.0	3.1								
Control Delay (s)	3.6	0.4	10.2	10.7								
Lane LOS	A	A	B	B								
Approach Delay (s)	3.6	0.4	10.2	10.7								
Approach LOS			B	B								
Intersection Summary												
Average Delay	4.1											
Intersection Capacity Utilization	37.8%			ICU Level of Service					A			
Analysis Period (min)	30											

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2039 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	13	11	270	386	23
Future Volume (Veh/h)	62	13	11	270	386	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	62	13	11	270	386	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	690	398	409			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	690	398	409			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	98	99			
cM capacity (veh/h)	407	652	1150			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	75	281	409			
Volume Left	62	11	0			
Volume Right	13	0	23			
cSH	436	1150	1700			
Volume to Capacity	0.17	0.01	0.24			
Queue Length 95th (m)	4.7	0.2	0.0			
Control Delay (s)	15.0	0.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	15.0	0.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization		34.0%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2039 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	24	364	137	56	79	183	918	53	69	869	28
Future Volume (vph)	89	24	364	137	56	79	183	918	53	69	869	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1699		1770	3539	1583	1770	3539	1583
Flt Permitted	0.67	1.00	1.00	0.74	1.00		0.18	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	1249	1863	1583	1381	1699		329	3539	1583	442	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	24	364	137	56	79	183	918	53	69	869	28
RTOR Reduction (vph)	0	0	310	0	68	0	0	0	31	0	0	18
Lane Group Flow (vph)	89	24	54	137	67	0	183	918	22	69	869	10
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	14.3	8.9	8.9	14.3	8.9		32.2	25.1	25.1	26.0	22.0	22.0
Effective Green, g (s)	14.3	8.9	8.9	14.3	8.9		32.2	25.1	25.1	26.0	22.0	22.0
Actuated g/C Ratio	0.23	0.14	0.14	0.23	0.14		0.52	0.41	0.41	0.42	0.36	0.36
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	336	270	229	355	246		339	1446	647	273	1268	567
v/s Ratio Prot	0.02	0.01		c0.03	0.04		c0.06	c0.26		0.02	0.25	
v/s Ratio Perm	0.04		0.03	c0.06			0.22		0.01	0.09		0.01
v/c Ratio	0.26	0.09	0.23	0.39	0.27		0.54	0.63	0.03	0.25	0.69	0.02
Uniform Delay, d1	19.0	22.7	23.2	19.6	23.4		9.3	14.5	10.9	10.9	16.8	12.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.5	0.7	0.6		1.7	2.2	0.1	0.5	3.1	0.1
Delay (s)	19.4	22.9	23.8	20.3	24.0		11.0	16.6	11.0	11.4	19.8	12.8
Level of Service	B	C	C	C	C		B	B	B	B	B	B
Approach Delay (s)		22.9			22.1			15.5			19.0	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			61.4			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			65.8%			ICU Level of Service			C			
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2039 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	11	22	72	72	18
Future Volume (Veh/h)	49	11	22	72	72	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	49	11	22	72	72	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	197	81	90			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	197	81	90			
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	99	99			
cM capacity (veh/h)	780	979	1505			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	60	94	90			
Volume Left	49	22	0			
Volume Right	11	0	18			
cSH	810	1505	1700			
Volume to Capacity	0.07	0.01	0.05			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	9.8	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization		21.7%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Unsignalized Intersection Capacity Analysis

9: Future N/S Collector/McTavish Extension & Future E/W Collector

2039 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	10	10	10	21	10	36	10	18	10	25	10
Future Volume (vph)	10	10	10	10	21	10	36	10	18	10	25	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	10	10	21	10	36	10	18	10	25	10
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	30	41	64	45								
Volume Left (vph)	10	10	36	10								
Volume Right (vph)	10	10	18	10								
Hadj (s)	-0.10	-0.06	-0.02	-0.05								
Departure Headway (s)	4.1	4.1	4.1	4.1								
Degree Utilization, x	0.03	0.05	0.07	0.05								
Capacity (veh/h)	854	851	857	865								
Control Delay (s)	7.2	7.3	7.4	7.3								
Approach Delay (s)	7.2	7.3	7.4	7.3								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.3								
Level of Service				A								
Intersection Capacity Utilization				17.9%	ICU Level of Service	A						
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2039 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	10	107	49	10	30	76	971	36	72	978	114
Future Volume (vph)	161	10	107	49	10	30	76	971	36	72	978	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00	0.89		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1607		1770	1653		1770	3520		1770	3539	1583
Flt Permitted	0.73	1.00		0.68	1.00		0.22	1.00		0.21	1.00	1.00
Satd. Flow (perm)	1362	1607		1270	1653		417	3520		396	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	161	10	107	49	10	30	76	971	36	72	978	114
RTOR Reduction (vph)	0	87	0	0	25	0	0	4	0	0	0	59
Lane Group Flow (vph)	161	30	0	49	15	0	76	1003	0	72	978	55
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	9.6	9.6		9.6	9.6		28.9	25.2		28.9	25.2	25.2
Effective Green, g (s)	9.6	9.6		9.6	9.6		28.9	25.2		28.9	25.2	25.2
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.55	0.48		0.55	0.48	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	249	293		232	302		324	1689		314	1698	759
v/s Ratio Prot		0.02			0.01		c0.02	c0.29		0.02	0.28	
v/s Ratio Perm	c0.12			0.04			0.11			0.11		0.03
v/c Ratio	0.65	0.10		0.21	0.05		0.23	0.59		0.23	0.58	0.07
Uniform Delay, d1	19.9	17.9		18.2	17.7		5.9	9.9		6.0	9.8	7.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2		0.5	0.1		0.4	1.6		0.4	1.4	0.2
Delay (s)	25.6	18.0		18.7	17.8		6.3	11.5		6.4	11.2	7.5
Level of Service	C	B		B	B		A	B		A	B	A
Approach Delay (s)		22.4			18.3			11.1			10.6	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM 2000 Control Delay	12.3			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	52.5			Sum of lost time (s)			14.0					
Intersection Capacity Utilization	61.1%			ICU Level of Service			B					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

13: Tower St S & Future E/W Collector

2039 Total Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	154	290	821	91	129	1005
Future Volume (vph)	154	290	821	91	129	1005
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.24	1.00
Satd. Flow (perm)	1770	1583	3539	1583	441	3539
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	154	290	821	91	129	1005
RTOR Reduction (vph)	0	235	0	51	0	0
Lane Group Flow (vph)	154	55	821	40	129	1005
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	10.1	10.1	23.5	23.5	33.4	33.4
Effective Green, g (s)	10.1	10.1	23.5	23.5	33.4	33.4
Actuated g/C Ratio	0.19	0.19	0.44	0.44	0.62	0.62
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	334	298	1554	695	421	2209
v/s Ratio Prot			c0.23		0.03	c0.28
v/s Ratio Perm	c0.09	0.03		0.03	0.16	
v/c Ratio	0.46	0.18	0.53	0.06	0.31	0.45
Uniform Delay, d1	19.3	18.2	11.0	8.6	4.9	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3	1.3	0.2	0.4	0.7
Delay (s)	20.3	18.5	12.2	8.8	5.3	6.0
Level of Service	C	B	B	A	A	A
Approach Delay (s)	19.1		11.9			5.9
Approach LOS	B		B			A
Intersection Summary						
HCM 2000 Control Delay			10.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.52			
Actuated Cycle Length (s)			53.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			50.0%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 14: Guelph St & McQueen Blvd Extension

2039 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	160	100	36	223	10	59	20	68	10	30	10
Future Volume (Veh/h)	10	160	100	36	223	10	59	20	68	10	30	10
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	160	100	36	223	10	59	20	68	10	30	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	233			260			550	535	210	558	580	228
vC1, stage 1 conf vol							230	230		300	300	
vC2, stage 2 conf vol							320	305		258	280	
vCu, unblocked vol	233			260			550	535	210	558	580	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			90	97	92	98	95	99
cM capacity (veh/h)	1335			1304			571	574	830	549	552	811
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	10	260	36	233	147	50						
Volume Left	10	0	36	0	59	10						
Volume Right	0	100	0	10	68	10						
cSH	1335	1700	1304	1700	668	589						
Volume to Capacity	0.01	0.15	0.03	0.14	0.22	0.08						
Queue Length 95th (m)	0.2	0.0	0.6	0.0	6.4	2.1						
Control Delay (s)	7.7	0.0	7.8	0.0	11.9	11.7						
Lane LOS	A		A		B	B						
Approach Delay (s)	0.3		1.0		11.9	11.7						
Approach LOS					B	B						
Intersection Summary												
Average Delay				3.7								
Intersection Capacity Utilization				43.0%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2039 Total Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	17	202	120	21	22	94	785	51	17	1049	111
Future Volume (vph)	75	17	202	120	21	22	94	785	51	17	1049	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.92		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1605		1770	1720		1770	3507		1770	3488	
Flt Permitted	0.73	1.00		0.38	1.00		0.13	1.00		0.32	1.00	
Satd. Flow (perm)	1358	1605		703	1720		235	3507		592	3488	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	75	17	202	120	21	22	94	785	51	17	1049	111
RTOR Reduction (vph)	0	176	0	0	19	0	0	4	0	0	8	0
Lane Group Flow (vph)	75	43	0	120	24	0	94	832	0	17	1152	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.3	9.3		15.9	10.6		43.5	38.2		35.5	34.2	
Effective Green, g (s)	13.3	9.3		15.9	10.6		43.5	38.2		35.5	34.2	
Actuated g/C Ratio	0.18	0.13		0.22	0.15		0.60	0.53		0.49	0.47	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	273	207		233	252		254	1858		312	1654	
v/s Ratio Prot	0.02	0.03		c0.04	0.01		c0.03	0.24		0.00	c0.33	
v/s Ratio Perm	0.04			c0.08			0.20			0.03		
v/c Ratio	0.27	0.21		0.52	0.10		0.37	0.45		0.05	0.70	
Uniform Delay, d1	25.0	28.1		23.7	26.6		9.0	10.4		9.4	14.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.5		1.9	0.2		0.9	0.8		0.1	2.5	
Delay (s)	25.6	28.6		25.6	26.8		9.9	11.2		9.5	17.3	
Level of Service	C	C		C	C		A	B		A	B	
Approach Delay (s)		27.8			25.9			11.1			17.2	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			72.1			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			73.4%			ICU Level of Service				D		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2039 Total Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	71	10	10	86	102	10	10	10	198	10	22
Future Volume (Veh/h)	13	71	10	10	86	102	10	10	10	198	10	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	71	10	10	86	102	10	10	10	198	10	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh					2							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	188			81			286	310	76	274	264	137
vC1, stage 1 conf vol							102	102		157	157	
vC2, stage 2 conf vol							184	208		117	107	
vCu, unblocked vol	188			81			286	310	76	274	264	137
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	99	74	99	98
cM capacity (veh/h)	1386			1517			732	676	985	763	709	911
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	94	198	30	230								
Volume Left	13	10	10	198								
Volume Right	10	102	10	22								
cSH	1386	1517	777	773								
Volume to Capacity	0.01	0.01	0.04	0.30								
Queue Length 95th (m)	0.2	0.2	0.9	9.6								
Control Delay (s)	1.1	0.4	9.8	11.6								
Lane LOS	A	A	A	B								
Approach Delay (s)	1.1	0.4	9.8	11.6								
Approach LOS			A	B								
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			38.7%		ICU Level of Service				A			
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2039 Total Conditions
Weekday PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			T	T	R
Traffic Volume (veh/h)	30	11	11	256	168	45
Future Volume (Veh/h)	30	11	11	256	168	45
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	11	11	256	168	45
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	468	190	213			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468	190	213			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	99	99			
cM capacity (veh/h)	549	851	1357			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	41	267	213			
Volume Left	30	11	0			
Volume Right	11	0	45			
cSH	606	1357	1700			
Volume to Capacity	0.07	0.01	0.13			
Queue Length 95th (m)	1.7	0.2	0.0			
Control Delay (s)	11.4	0.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.4	0.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			32.4%	ICU Level of Service		A
Analysis Period (min)			30			

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2039 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	68	301	137	56	79	350	1294	195	216	1406	92
Future Volume (vph)	87	68	301	137	56	79	350	1294	195	216	1406	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1699		1770	3539	1583	1770	3539	1583
Flt Permitted	0.61	1.00	1.00	0.62	1.00		0.07	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1134	1863	1583	1154	1699		130	3539	1583	280	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	68	301	137	56	79	350	1294	195	216	1406	92
RTOR Reduction (vph)	0	0	269	0	44	0	0	0	37	0	0	47
Lane Group Flow (vph)	87	68	32	137	91	0	350	1294	158	216	1406	45
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	18.2	12.0	12.0	21.8	13.8		78.3	62.7	62.7	66.8	54.2	54.2
Effective Green, g (s)	18.2	12.0	12.0	21.8	13.8		78.3	62.7	62.7	66.8	54.2	54.2
Actuated g/C Ratio	0.16	0.11	0.11	0.20	0.12		0.70	0.56	0.56	0.60	0.49	0.49
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	220	200	170	270	210		402	1993	891	336	1723	770
v/s Ratio Prot	0.02	0.04		c0.04	0.05		c0.16	0.37		0.07	0.40	
v/s Ratio Perm	0.04		0.02	c0.06			c0.45		0.10	0.31		0.03
v/c Ratio	0.40	0.34	0.19	0.51	0.43		0.87	0.65	0.18	0.64	0.82	0.06
Uniform Delay, d1	41.0	46.0	45.2	39.0	45.1		33.6	16.7	11.8	12.7	24.3	15.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	1.0	0.5	1.5	1.4		20.3	1.7	0.4	4.2	4.5	0.1
Delay (s)	42.1	47.0	45.8	40.5	46.6		54.0	18.4	12.2	16.9	28.8	15.2
Level of Service	D	D	D	D	D		D	B	B	B	C	B
Approach Delay (s)		45.3			43.5			24.5			26.6	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			28.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			111.3			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			86.9%			ICU Level of Service				E		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 8: Jones Baseline/Scotland St & 2nd Line

2039 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	10	30	154	68	17
Future Volume (Veh/h)	28	10	30	154	68	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	28	10	30	154	68	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	290	76	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	76	85			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	98			
cM capacity (veh/h)	686	985	1512			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	38	184	85			
Volume Left	28	30	0			
Volume Right	10	0	17			
cSH	746	1512	1700			
Volume to Capacity	0.05	0.02	0.05			
Queue Length 95th (m)	1.2	0.5	0.0			
Control Delay (s)	10.1	1.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.1	1.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.1				
Intersection Capacity Utilization		26.4%		ICU Level of Service	A	
Analysis Period (min)		30				

HCM Unsignalized Intersection Capacity Analysis

9: Future N/S Collector/McTavish Extension & Future E/W Collector

2039 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	10	23	10	20	14	10	24	10	12	10	10	10
Future Volume (vph)	10	23	10	20	14	10	24	10	12	10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	23	10	20	14	10	24	10	12	10	10	10
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	43	44	46	30								
Volume Left (vph)	10	20	24	10								
Volume Right (vph)	10	10	12	10								
Hadj (s)	-0.06	-0.01	-0.02	-0.10								
Departure Headway (s)	4.0	4.1	4.1	4.0								
Degree Utilization, x	0.05	0.05	0.05	0.03								
Capacity (veh/h)	866	858	849	868								
Control Delay (s)	7.3	7.3	7.3	7.2								
Approach Delay (s)	7.3	7.3	7.3	7.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.3								
Level of Service				A								
Intersection Capacity Utilization				15.4%	ICU Level of Service	A						
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2039 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	10	214	67	10	128	229	1370	90	117	1312	344
Future Volume (vph)	321	10	214	67	10	128	229	1370	90	117	1312	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1596		1770	1604		1770	3506		1770	3539	1583
Flt Permitted	0.64	1.00		0.50	1.00		0.08	1.00		0.08	1.00	1.00
Satd. Flow (perm)	1194	1596		938	1604		151	3506		147	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	321	10	214	67	10	128	229	1370	90	117	1312	344
RTOR Reduction (vph)	0	142	0	0	91	0	0	4	0	0	0	119
Lane Group Flow (vph)	321	82	0	67	47	0	229	1456	0	117	1312	225
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	31.2	31.2		31.2	31.2		65.9	55.2		58.5	50.8	50.8
Effective Green, g (s)	31.2	31.2		31.2	31.2		65.9	55.2		58.5	50.8	50.8
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.62	0.52		0.55	0.47	0.47
Clearance Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	347	464		273	467		275	1807		196	1678	750
v/s Ratio Prot		0.05			0.03		c0.09	0.42		0.04	0.37	
v/s Ratio Perm	c0.27			0.07			c0.42			0.28		0.14
v/c Ratio	0.93	0.18		0.25	0.10		0.83	0.81		0.60	0.78	0.30
Uniform Delay, d1	36.8	28.4		29.0	27.7		27.5	21.5		17.8	23.5	17.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	36.3	0.2		0.5	0.1		20.8	4.0		4.9	3.8	1.0
Delay (s)	73.1	28.5		29.4	27.8		48.4	25.5		22.7	27.3	18.3
Level of Service	E	C		C	C		D	C		C	C	B
Approach Delay (s)		54.8			28.3			28.6			25.2	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			107.1			Sum of lost time (s)				13.0		
Intersection Capacity Utilization			91.0%			ICU Level of Service				F		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

13: Tower St S & Future E/W Collector

2039 Total Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	177	305	1453	273	404	1189
Future Volume (vph)	177	305	1453	273	404	1189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	3.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.08	1.00
Satd. Flow (perm)	1770	1583	3539	1583	143	3539
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	177	305	1453	273	404	1189
RTOR Reduction (vph)	0	265	0	103	0	0
Lane Group Flow (vph)	177	40	1453	170	404	1189
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	15.6	15.6	63.2	63.2	92.1	92.1
Effective Green, g (s)	15.6	15.6	63.2	63.2	92.1	92.1
Actuated g/C Ratio	0.13	0.13	0.54	0.54	0.78	0.78
Clearance Time (s)	5.0	5.0	5.0	5.0	3.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	209	1900	850	469	2769
v/s Ratio Prot			0.41		c0.19	0.34
v/s Ratio Perm	c0.10	0.03		0.11	c0.48	
v/c Ratio	0.76	0.19	0.76	0.20	0.86	0.43
Uniform Delay, d1	49.2	45.4	21.4	14.1	33.8	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.7	0.5	3.0	0.5	16.4	0.5
Delay (s)	62.9	45.9	24.4	14.7	50.2	4.7
Level of Service	E	D	C	B	D	A
Approach Delay (s)	52.2		22.9			16.2
Approach LOS	D		C			B
Intersection Summary						
HCM 2000 Control Delay			23.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.86			
Actuated Cycle Length (s)			117.7		Sum of lost time (s)	13.0
Intersection Capacity Utilization			84.0%		ICU Level of Service	E
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2039 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	315	87	80	317	10	143	87	57	10	34	10
Future Volume (Veh/h)	10	315	87	80	317	10	143	87	57	10	34	10
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	315	87	80	317	10	143	87	57	10	34	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	327			402			882	866	358	918	904	322
vC1, stage 1 conf vol							378	378		482	482	
vC2, stage 2 conf vol							504	487		436	422	
vCu, unblocked vol	327			402			882	866	358	918	904	322
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			93			65	80	92	97	92	99
cM capacity (veh/h)	1233			1157			413	441	686	342	414	719
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	10	402	80	327	287	54						
Volume Left	10	0	80	0	143	10						
Volume Right	0	87	0	10	57	10						
cSH	1233	1700	1157	1700	458	431						
Volume to Capacity	0.01	0.24	0.07	0.19	0.63	0.13						
Queue Length 95th (m)	0.2	0.0	1.7	0.0	34.6	3.2						
Control Delay (s)	7.9	0.0	8.3	0.0	25.6	14.5						
Lane LOS	A		A		D	B						
Approach Delay (s)	0.2		1.6		25.6	14.5						
Approach LOS					D	B						
Intersection Summary												
Average Delay	7.7											
Intersection Capacity Utilization	58.9%			ICU Level of Service			B					
Analysis Period (min)	30											

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2039 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	13	140	96	35	50	251	1451	138	34	1220	132
Future Volume (vph)	126	13	140	96	35	50	251	1451	138	34	1220	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1607		1770	1698		1770	3493		1770	3487	
Flt Permitted	0.68	1.00		0.55	1.00		0.09	1.00		0.10	1.00	
Satd. Flow (perm)	1261	1607		1024	1698		177	3493		190	3487	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	13	140	96	35	50	251	1451	138	34	1220	132
RTOR Reduction (vph)	0	125	0	0	45	0	0	6	0	0	8	0
Lane Group Flow (vph)	126	28	0	96	40	0	251	1583	0	34	1344	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.4	8.5		14.8	8.2		52.2	46.5		41.9	39.2	
Effective Green, g (s)	15.4	8.5		14.8	8.2		52.2	46.5		41.9	39.2	
Actuated g/C Ratio	0.19	0.11		0.18	0.10		0.65	0.58		0.52	0.49	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	170		250	173		313	2022		152	1702	
v/s Ratio Prot	c0.04	0.02		0.03	0.02		c0.10	0.45		0.01	0.39	
v/s Ratio Perm	c0.05			0.04			c0.42			0.11		
v/c Ratio	0.44	0.16		0.38	0.23		0.80	0.78		0.22	0.79	
Uniform Delay, d1	28.2	32.7		28.3	33.2		18.9	13.0		11.4	17.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.5		1.0	0.7		14.6	3.2		0.7	3.9	
Delay (s)	29.3	33.1		29.2	33.8		33.5	16.2		12.1	21.0	
Level of Service	C	C		C	C		C	B		B	C	
Approach Delay (s)		31.4			31.4			18.5			20.8	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			21.0				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			80.3				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			82.0%				ICU Level of Service			E		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2039 Total Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	77	10	10	83	261	10	10	10	148	11	23
Future Volume (Veh/h)	71	77	10	10	83	261	10	10	10	148	11	23
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	71	77	10	10	83	261	10	10	10	148	11	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh				2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	344			87			486	588	82	472	462	214
vC1, stage 1 conf vol							224	224		234	234	
vC2, stage 2 conf vol							262	364		239	229	
vCu, unblocked vol	344			87			486	588	82	472	462	214
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			98	98	99	76	98	97
cM capacity (veh/h)	1215			1509			582	511	978	621	595	827
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	158	354	30	182								
Volume Left	71	10	10	148								
Volume Right	10	261	10	23								
cSH	1215	1509	639	639								
Volume to Capacity	0.06	0.01	0.05	0.28								
Queue Length 95th (m)	1.4	0.2	1.1	9.0								
Control Delay (s)	3.9	0.3	10.9	12.9								
Lane LOS	A	A	B	B								
Approach Delay (s)	3.9	0.3	10.9	12.9								
Approach LOS			B	B								
Intersection Summary												
Average Delay				4.7								
Intersection Capacity Utilization				56.4%	ICU Level of Service				B			
Analysis Period (min)				30								

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2049 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	20	20	292	425	25
Future Volume (Veh/h)	64	20	20	292	425	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	64	20	20	292	425	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	770	438	450			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	770	438	450			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	97	98			
cM capacity (veh/h)	362	619	1110			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	84	312	450			
Volume Left	64	20	0			
Volume Right	20	0	25			
cSH	402	1110	1700			
Volume to Capacity	0.21	0.02	0.26			
Queue Length 95th (m)	6.0	0.4	0.0			
Control Delay (s)	16.3	0.7	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.3	0.7	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization		43.2%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2049 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	25	392	145	58	83	184	969	56	75	916	29
Future Volume (vph)	90	25	392	145	58	83	184	969	56	75	916	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1698		1770	3539	1583	1770	3539	1583
Flt Permitted	0.67	1.00	1.00	0.74	1.00		0.16	1.00	1.00	0.21	1.00	1.00
Satd. Flow (perm)	1243	1863	1583	1380	1698		295	3539	1583	390	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	90	25	392	145	58	83	184	969	56	75	916	29
RTOR Reduction (vph)	0	0	301	0	70	0	0	0	33	0	0	19
Lane Group Flow (vph)	90	25	91	145	71	0	184	969	23	75	916	10
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	15.1	9.7	9.7	15.1	9.7		32.4	25.3	25.3	26.0	22.1	22.1
Effective Green, g (s)	15.1	9.7	9.7	15.1	9.7		32.4	25.3	25.3	26.0	22.1	22.1
Actuated g/C Ratio	0.24	0.16	0.16	0.24	0.16		0.52	0.41	0.41	0.42	0.35	0.35
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	346	290	246	368	264		321	1437	642	249	1255	561
v/s Ratio Prot	0.02	0.01		c0.03	0.04		c0.07	c0.27		0.02	0.26	
v/s Ratio Perm	0.04		0.06	c0.06			0.23		0.01	0.11		0.01
v/c Ratio	0.26	0.09	0.37	0.39	0.27		0.57	0.67	0.04	0.30	0.73	0.02
Uniform Delay, d1	18.8	22.5	23.6	19.5	23.2		9.9	15.1	11.1	11.4	17.5	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	1.0	0.7	0.6		2.5	2.6	0.1	0.7	3.8	0.1
Delay (s)	19.2	22.6	24.5	20.2	23.7		12.4	17.7	11.3	12.1	21.3	13.1
Level of Service	B	C	C	C	C		B	B	B	B	C	B
Approach Delay (s)		23.5			21.9			16.6			20.4	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			19.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			62.3			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			69.3%			ICU Level of Service				C		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Jones Baseline/Scotland St & 2nd Line

2049 Total Conditions
Weekday AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	20	24	79	79	20
Future Volume (Veh/h)	54	20	24	79	79	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	20	24	79	79	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	216	89	99			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216	89	99			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	98	98			
cM capacity (veh/h)	760	969	1494			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	74	103	99			
Volume Left	54	24	0			
Volume Right	20	0	20			
cSH	807	1494	1700			
Volume to Capacity	0.09	0.02	0.06			
Queue Length 95th (m)	2.3	0.4	0.0			
Control Delay (s)	9.9	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization		23.0%		ICU Level of Service		A
Analysis Period (min)			30			

HCM Unsignalized Intersection Capacity Analysis

9: Future N/S Collector/McTavish Extension & Future E/W Collector

2049 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	20	20	20	21	20	36	20	20	20	25	20
Future Volume (vph)	20	20	20	20	21	20	36	20	20	20	25	20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	20	20	20	21	20	36	20	20	20	25	20
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	60	61	76	65								
Volume Left (vph)	20	20	36	20								
Volume Right (vph)	20	20	20	20								
Hadj (s)	-0.10	-0.10	-0.03	-0.09								
Departure Headway (s)	4.2	4.2	4.2	4.2								
Degree Utilization, x	0.07	0.07	0.09	0.07								
Capacity (veh/h)	828	828	823	836								
Control Delay (s)	7.5	7.5	7.6	7.5								
Approach Delay (s)	7.5	7.5	7.6	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.5								
Level of Service				A								
Intersection Capacity Utilization				18.0%	ICU Level of Service	A						
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2049 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	20	107	54	20	33	76	1024	40	80	1035	114
Future Volume (vph)	161	20	107	54	20	33	76	1024	40	80	1035	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.0	5.0		4.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.87		1.00	0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1627		1770	1689		1770	3519		1770	3539	1583
Flt Permitted	0.72	1.00		0.68	1.00		0.20	1.00		0.19	1.00	1.00
Satd. Flow (perm)	1346	1627		1258	1689		375	3519		354	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	161	20	107	54	20	33	76	1024	40	80	1035	114
RTOR Reduction (vph)	0	87	0	0	27	0	0	4	0	0	0	59
Lane Group Flow (vph)	161	40	0	54	26	0	76	1060	0	80	1035	55
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	9.7	9.7		9.7	9.7		28.9	25.2		28.9	25.2	25.2
Effective Green, g (s)	9.7	9.7		9.7	9.7		28.9	25.2		28.9	25.2	25.2
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.55	0.48		0.55	0.48	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0		4.0	5.0		4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	248	300		231	311		304	1685		294	1695	758
v/s Ratio Prot		0.02			0.02		0.02	c0.30		c0.02	0.29	
v/s Ratio Perm	c0.12			0.04			0.12			0.13		0.03
v/c Ratio	0.65	0.13		0.23	0.08		0.25	0.63		0.27	0.61	0.07
Uniform Delay, d1	19.9	17.9		18.3	17.8		6.1	10.2		6.2	10.1	7.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.9	0.2		0.5	0.1		0.4	1.8		0.5	1.7	0.2
Delay (s)	25.7	18.1		18.8	17.9		6.5	12.0		6.7	11.7	7.6
Level of Service	C	B		B	B		A	B		A	B	A
Approach Delay (s)		22.4			18.3			11.7			11.0	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			12.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			52.6			Sum of lost time (s)				14.0		
Intersection Capacity Utilization			66.0%			ICU Level of Service				C		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

13: Tower St S & Future E/W Collector

2049 Total Conditions
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	154	290	878	91	129	1067
Future Volume (vph)	154	290	878	91	129	1067
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.21	1.00
Satd. Flow (perm)	1770	1583	3539	1583	397	3539
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	154	290	878	91	129	1067
RTOR Reduction (vph)	0	235	0	51	0	0
Lane Group Flow (vph)	154	55	878	40	129	1067
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	10.1	10.1	23.5	23.5	33.4	33.4
Effective Green, g (s)	10.1	10.1	23.5	23.5	33.4	33.4
Actuated g/C Ratio	0.19	0.19	0.44	0.44	0.62	0.62
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	334	298	1554	695	399	2209
v/s Ratio Prot			c0.25		0.04	c0.30
v/s Ratio Perm	c0.09	0.03		0.03	0.17	
v/c Ratio	0.46	0.18	0.56	0.06	0.32	0.48
Uniform Delay, d1	19.3	18.2	11.2	8.6	5.1	5.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3	1.5	0.2	0.5	0.8
Delay (s)	20.3	18.5	12.7	8.8	5.6	6.2
Level of Service	C	B	B	A	A	A
Approach Delay (s)	19.1		12.3			6.1
Approach LOS	B		B			A
Intersection Summary						
HCM 2000 Control Delay			10.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			53.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			51.6%		ICU Level of Service	A
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2049 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	166	106	36	223	20	59	23	68	20	33	20
Future Volume (Veh/h)	20	166	106	36	223	20	59	23	68	20	33	20
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	166	106	36	223	20	59	23	68	20	33	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	243			272			590	574	219	590	617	233
vC1, stage 1 conf vol							259	259		305	305	
vC2, stage 2 conf vol							332	315		286	312	
vCu, unblocked vol	243			272			590	574	219	590	617	233
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			89	96	92	96	94	98
cM capacity (veh/h)	1323			1291			540	553	821	527	534	806
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	20	272	36	243	150	73						
Volume Left	20	0	36	0	59	20						
Volume Right	0	106	0	20	68	20						
cSH	1323	1700	1291	1700	642	586						
Volume to Capacity	0.02	0.16	0.03	0.14	0.23	0.12						
Queue Length 95th (m)	0.3	0.0	0.7	0.0	6.9	3.2						
Control Delay (s)	7.8	0.0	7.9	0.0	12.3	12.0						
Lane LOS	A		A		B	B						
Approach Delay (s)	0.5		1.0		12.3	12.0						
Approach LOS					B	B						
Intersection Summary												
Average Delay				4.0								
Intersection Capacity Utilization				41.9%	ICU Level of Service				A			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2049 Total Conditions
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	20	211	120	23	23	96	838	53	20	1106	117
Future Volume (vph)	78	20	211	120	23	23	96	838	53	20	1106	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1608		1770	1723		1770	3508		1770	3488	
Flt Permitted	0.73	1.00		0.37	1.00		0.11	1.00		0.29	1.00	
Satd. Flow (perm)	1354	1608		690	1723		200	3508		545	3488	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	78	20	211	120	23	23	96	838	53	20	1106	117
RTOR Reduction (vph)	0	183	0	0	20	0	0	4	0	0	8	0
Lane Group Flow (vph)	78	48	0	120	26	0	96	887	0	20	1215	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.3	9.4		16.1	10.8		43.2	38.0		35.1	33.9	
Effective Green, g (s)	13.3	9.4		16.1	10.8		43.2	38.0		35.1	33.9	
Actuated g/C Ratio	0.18	0.13		0.22	0.15		0.60	0.53		0.49	0.47	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	273	210		234	258		235	1854		286	1644	
v/s Ratio Prot	0.02	0.03		c0.04	0.02		c0.03	0.25		0.00	c0.35	
v/s Ratio Perm	0.04			c0.08			0.21			0.03		
v/c Ratio	0.29	0.23		0.51	0.10		0.41	0.48		0.07	0.74	
Uniform Delay, d1	25.0	28.0		23.5	26.4		9.7	10.7		9.6	15.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6		1.9	0.2		1.2	0.9		0.1	3.1	
Delay (s)	25.6	28.5		25.4	26.5		10.9	11.6		9.7	18.5	
Level of Service	C	C		C	C		B	B		A	B	
Approach Delay (s)		27.8			25.7			11.5			18.3	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay	17.4			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	71.9			Sum of lost time (s)			18.0					
Intersection Capacity Utilization	75.9%			ICU Level of Service			D					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2049 Total Conditions

Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	78	20	20	95	102	20	20	20	205	20	24
Future Volume (Veh/h)	20	78	20	20	95	102	20	20	20	205	20	24
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	78	20	20	95	102	20	20	20	205	20	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh				2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	197			98			348	365	88	344	324	146
vC1, stage 1 conf vol							128	128		186	186	
vC2, stage 2 conf vol							220	237		158	138	
vCu, unblocked vol	197			98			348	365	88	344	324	146
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	97	98	71	97	97
cM capacity (veh/h)	1376			1495			674	641	970	699	671	901
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	118	217	60	249								
Volume Left	20	20	20	205								
Volume Right	20	102	20	24								
cSH	1376	1495	737	712								
Volume to Capacity	0.01	0.01	0.08	0.35								
Queue Length 95th (m)	0.3	0.3	2.0	12.1								
Control Delay (s)	1.4	0.8	10.3	12.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.4	0.8	10.3	12.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			41.6%	ICU Level of Service						A		
Analysis Period (min)			30									

HCM Unsignalized Intersection Capacity Analysis

2: Scotland St & McQueen Blvd

2049 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	20	20	278	178	47
Future Volume (Veh/h)	32	20	20	278	178	47
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	32	20	20	278	178	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	520	202	225			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	520	202	225			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	98	99			
cM capacity (veh/h)	509	839	1344			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	52	298	225			
Volume Left	32	20	0			
Volume Right	20	0	47			
cSH	600	1344	1700			
Volume to Capacity	0.09	0.01	0.13			
Queue Length 95th (m)	2.2	0.3	0.0			
Control Delay (s)	11.6	0.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	0.6	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization		41.1%		ICU Level of Service		A
Analysis Period (min)		30				

HCM Signalized Intersection Capacity Analysis

7: Tower St S & McQueen Blvd

2049 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	71	303	145	58	83	363	1353	210	235	1474	93
Future Volume (vph)	91	71	303	145	58	83	363	1353	210	235	1474	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1698		1770	3539	1583	1770	3539	1583
Flt Permitted	0.57	1.00	1.00	0.63	1.00		0.07	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1070	1863	1583	1164	1698		128	3539	1583	245	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	91	71	303	145	58	83	363	1353	210	235	1474	93
RTOR Reduction (vph)	0	0	270	0	45	0	0	0	39	0	0	48
Lane Group Flow (vph)	91	71	33	145	96	0	363	1353	171	235	1474	45
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	18.7	12.4	12.4	22.1	14.1		79.8	63.6	63.6	68.4	55.2	55.2
Effective Green, g (s)	18.7	12.4	12.4	22.1	14.1		79.8	63.6	63.6	68.4	55.2	55.2
Actuated g/C Ratio	0.17	0.11	0.11	0.20	0.12		0.70	0.56	0.56	0.60	0.49	0.49
Clearance Time (s)	3.0	5.0	5.0	3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	204	173	270	211		403	1988	889	325	1725	771
v/s Ratio Prot	0.02	0.04		c0.04	0.06		c0.17	0.38		0.08	0.42	
v/s Ratio Perm	0.05		0.02	c0.07			c0.46		0.11	0.35		0.03
v/c Ratio	0.42	0.35	0.19	0.54	0.46		0.90	0.68	0.19	0.72	0.85	0.06
Uniform Delay, d1	41.6	46.7	45.8	40.0	46.0		35.3	17.6	12.2	14.5	25.5	15.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	1.0	0.5	2.1	1.6		26.3	1.9	0.5	8.0	5.9	0.1
Delay (s)	42.9	47.7	46.4	42.0	47.6		61.6	19.5	12.7	22.5	31.3	15.4
Level of Service	D	D	D	D	D		E	B	B	C	C	B
Approach Delay (s)		45.9			44.8			26.7			29.4	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			113.2			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			89.8%			ICU Level of Service				E		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 8: Jones Baseline/Scotland St & 2nd Line

2049 Total Conditions
Weekday PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	20	33	171	75	20
Future Volume (Veh/h)	30	20	33	171	75	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	20	33	171	75	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	322	85	95			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	322	85	95			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	98			
cM capacity (veh/h)	657	974	1499			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	204	95			
Volume Left	30	33	0			
Volume Right	20	0	20			
cSH	755	1499	1700			
Volume to Capacity	0.07	0.02	0.06			
Queue Length 95th (m)	1.6	0.5	0.0			
Control Delay (s)	10.1	1.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.1	1.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.2				
Intersection Capacity Utilization		27.5%	ICU Level of Service	A		
Analysis Period (min)		30				

HCM Unsignalized Intersection Capacity Analysis

9: Future N/S Collector/McTavish Extension & Future E/W Collector

2049 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	23	20	20	20	20	24	20	20	20	20	20
Future Volume (vph)	20	23	20	20	20	20	24	20	20	20	20	20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	23	20	20	20	20	24	20	20	20	20	20
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	63	60	64	60								
Volume Left (vph)	20	20	24	20								
Volume Right (vph)	20	20	20	20								
Hadj (s)	-0.09	-0.10	-0.08	-0.10								
Departure Headway (s)	4.1	4.1	4.1	4.1								
Degree Utilization, x	0.07	0.07	0.07	0.07								
Capacity (veh/h)	839	840	832	841								
Control Delay (s)	7.5	7.4	7.5	7.4								
Approach Delay (s)	7.5	7.4	7.5	7.4								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay	7.5											
Level of Service	A											
Intersection Capacity Utilization	16.2%			ICU Level of Service			A					
Analysis Period (min)	30											

HCM Signalized Intersection Capacity Analysis

10: Tower St S & New Collector Road/Commerical Access

2049 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	20	214	74	20	141	229	1441	99	129	1377	344
Future Volume (vph)	321	20	214	74	20	141	229	1441	99	129	1377	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00	0.87		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1607		1770	1618		1770	3505		1770	3539	1583
Flt Permitted	0.60	1.00		0.49	1.00		0.07	1.00		0.07	1.00	1.00
Satd. Flow (perm)	1122	1607		919	1618		131	3505		138	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	321	20	214	74	20	141	229	1441	99	129	1377	344
RTOR Reduction (vph)	0	138	0	0	97	0	0	4	0	0	0	103
Lane Group Flow (vph)	321	96	0	74	64	0	229	1536	0	129	1377	241
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	35.7	35.7		35.7	35.7		70.0	59.2		61.7	53.9	53.9
Effective Green, g (s)	35.7	35.7		35.7	35.7		70.0	59.2		61.7	53.9	53.9
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.61	0.51		0.53	0.47	0.47
Clearance Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	346	495		283	499		264	1793		183	1648	737
v/s Ratio Prot		0.06			0.04		c0.10	0.44		0.05	0.39	
v/s Ratio Perm	c0.29			0.08			c0.43			0.33		0.15
v/c Ratio	0.93	0.19		0.26	0.13		0.87	0.86		0.70	0.84	0.33
Uniform Delay, d1	38.8	29.4		30.1	28.8		33.4	24.6		21.7	27.0	19.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.1	0.2		0.5	0.1		28.0	5.7		12.1	5.4	1.2
Delay (s)	75.8	29.6		30.6	28.9		61.4	30.3		33.8	32.4	20.7
Level of Service	E	C		C	C		E	C		C	C	C
Approach Delay (s)		56.3			29.4			34.3			30.3	
Approach LOS		E			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			35.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			115.7			Sum of lost time (s)				13.0		
Intersection Capacity Utilization			94.1%			ICU Level of Service				F		
Analysis Period (min)			30									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

13: Tower St S & Future E/W Collector

2049 Total Conditions
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	177	305	1535	273	404	1261
Future Volume (vph)	177	305	1535	273	404	1261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	3.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1770	1583	3539	1583	113	3539
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	177	305	1535	273	404	1261
RTOR Reduction (vph)	0	265	0	97	0	0
Lane Group Flow (vph)	177	40	1535	176	404	1261
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	15.6	15.6	63.2	63.2	92.1	92.1
Effective Green, g (s)	15.6	15.6	63.2	63.2	92.1	92.1
Actuated g/C Ratio	0.13	0.13	0.54	0.54	0.78	0.78
Clearance Time (s)	5.0	5.0	5.0	5.0	3.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	209	1900	850	453	2769
v/s Ratio Prot			0.43		c0.20	0.36
v/s Ratio Perm	c0.10	0.03		0.11	c0.50	
v/c Ratio	0.76	0.19	0.81	0.21	0.89	0.46
Uniform Delay, d1	49.2	45.4	22.3	14.2	36.7	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.7	0.5	3.9	0.6	22.0	0.5
Delay (s)	62.9	45.9	26.2	14.7	58.7	4.9
Level of Service	E	D	C	B	E	A
Approach Delay (s)	52.2		24.5			17.9
Approach LOS	D		C			B
Intersection Summary						
HCM 2000 Control Delay			25.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			117.7		Sum of lost time (s)	13.0
Intersection Capacity Utilization			86.3%		ICU Level of Service	E
Analysis Period (min)			30			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

14: Guelph St & McQueen Blvd Extension

2049 Total Conditions
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	315	87	80	325	20	151	96	57	20	38	20
Future Volume (Veh/h)	20	315	87	80	325	20	151	96	57	20	38	20
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	315	87	80	325	20	151	96	57	20	38	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh)	2			2								
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	345			402			922	904	358	955	937	335
vC1, stage 1 conf vol							398	398		495	495	
vC2, stage 2 conf vol							524	505		460	442	
vCu, unblocked vol	345			402			922	904	358	955	937	335
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			93			61	77	92	94	91	97
cM capacity (veh/h)	1214			1157			385	423	686	321	402	707
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	20	402	80	345	304	78						
Volume Left	20	0	80	0	151	20						
Volume Right	0	87	0	20	57	20						
cSH	1214	1700	1157	1700	433	421						
Volume to Capacity	0.02	0.24	0.07	0.20	0.70	0.19						
Queue Length 95th (m)	0.4	0.0	1.7	0.0	45.3	5.1						
Control Delay (s)	8.0	0.0	8.3	0.0	31.6	15.5						
Lane LOS	A		A		D	C						
Approach Delay (s)	0.4		1.6		31.6	15.5						
Approach LOS					D	C						
Intersection Summary												
Average Delay				9.5								
Intersection Capacity Utilization				59.8%	ICU Level of Service				B			
Analysis Period (min)				30								

HCM Signalized Intersection Capacity Analysis

15: Highway 6/Tower St S & 2nd Line

2049 Total Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	20	142	97	37	52	261	1525	140	34	1286	138
Future Volume (vph)	132	20	142	97	37	52	261	1525	140	34	1286	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1618		1770	1699		1770	3495		1770	3488	
Flt Permitted	0.68	1.00		0.51	1.00		0.10	1.00		0.10	1.00	
Satd. Flow (perm)	1258	1618		959	1699		177	3495		191	3488	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	132	20	142	97	37	52	261	1525	140	34	1286	138
RTOR Reduction (vph)	0	127	0	0	47	0	0	5	0	0	8	0
Lane Group Flow (vph)	132	35	0	97	42	0	261	1660	0	34	1416	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.6	8.7		15.0	8.4		52.1	46.5		41.6	39.0	
Effective Green, g (s)	15.6	8.7		15.0	8.4		52.1	46.5		41.6	39.0	
Actuated g/C Ratio	0.19	0.11		0.19	0.10		0.65	0.58		0.52	0.49	
Clearance Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	288	175		245	177		314	2021		149	1691	
v/s Ratio Prot	c0.04	0.02		0.03	0.02		c0.10	0.47		0.01	0.41	
v/s Ratio Perm	c0.05			0.04			c0.43			0.11		
v/c Ratio	0.46	0.20		0.40	0.24		0.83	0.82		0.23	0.84	
Uniform Delay, d1	28.2	32.7		28.2	33.1		20.0	13.6		12.2	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.6		1.1	0.7		18.3	4.0		0.8	5.3	
Delay (s)	29.4	33.3		29.2	33.8		38.3	17.6		13.0	23.2	
Level of Service	C	C		C	C		D	B		B	C	
Approach Delay (s)		31.5			31.4			20.4			23.0	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay	22.8			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	80.4			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	85.1%			ICU Level of Service			E					
Analysis Period (min)	30											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

16: Guelph St & 2nd Line

2049 Total Conditions

Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	85	20	20	91	270	20	20	20	148	20	25
Future Volume (Veh/h)	78	85	20	20	91	270	20	20	20	148	20	25
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	78	85	20	20	91	270	20	20	20	148	20	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			TWLTL								
Median storage veh	2											
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	361			105			552	652	95	547	527	226
vC1, stage 1 conf vol							251	251		266	266	
vC2, stage 2 conf vol							301	401		281	261	
vCu, unblocked vol	361			105			552	652	95	547	527	226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			96	96	98	74	96	97
cM capacity (veh/h)	1198			1486			532	479	962	562	560	813
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	183	381	60	193								
Volume Left	78	20	20	148								
Volume Right	20	270	20	25								
cSH	1198	1486	599	585								
Volume to Capacity	0.07	0.01	0.10	0.33								
Queue Length 95th (m)	1.6	0.3	2.5	11.1								
Control Delay (s)	3.8	0.5	11.7	14.2								
Lane LOS	A	A	B	B								
Approach Delay (s)	3.8	0.5	11.7	14.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay				5.3								
Intersection Capacity Utilization				59.9%	ICU Level of Service				B			
Analysis Period (min)				30								

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	18.9	10.5
Average Queue (m)	9.8	0.9
95th Queue (m)	17.2	5.7
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (m)	30.3	30.5	63.5	37.2	45.7	60.7	78.5	83.9	45.8	25.2	91.9	87.8
Average Queue (m)	12.6	4.8	30.1	18.6	16.4	24.6	39.3	43.9	7.4	10.3	54.0	47.4
95th Queue (m)	24.5	19.1	50.9	31.9	32.5	43.7	63.6	68.9	28.9	19.8	82.9	79.2
Link Distance (m)							268.2	268.2			363.6	363.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	50.0		50.0	30.0		50.0			30.0	75.0		
Storage Blk Time (%)	0		1	2	1	1	2	17			2	22
Queuing Penalty (veh)	0		1	3	1	4	4	9			2	6

Intersection: 7: Tower St S & McQueen Blvd

Movement	SB
Directions Served	R
Maximum Queue (m)	46.8
Average Queue (m)	7.2
95th Queue (m)	28.7
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	30.0
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.8	6.4
Average Queue (m)	7.1	0.4
95th Queue (m)	12.5	3.2
Link Distance (m)	382.5	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Future N/S Collector/McTavish Extension & Future E/W Collector

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.6	10.6	12.2	16.7
Average Queue (m)	5.1	6.4	8.5	7.7
95th Queue (m)	12.6	13.4	13.5	15.0
Link Distance (m)	709.6			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Tower St S & New Collector Road/Commerical Access

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	T	R
Maximum Queue (m)	42.8	29.0	18.5	17.9	24.8	58.8	63.8	19.7	61.0	62.5	20.3
Average Queue (m)	19.2	11.4	8.9	7.0	10.4	30.4	34.2	9.5	31.5	34.5	8.8
95th Queue (m)	33.5	22.9	18.0	15.4	20.4	52.8	56.6	17.6	52.9	56.3	18.6
Link Distance (m)	74.1				240.4		240.4	268.2		268.2	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	50.0	50.0		100.0		75.0				50.0	
Storage Blk Time (%)	0									1	
Queuing Penalty (veh)	0									2	

Intersection: 13: Tower St S & Future E/W Collector

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	44.7	47.5	69.0	66.8	23.2	36.1	53.2	63.7
Average Queue (m)	19.2	20.4	31.5	32.4	8.4	16.1	26.0	32.5
95th Queue (m)	34.0	36.7	53.0	56.3	18.4	28.7	49.5	55.3
Link Distance (m)		709.6	331.9	331.9			244.8	244.8
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0				75.0	100.0		
Storage Blk Time (%)	0	0		0				
Queuing Penalty (veh)	0	0		0				

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	L	LTR	LTR
Maximum Queue (m)	7.2	5.3	9.0	30.4	18.7
Average Queue (m)	0.7	0.3	2.4	13.6	8.1
95th Queue (m)	4.7	2.8	8.9	22.5	15.6
Link Distance (m)		118.4		1008.8	323.2
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	30.0		30.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	29.2	49.1	39.0	20.2	27.4	58.0	55.4	12.7	77.6	87.1
Average Queue (m)	12.3	23.9	18.0	7.7	13.1	27.7	23.2	3.5	43.2	48.4
95th Queue (m)	23.2	39.4	32.7	17.9	23.4	48.0	45.3	11.1	73.7	79.5
Link Distance (m)		659.7				372.6	372.6		331.9	331.9
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	50.0		30.0		100.0			100.0		
Storage Blk Time (%)		0	3	0						
Queuing Penalty (veh)		0	1	0						

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.1	6.6	9.3	28.9
Average Queue (m)	0.7	0.3	5.3	15.7
95th Queue (m)	4.7	3.0	12.0	24.5
Link Distance (m)	164.1	659.7	264.2	1008.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 34

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	18.7	8.8
Average Queue (m)	7.2	0.5
95th Queue (m)	15.7	4.3
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (m)	62.5	89.0	74.7	53.7	81.7	74.9	178.7	184.7	55.0	99.9	243.5	233.9
Average Queue (m)	18.5	25.4	44.4	30.9	33.2	65.5	95.0	94.2	30.7	61.5	136.8	133.8
95th Queue (m)	42.5	66.5	74.1	52.5	65.0	88.3	163.0	161.6	68.9	119.6	230.1	221.5
Link Distance (m)							268.2	268.2			363.6	363.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	50.0		50.0	30.0		50.0			30.0	75.0		
Storage Blk Time (%)	0	1	10	18	10	34	13	29	0	0	29	43
Queuing Penalty (veh)	0	3	16	24	14	223	46	56	1	2	62	40

Intersection: 7: Tower St S & McQueen Blvd

Movement	SB
Directions Served	R
Maximum Queue (m)	55.0
Average Queue (m)	22.2
95th Queue (m)	58.6
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	30.0
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	13.2	12.6
Average Queue (m)	5.8	1.0
95th Queue (m)	11.8	6.3
Link Distance (m)	382.5	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Future N/S Collector/McTavish Extension & Future E/W Collector

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	12.2	12.0	12.1	11.7
Average Queue (m)	6.6	7.4	7.7	5.9
95th Queue (m)	13.5	13.5	13.3	13.1
Link Distance (m)	709.6			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Tower St S & New Collector Road/Commerical Access

Movement	EB	EB	WB	WB	NB	NB	NB	B28	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	T	L	T	T	R
Maximum Queue (m)	73.8	78.9	18.9	21.8	124.8	160.2	160.1	3.5	99.6	158.6	184.2	75.0
Average Queue (m)	54.0	38.5	10.5	16.0	46.5	80.8	84.7	0.1	29.2	84.1	86.2	42.6
95th Queue (m)	79.7	77.5	21.1	22.4	91.7	149.0	151.6	2.5	72.1	149.8	159.9	89.0
Link Distance (m)	74.1				240.4		240.4	244.8	268.2		268.2	
Upstream Blk Time (%)	1	2	0								0	
Queuing Penalty (veh)	0	0	0								0	
Storage Bay Dist (m)	50.0	50.0		100.0						75.0	50.0	
Storage Blk Time (%)	19	1	0		0	4					12	19
Queuing Penalty (veh)	43	3	0		0	10					14	67

Intersection: 13: Tower St S & Future E/W Collector

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	74.8	106.1	197.5	199.4	100.0	121.7	118.9	100.1
Average Queue (m)	44.3	50.9	110.3	111.9	56.1	71.0	37.3	37.8
95th Queue (m)	74.6	90.9	179.4	185.0	122.5	117.7	96.9	86.6
Link Distance (m)		709.6	331.9	331.9			244.8	244.8
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0				75.0	100.0		
Storage Blk Time (%)	12	9		20		6		
Queuing Penalty (veh)	36	16		56		33		

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (m)	9.0	5.1	16.9	3.6	61.4	19.9
Average Queue (m)	0.6	0.2	6.3	0.1	27.9	8.1
95th Queue (m)	4.2	2.3	14.5	1.5	47.0	16.6
Link Distance (m)		118.4			1008.8	323.2
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	30.0		30.0			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	47.1	38.3	36.6	38.1	92.1	108.4	155.7	18.1	128.8	132.0
Average Queue (m)	21.0	19.1	15.6	14.5	40.0	55.8	60.5	7.1	70.4	77.0
95th Queue (m)	37.4	32.8	29.2	28.4	71.5	96.3	117.7	16.4	117.0	123.2
Link Distance (m)		659.7				372.6	372.6		331.9	331.9
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (m)	50.0		30.0		100.0			100.0		
Storage Blk Time (%)	0	0	1	1	0	1			2	
Queuing Penalty (veh)	0	0	1	1	0	1			1	

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	20.9	13.2	11.9	35.8
Average Queue (m)	6.0	1.1	6.0	16.1
95th Queue (m)	15.6	7.0	13.1	26.4
Link Distance (m)	164.1	659.7	264.2	1008.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 768

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	19.9	16.1
Average Queue (m)	10.6	2.2
95th Queue (m)	17.2	9.8
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (m)	26.6	36.4	63.6	43.0	45.5	70.4	103.0	102.4	55.0	51.4	103.7	96.1
Average Queue (m)	12.0	4.9	33.3	19.1	16.7	27.1	48.9	52.9	14.0	13.4	58.2	51.8
95th Queue (m)	23.4	21.2	54.5	34.7	33.2	53.4	82.4	85.2	46.0	34.3	94.7	87.6
Link Distance (m)							268.2	268.2			363.6	363.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	50.0		50.0	30.0		50.0			30.0	75.0		
Storage Blk Time (%)			2	2	1	1	7	25			4	23
Queuing Penalty (veh)			2	2	2	3	12	14			3	7

Intersection: 7: Tower St S & McQueen Blvd

Movement	SB
Directions Served	R
Maximum Queue (m)	54.9
Average Queue (m)	8.0
95th Queue (m)	30.8
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	30.0
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	17.5	7.5
Average Queue (m)	7.6	0.6
95th Queue (m)	13.8	4.2
Link Distance (m)	382.5	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Future N/S Collector/McTavish Extension & Future E/W Collector

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	14.9	13.2	18.0	14.6
Average Queue (m)	8.4	8.3	9.0	8.5
95th Queue (m)	14.9	13.4	14.8	14.2
Link Distance (m)	709.6			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Tower St S & New Collector Road/Commerical Access

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	T	R
Maximum Queue (m)	41.2	26.2	20.2	18.8	26.1	71.9	72.8	28.4	66.5	71.4	31.7
Average Queue (m)	19.5	11.1	9.1	8.7	10.7	36.3	39.0	10.9	32.4	36.1	8.7
95th Queue (m)	33.6	21.9	19.0	17.8	21.0	62.2	64.3	21.5	57.5	59.3	21.4
Link Distance (m)	74.1				240.4		240.4	268.2		268.2	
Upstream Blk Time (%)			0								
Queuing Penalty (veh)			0								
Storage Bay Dist (m)	50.0		50.0		100.0		75.0		50.0		
Storage Blk Time (%)	0		0						0		2
Queuing Penalty (veh)	0		0						0		2

Intersection: 13: Tower St S & Future E/W Collector

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	36.6	47.6	66.2	71.3	21.0	30.3	53.9	57.6
Average Queue (m)	18.6	20.9	33.5	36.2	8.3	15.4	26.6	32.0
95th Queue (m)	31.8	37.2	59.0	63.3	17.4	25.5	47.9	54.2
Link Distance (m)		709.6	331.9	331.9			244.8	244.8
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0				75.0	100.0		
Storage Blk Time (%)		0		0				
Queuing Penalty (veh)		0		0				

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (m)	8.5	2.7	9.0	1.2	29.4	17.9
Average Queue (m)	0.8	0.2	3.1	0.0	14.8	9.4
95th Queue (m)	5.2	2.1	10.0	0.8	24.2	16.1
Link Distance (m)		118.4			1008.8	323.2
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	30.0		30.0			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	39.6	61.1	37.9	19.6	28.4	59.5	58.9	14.5	99.4	103.4
Average Queue (m)	12.8	26.8	19.2	8.4	13.8	30.0	27.3	3.9	52.0	57.6
95th Queue (m)	27.2	48.6	32.9	17.8	24.1	50.4	47.4	11.8	88.0	93.7
Link Distance (m)		659.7				372.6	372.6		331.9	331.9
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	50.0		30.0		100.0			100.0		
Storage Blk Time (%)		1	2						0	
Queuing Penalty (veh)		1	1						0	

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.0	8.0	16.9	38.7
Average Queue (m)	1.0	0.5	8.0	17.7
95th Queue (m)	5.3	4.1	14.1	28.7
Link Distance (m)	164.1	659.7	264.2	1008.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 50

Intersection: 2: Scotland St & McQueen Blvd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	18.6	14.9
Average Queue (m)	8.4	1.8
95th Queue (m)	15.7	8.9
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Tower St S & McQueen Blvd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (m)	63.6	100.8	74.9	54.9	100.3	75.0	243.9	246.9	55.0	100.0	301.9	301.4
Average Queue (m)	21.0	30.1	48.4	36.3	45.1	71.5	153.5	152.8	36.7	77.8	200.0	193.6
95th Queue (m)	43.4	77.9	75.2	60.0	93.4	85.9	270.1	274.4	73.8	125.4	330.7	323.8
Link Distance (m)							268.2	268.2			363.6	363.6
Upstream Blk Time (%)							0	1			3	3
Queuing Penalty (veh)							4	6			0	0
Storage Bay Dist (m)	50.0		50.0	30.0		50.0			30.0	75.0		
Storage Blk Time (%)	0	1	14	33	9	53	17	34	0	3	38	49
Queuing Penalty (veh)	0	3	23	47	13	360	60	71	1	22	90	45

Intersection: 7: Tower St S & McQueen Blvd

Movement	SB
Directions Served	R
Maximum Queue (m)	55.0
Average Queue (m)	24.2
95th Queue (m)	62.8
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	30.0
Storage Blk Time (%)	0
Queuing Penalty (veh)	1

Intersection: 8: Jones Baseline/Scotland St & 2nd Line

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.3	11.7
Average Queue (m)	6.2	1.0
95th Queue (m)	12.3	6.5
Link Distance (m)	382.5	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Future N/S Collector/McTavish Extension & Future E/W Collector

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	16.2	16.1	13.5	13.3
Average Queue (m)	8.5	8.5	8.3	7.9
95th Queue (m)	14.3	14.1	13.4	13.7
Link Distance (m)	709.6			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Tower St S & New Collector Road/Commerical Access

Movement	EB	EB	WB	WB	NB	NB	NB	B28	B28	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	T	T	L	T	T
Maximum Queue (m)	73.7	79.6	18.9	24.9	124.6	222.4	221.3	55.9	54.7	99.9	172.8	173.3
Average Queue (m)	57.2	43.4	11.6	17.0	68.4	122.8	125.6	7.9	8.0	43.5	98.9	101.2
95th Queue (m)	79.8	84.4	22.4	23.8	133.8	231.2	231.4	69.1	69.9	100.7	164.7	167.9
Link Distance (m)		74.1				240.4	240.4	244.8	244.8		268.2	268.2
Upstream Blk Time (%)	3	5		0		3	3	0	0			
Queuing Penalty (veh)	0	0		0		27	30	0	0			
Storage Bay Dist (m)	50.0		50.0		100.0					75.0		
Storage Blk Time (%)	23	2		0	1	16				0	15	24
Queuing Penalty (veh)	54	7		0	9	37				0	20	82

Intersection: 10: Tower St S & New Collector Road/Commerical Access

Movement	SB
Directions Served	R
Maximum Queue (m)	75.0
Average Queue (m)	51.7
95th Queue (m)	97.5
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	50.0
Storage Blk Time (%)	0
Queuing Penalty (veh)	2

Intersection: 13: Tower St S & Future E/W Collector

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	74.8	148.0	197.1	212.0	100.0	123.2	129.3	101.9
Average Queue (m)	45.2	56.5	118.6	123.2	60.6	81.8	39.0	40.4
95th Queue (m)	77.5	115.2	189.3	200.0	128.0	124.3	90.9	84.2
Link Distance (m)		709.6	331.9	331.9			244.8	244.8
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0				75.0	100.0		
Storage Blk Time (%)	16	12		24		8	0	
Queuing Penalty (veh)	48	21		66		49	0	

Intersection: 14: Guelph St & McQueen Blvd Extension

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (m)	9.1	6.5	16.6	6.5	74.3	22.9
Average Queue (m)	2.1	0.5	5.9	0.3	33.7	10.9
95th Queue (m)	8.2	3.2	15.1	2.3	60.5	19.3
Link Distance (m)		118.4			1008.8	323.2
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	30.0		30.0			
Storage Blk Time (%)			0			
Queuing Penalty (veh)			0			

Intersection: 15: Highway 6/Tower St S & 2nd Line

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (m)	46.7	41.3	36.4	42.4	87.2	118.6	122.2	39.8	142.6	142.8
Average Queue (m)	23.0	21.2	16.3	16.3	43.0	66.0	72.4	8.2	83.8	89.9
95th Queue (m)	40.5	36.4	30.0	32.0	74.7	105.5	112.9	26.6	130.5	137.3
Link Distance (m)		659.7				372.6	372.6		331.9	331.9
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	50.0		30.0		100.0			100.0		
Storage Blk Time (%)	0	0	2	1		1			4	
Queuing Penalty (veh)	0	0	2	1		2			2	

Intersection: 16: Guelph St & 2nd Line

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	24.3	15.7	20.6	33.4
Average Queue (m)	7.3	2.2	8.3	17.1
95th Queue (m)	18.2	9.5	15.8	27.7
Link Distance (m)	164.1	659.7	264.2	1008.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1207

Appendix G: Roundabout Operations

Junctions 9									
ARCADY 9 - Roundabout Module									
Version: 9.5.1.7462 © Copyright TRL Limited, 2019									
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Filename: Highway 6 & 2nd Line.j9

Path: I:\2020 Projects\120157 - South Fergus MESP and Secondary Plan\Design\Transportation\ARCADY

Report generation date: 1/9/2023 9:43:18 AM

»2049 Total - 2049, AM

»2049 Total - 2049, PM

Summary of intersection performance

	AM									PM								
	Set ID	Q (Veh)	Q95 (Veh)	Delay (s)	V/C	LOS	Int Del (s)	Int LOS	Res Cap	Set ID	Q (Veh)	Q95 (Veh)	Delay (s)	V/C	LOS	Int Del (s)	Int LOS	Res Cap
2049 Total - 2049																		
1 - 2nd Line	D1	0.3	1.2	5.40	0.22	A	6.47	A	25 % [3 - 2nd Line]	D2	0.9	4.2	16.01	0.48	C	114.54	F	-14 % [4 - Highway 6]
2 - Highway 6		2.8	6.4	7.56	0.74	A					9.3	50.6	22.14	0.91	C			
3 - 2nd Line		0.9	3.8	9.76	0.48	A					1.1	4.8	12.63	0.53	B			
4 - Highway 6		1.3	1.7	4.27	0.56	A					129.7	200.0	209.30	1.13	F			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle. Int LOS and Int Del are demand-weighted Av.s. Res Cap indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

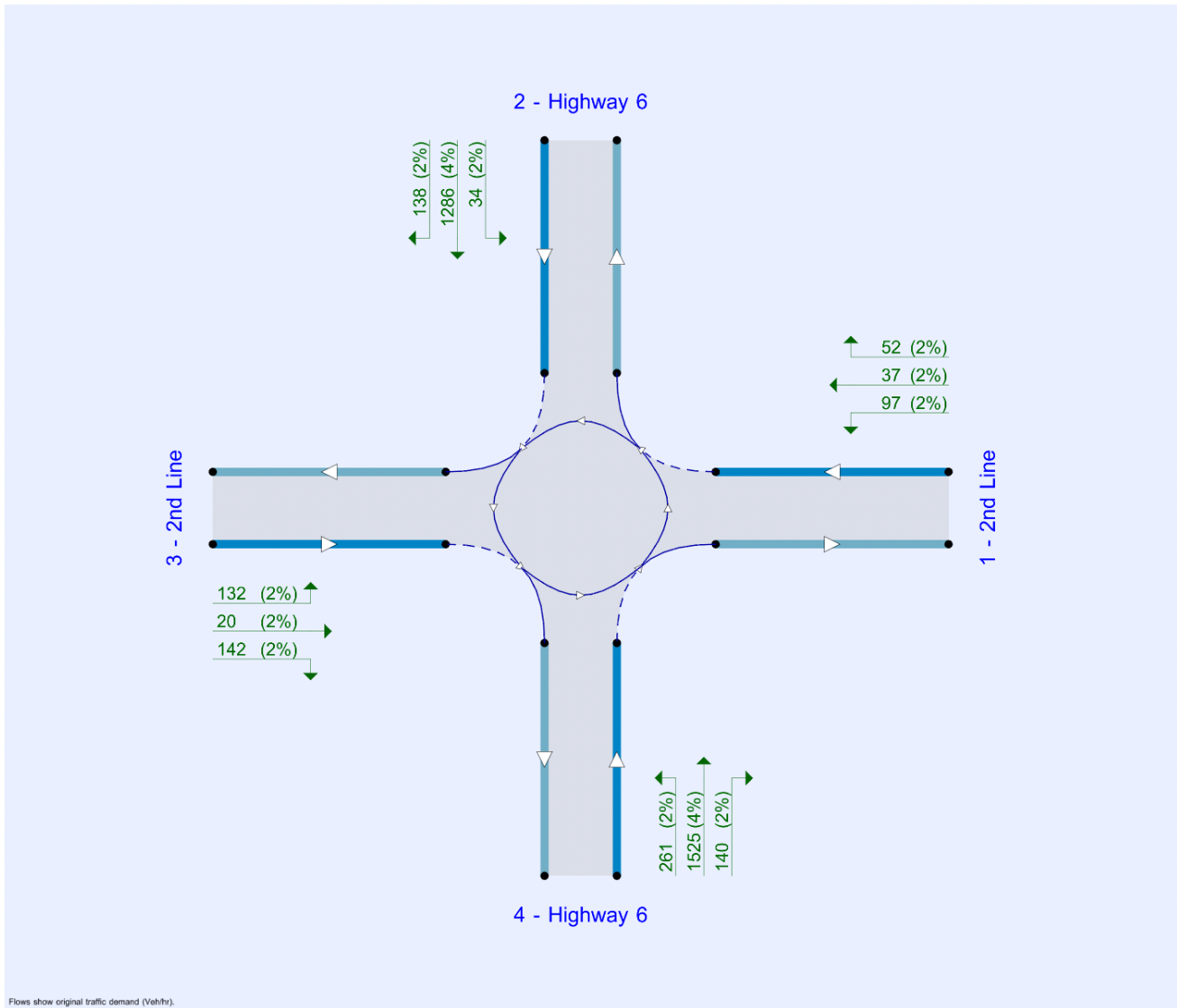
File summary

File Description

Title	South Fergus Secondary Plan
Location	
Site number	
Date	3/14/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	B-D9MT0B3\DPPerks
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin



The intersection diagram reflects the last run of Intersections.

Analysis Options

Vehicle length (m)	Calculate Q Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	V/C Threshold	Av. Delay threshold (s)	Q threshold (PCE)
5.75	✓		✓	Delay	0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Results for central hour only	Run automatically
D1	2049	AM	ONE HOUR	07:00	08:30	15	✓	✓
D2	2049	PM	ONE HOUR	16:00	17:30	15	✓	✓

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	2049 Total	✓	100.000	100.000

2049 Total - 2049, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Demand Sets	D1 - 2049, AM	Time results are shown for central hour only. (Model is run for a 90 minute period.)
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Int Del (s)	Int LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.47	A

Intersection Network Options

Driving side	Lighting	Res Cap (%)	First leg reaching threshold
Right	Normal/unknown	25	3 - 2nd Line

Legs

Legs

Leg	Name	Description
1	2nd Line	
2	Highway 6	
3	2nd Line	
4	Highway 6	

Roundabout Geometry

Leg	V (m)	E (m)	I' (m)	R (m)	D (m)	PHI (deg)	Exit only
1 - 2nd Line	3.00	5.00	30.0	20.0	60.0	15.0	
2 - Highway 6	3.50	8.00	30.0	20.0	60.0	15.0	
3 - 2nd Line	3.00	5.00	30.0	20.0	60.0	15.0	
4 - Highway 6	3.50	8.00	30.0	20.0	60.0	15.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - 2nd Line	0.533	1482
2 - Highway 6	0.637	2085
3 - 2nd Line	0.533	1482
4 - Highway 6	0.637	2085

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Results for central hour only	Run automatically
D1	2049	AM	ONE HOUR	07:00	08:30	15	✓	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck %s	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - 2nd Line		ONE HOUR	✓	166	100.000
2 - Highway 6		ONE HOUR	✓	1243	100.000
3 - 2nd Line		ONE HOUR	✓	309	100.000
4 - Highway 6		ONE HOUR	✓	987	100.000

Origin-Destination Data

Demand (Veh/hr)

	To				
		1 - 2nd Line	2 - Highway 6	3 - 2nd Line	4 - Highway 6
From	1 - 2nd Line	0	23	23	120
	2 - Highway 6	20	0	117	1106
	3 - 2nd Line	20	78	0	211
	4 - Highway 6	53	838	96	0

Vehicle Mix

Truck %s

	To				
		1 - 2nd Line	2 - Highway 6	3 - 2nd Line	4 - Highway 6
From	1 - 2nd Line	0	2	2	2
	2 - Highway 6	2	0	2	4
	3 - 2nd Line	2	2	0	2
	4 - Highway 6	2	4	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C	Max Delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - 2nd Line	0.22	5.40	0.3	1.2	A	166	166
2 - Highway 6	0.74	7.56	2.8	6.4	A	1243	1243
3 - 2nd Line	0.48	9.76	0.9	3.8	A	309	309
4 - Highway 6	0.56	4.27	1.3	1.7	A	987	987

Main Results for each time segment

07:15 - 07:30

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	149	37	909	961	0.155	149	83	0.1	0.2	4.435	A
2 - Highway 6	1117	279	215	1875	0.596	1115	843	1.0	1.5	4.730	A
3 - 2nd Line	278	69	1118	846	0.328	277	212	0.3	0.5	6.317	A
4 - Highway 6	887	222	106	1944	0.456	886	1290	0.6	0.8	3.399	A

07:30 - 07:45

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	183	46	1112	850	0.215	182	102	0.2	0.3	5.387	A
2 - Highway 6	1369	342	263	1844	0.742	1363	1032	1.5	2.8	7.398	A
3 - 2nd Line	340	85	1367	712	0.478	339	259	0.5	0.9	9.606	A
4 - Highway 6	1087	272	129	1930	0.563	1085	1576	0.8	1.3	4.254	A

07:45 - 08:00

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	183	46	1114	849	0.215	183	102	0.3	0.3	5.400	A
2 - Highway 6	1369	342	263	1844	0.742	1368	1034	2.8	2.8	7.559	A
3 - 2nd Line	340	85	1372	709	0.480	340	260	0.9	0.9	9.757	A
4 - Highway 6	1087	272	130	1929	0.563	1087	1582	1.3	1.3	4.273	A

08:00 - 08:15

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	149	37	912	959	0.156	150	84	0.3	0.2	4.451	A
2 - Highway 6	1117	279	215	1874	0.596	1123	846	2.8	1.5	4.826	A
3 - 2nd Line	278	69	1125	843	0.330	279	213	0.9	0.5	6.412	A
4 - Highway 6	887	222	107	1944	0.457	889	1298	1.3	0.8	3.420	A

Q Variation Results for each time segment

07:15 - 07:30

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.18	0.00	0.00	0.18	0.18			N/A	N/A
2 - Highway 6	1.46	0.05	0.49	3.67	5.66			N/A	N/A
3 - 2nd Line	0.48	0.00	0.00	0.48	0.48			N/A	N/A
4 - Highway 6	0.83	0.08	0.82	1.20	1.67			N/A	N/A

07:30 - 07:45

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.27	0.03	0.25	0.46	0.48			N/A	N/A
2 - Highway 6	2.79	0.03	0.28	2.79	6.43			N/A	N/A
3 - 2nd Line	0.90	0.03	0.26	0.90	0.90			N/A	N/A
4 - Highway 6	1.28	0.03	0.26	1.28	1.28			N/A	N/A

07:45 - 08:00

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.27	0.03	0.29	0.84	1.18			N/A	N/A
2 - Highway 6	2.83	0.03	0.27	2.83	2.83			N/A	N/A
3 - 2nd Line	0.91	0.03	0.29	1.19	3.82			N/A	N/A
4 - Highway 6	1.28	0.03	0.26	1.28	1.28			N/A	N/A

08:00 - 08:15

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.19	0.00	0.00	0.19	0.19			N/A	N/A
2 - Highway 6	1.50	0.08	1.05	3.12	4.32			N/A	N/A
3 - 2nd Line	0.50	0.05	0.46	1.28	1.39			N/A	N/A
4 - Highway 6	0.85	0.52	0.98	1.40	1.45			N/A	N/A

2049 Total - 2049, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Demand Sets	D2 - 2049, PM	Time results are shown for central hour only. (Model is run for a 90 minute period.)
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Int Del (s)	Int LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	114.54	F

Intersection Network Options

Driving side	Lighting	Res Cap (%)	First leg reaching threshold
Right	Normal/unknown	-14	4 - Highway 6

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Results for central hour only	Run automatically
D2	2049	PM	ONE HOUR	16:00	17:30	15	✓	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck %s	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - 2nd Line		ONE HOUR	✓	186	100.000
2 - Highway 6		ONE HOUR	✓	1458	100.000
3 - 2nd Line		ONE HOUR	✓	294	100.000
4 - Highway 6		ONE HOUR	✓	1926	100.000

Origin-Destination Data

Demand (Veh/hr)

	To				
		1 - 2nd Line	2 - Highway 6	3 - 2nd Line	4 - Highway 6
From	1 - 2nd Line	0	52	37	97
	2 - Highway 6	34	0	138	1286
	3 - 2nd Line	20	132	0	142
	4 - Highway 6	140	1525	261	0

Vehicle Mix

Truck %s

	To				
From		1 - 2nd Line	2 - Highway 6	3 - 2nd Line	4 - Highway 6
	1 - 2nd Line	0	2	2	2
	2 - Highway 6	2	0	2	4
	3 - 2nd Line	2	2	0	2
	4 - Highway 6	2	4	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C	Max Delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - 2nd Line	0.48	16.01	0.9	4.2	C	186	186
2 - Highway 6	0.91	22.14	9.3	50.6	C	1458	1458
3 - 2nd Line	0.53	12.63	1.1	4.8	B	294	294
4 - Highway 6	1.13	209.30	129.7	200.0	F	1926	1926

Main Results for each time segment

16:15 - 16:30

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	167	42	1705	530	0.315	166	173	0.3	0.5	9.873	A
2 - Highway 6	1311	328	352	1789	0.733	1306	1519	1.5	2.7	7.382	A
3 - 2nd Line	264	66	1269	764	0.346	264	389	0.3	0.5	7.179	A
4 - Highway 6	1731	433	167	1908	0.907	1711	1366	3.0	8.2	16.679	C

16:30 - 16:45

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	205	51	1880	435	0.471	203	195	0.5	0.9	15.409	C
2 - Highway 6	1605	401	400	1759	0.913	1582	1684	2.7	8.5	18.378	C
3 - 2nd Line	324	81	1538	618	0.523	322	444	0.5	1.1	12.040	B
4 - Highway 6	2121	530	203	1885	1.125	1872	1657	8.2	70.3	83.901	F

16:45 - 17:00

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	205	51	1891	429	0.477	205	196	0.9	0.9	16.008	C
2 - Highway 6	1605	401	403	1757	0.914	1602	1693	8.5	9.3	22.141	C
3 - 2nd Line	324	81	1557	608	0.532	324	447	1.1	1.1	12.629	B
4 - Highway 6	2121	530	205	1884	1.125	1883	1676	70.3	129.7	196.558	F

17:00 - 17:15

Leg	Total Demand (Veh/hr)	Intersection Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	V/C	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - 2nd Line	167	42	1874	438	0.382	168	187	0.9	0.6	13.385	B
2 - Highway 6	1311	328	378	1773	0.739	1336	1665	9.3	2.9	8.701	A
3 - 2nd Line	264	66	1297	749	0.353	267	416	1.1	0.6	7.498	A
4 - Highway 6	1731	433	169	1907	0.908	1892	1395	129.7	89.5	209.297	F

Q Variation Results for each time segment

16:15 - 16:30

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.45	0.00	0.00	0.45	0.45			N/A	N/A
2 - Highway 6	2.66	0.05	0.47	7.40	12.45			N/A	N/A
3 - 2nd Line	0.52	0.06	0.59	1.32	1.41			N/A	N/A
4 - Highway 6	8.17	0.11	2.84	22.03	32.00			N/A	N/A

16:30 - 16:45

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.86	0.03	0.26	0.86	0.86			N/A	N/A
2 - Highway 6	8.45	0.05	0.46	23.76	44.60			N/A	N/A
3 - 2nd Line	1.07	0.03	0.26	1.07	1.07			N/A	N/A
4 - Highway 6	70.27	29.51	65.77	108.91	123.80			N/A	N/A

16:45 - 17:00

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.89	0.03	0.30	1.04	4.18			N/A	N/A
2 - Highway 6	9.31	0.04	0.35	18.71	50.60			N/A	N/A
3 - 2nd Line	1.11	0.03	0.29	1.37	4.77			N/A	N/A
4 - Highway 6	129.71	>199	>199	>199	>199			N/A	N/A

17:00 - 17:15

Leg	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - 2nd Line	0.63	0.10	0.84	1.37	1.43			N/A	N/A
2 - Highway 6	2.93	0.04	0.45	8.15	14.14			N/A	N/A
3 - 2nd Line	0.55	0.06	0.60	1.32	1.41			N/A	N/A
4 - Highway 6	89.53	54.58	87.03	119.75	130.29			N/A	N/A